APPENDIX J

Comment Letters

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MOJAVE DESERT air quality management district

Mojave Desert Air Quality Management District
14306 Park Avenue, Victorville, CA 92392-2310
760.245.1661 • fax 760.245.2699
Visit our web site: http://www.mdaqmd.ca.gov
Eldon Heaston, Executive Director

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2012 JUN -6 PM 4:57

CALIF. DESERT DISTRICT
MORENO VALLEY, CA

June 4, 2012

Bureau of Land Management
Jeff Childers, Project Manager
22835 Calle San Juan De Los Lagos
Moreno Valley, CA 92553

Re: Draft Plan Amendment and Environmental Impact Statement for the McCoy Solar Energy Project

Dear Mr. Childers,

The Mojave Desert Air Quality Management District (District) has reviewed the Draft Plan Amendment and Environmental Impact Statement for the McCoy Solar Energy Project. This project proposes to construct, operate, maintain and decommission an up-to-750 megawatt (MW) photovoltaic (PV) solar energy generating facility and related infrastructure in unincorporated Riverside County, CA (McCoy Solar Energy Project). The majority of the project would be developed on Bureau of Land Management (BLM) administered land with approximately 477 acres of privately owned land included in the proposed solar plant site boundary. The project would generate and deliver solar-generated power to the California electrical grid through an interconnection at the Colorado River Substation owned by Southern California

The District concurs with the Applicant Proposed Measures and Management Practices, AIR-1 and AIR-2. 1-1 Please note that the District requires fugitive dust best management practices (including but not limited to applicable provisions of District Rule 403.2) be implemented in the grading and construction phases of the project. 1-2

Thank you for the opportunity to review this notice of preparation. If you have any questions regarding this letter, please contact me at (760) 245-1661 or Tracy Walters at ext. 6122.

Sincerely,

Alan J. De Salvio
Supervising Air Quality Engineer

AJD/tw McCoy Solar PA EIS.doc

Comment Letter 2

From: Richard Dean [mailto:rdean2733@gmail.com]
Sent: Saturday, June 09, 2012 10:04 PM
To: BLM_CA_McCoySolorEnergyPlant
Subject: Our Support for the solar unit construction North of Blythe, Calfiornia

Dear Mr. Childers:

This email is just a short note of support for the McCoy Solar Project Northwest of Blythe, California. During the next 5 to 10 years hopefully, many other such plants will be built in the Southwest of the United States. If enough alternative energy can be secured from projects such as this, the Southwest would need far less hydroelectric power from the Colorado River Basin allowing the dams along the Colorado River to keep the water behind the dams for drinking and irrigation purposes.

To reduce the impact of these projects along the Colorado River it is nice to note that many of them are proposed near existing transmission lines to get the power into the grid and to where the power is needed, especially, in the large cities of the Southwest United States.

Keep up the great effort and the good work toward more renewable power. 2-1

Sincerely,

The Dean Family
64079 Dolomites Court
Desert Hot Springs, CA 92240

Comment Letter 3

Department of Toxic Substances Control

Matthew Rodriquez
Secretary for
Environmental Protection

Deborah O. Raphael, Director
5796 Corporate Avenue
Cypress, California 90630

Edmund G. Brown Jr.
Governor

RECEIVED
BUREAU OF LAND MGMT.
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2012 JUN 28 PM 2:08
CALIF. DESERT DISTRICT
MORENO VALLEY, CA

June 26, 2012

Mr. Jeffery Childers
Bureau of Land Management, Desert District Office
22835 Calle San Juan de Los Lagos
Moreno Valley, California 92553

DRAFT PLAN AMENDMENT AND ENVIRONMENTAL IMPACT STATEMENT FOR MCCOY SOLAR ENERGY PROJECT (SCH# 2012054002)

Dear Mr. Childers:

The Department of Toxic Substances Control (DTSC) has received your submitted Notice of Preparation Report for the above-mentioned project. The following project description is stated in your document: "McCoy Solar LLC, a subsidiary of NextEra Energy Resources LLC (Applicant), proposes to construct, operate, maintain, and decommission an up-to-750 megawatt (MW) photovoltaic (PV) solar energy generating facility and related infrastructure in unincorporated Riverside County, California, to be known as the McCoy Solar Energy Project (MSEP or Project). The majority of the MSEP would be developed on public land administered by the Bureau of Land Management (BLM). Approximately 477 acres of privately owned land would be included in the proposed solar plant site boundary. The Project would generate and deliver solar-generated power to the California electrical grid through an interconnection at the Colorado River Substation (CRS) owned by Southern California Edison (SCE)".

Based on the review of the submitted document DTSC has the following comments:

1) The EIS should evaluate whether conditions within the project area may pose a threat to human health or the environment. Following are the databases of some of the regulatory agencies: 3-1

   - National Priorities List (NPL): A list maintained by the United States Environmental Protection Agency (U.S.EPA).

- Envirostor (formerly CalSites): A Database primarily used by the California Department of Toxic Substances Control, accessible through DTSC's website (see below).
- Resource Conservation and Recovery Information System (RCRIS): A database of RCRA facilities that is maintained by U.S. EPA.
- Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS): A database of CERCLA sites that is maintained by U.S.EPA.
- Solid Waste Information System (SWIS): A database provided by the California Integrated Waste Management Board which consists of both open as well as closed and inactive solid waste disposal facilities and transfer stations. 3-1 cont.
- GeoTracker: A List that is maintained by Regional Water Quality Control Boards.
- Local Counties and Cities maintain lists for hazardous substances cleanup sites and leaking underground storage tanks.
- The United States Army Corps of Engineers, 911 Wilshire Boulevard, Los Angeles, California, 90017, (213) 452-3908, maintains a list of Formerly Used Defense Sites (FUDS).

2) The EIS should identify the mechanism to initiate any required investigation and/or remediation for any site that may be contaminated, and the government agency to provide appropriate regulatory oversight. If necessary, DTSC would require an oversight agreement in order to review such documents. 3-2

3) Any environmental investigations, sampling and/or remediation for a site should be conducted under a Workplan approved and overseen by a regulatory agency that has jurisdiction to oversee hazardous substance cleanup. The findings of any investigations, including any Phase I or II Environmental Site Assessment Investigations should be summarized in the document. All sampling results in which hazardous substances were found above regulatory standards should be clearly summarized in a table. All closure, certification or remediation approval reports by regulatory agencies should be included in the EIS. 3-3

4) If buildings, other structures, asphalt or concrete-paved surface areas are being planned to be demolished, an investigation should also be conducted for the presence of other hazardous chemicals, mercury, and asbestos containing materials (ACMs). If other hazardous chemicals, lead-based paints (LPB) or 3-4

products, mercury or ACMs are identified, proper precautions should be taken during demolition activities. Additionally, the contaminants should be remediated in compliance with California environmental regulations and policies. 3-4 cont.

5) Future project construction may require soil excavation or filling in certain areas. Sampling may be required. If soil is contaminated, it must be properly disposed and not simply placed in another location onsite. Land Disposal Restrictions (LDRs) may be applicable to such soils. Also, if the project proposes to import soil to backfill the areas excavated, sampling should be conducted to ensure that the imported soil is free of contamination. 3-5

6) Human health and the environment of sensitive receptors should be protected during any construction or demolition activities. If necessary, a health risk assessment overseen and approved by the appropriate government agency should be conducted by a qualified health risk assessor to determine if there are, have been, or will be, any releases of hazardous materials that may pose a risk to human health or the environment. 3-6

7) If it is determined that hazardous wastes are, or will be, generated by the proposed operations, the wastes must be managed in accordance with the California Hazardous Waste Control Law (California Health and Safety Code, Division 20, Chapter 6.5) and the Hazardous Waste Control Regulations (California Code of Regulations, Title 22, Division 4.5). If it is determined that hazardous wastes will be generated, the facility should also obtain a United States Environmental Protection Agency Identification Number by contacting (800) 618-6942. Certain hazardous waste treatment processes or hazardous materials, handling, storage or uses may require authorization from the local Certified Unified Program Agency (CUPA). Information about the requirement for authorization can be obtained by contacting your local CUPA. 3-7

8) Hazardous substances would be present on the Project site during construction (e.g., fuels and lubricants, wastes from demolition and remediation, paints and solvents). If released, these substances could pose risks to human health and the environment. For example, demolition wastes containing volatile or fluid hazardous wastes, such as PCB-containing oils or residual fuels from abandoned storage tanks, should be contained and packaged in accordance with regulatory requirements and regularly transported to appropriate disposal facilities. 3-8

9) DTSC can provide cleanup oversight through an Environmental Oversight Agreement (EOA) for government agencies that are not responsible parties, or a Voluntary Cleanup Agreement (VCA) for private parties. For additional information on the EOA or VCA, please see www.dtsc.ca.gov/SiteCleanup/Brownfields, or contact Ms. Maryam Tasnif-Abbasi, DTSC's Voluntary Cleanup Coordinator, at (714) 484-5489. 3-9

If you have any questions regarding this letter, please contact me at ashami@dtsc.ca.gov, or by phone at (714) 484-5472.

Sincerely,

Al Shami
Project Manager
Brownfields and Environmental Restoration Program

cc: Governor's Office of Planning and Research
State Clearinghouse
P.O. Box 3044
Sacramento, California 95812-3044
state.clearinghouse@opr.ca.gov

CEQA Tracking Center
Department of Toxic Substances Control
Office of Environmental Planning and Analysis
P.O. Box 806
Sacramento, California 95812
nritter@dtsc.ca.gov

CEQA # 3562

PALO VERDE IRRIGATION DISTRICT

180 W. 14TH AVENUE - BLYTHE, CALIFORNIA 92225-2714
TELEPHONE (760) 922-3144 - FAX (760) 922-8294

June 26, 2012

Attn: Jeffrey Childers, Project Manager
McCoy Solar Energy Project
BLM, California Desert District Office
22835 Calle San Juan De Los Lagos
Moreno Valley, CA 92553

RECEIVED
BUREAU OF LAND MGMT.
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2012 JUN 28 PM 2:00
CALIF. DESERT DISTRICT
MORENO VALLEY, CA

Re: McCoy Solar Energy Project, Draft Plan Amendment & EIS

Dear Mr. Childers:

Thank you for sending us the McCoy Solar Energy Project CD. PVID has the following comments:

1. In both Water Resource sections between Volumes 1 and 2, there is some confusion as to where the boundary between the Palo Verde Mesa Groundwater Basin (PVMGB) and Palo Verde Valley Groundwater Basin (PVVGB) lies. In Volume 1, the PVMGB was generally described as being west of the valley flood plain with the boundary between the two at the east toe of the mesa. The Palo Verde Valley was described as the entire floodplain west of the Colorado River in California. In Volume 2, Appendix G, the Palo Verde Valley was defined as being comprised of both the Mesa and the floodplain with the boundary between the two groundwater basins lying near the middle of the floodplain generally parallel with the Colorado River. Prior to this report, most locals and report writers considered the Valley to be the same as the flood plain, the mesa to be the higher ground west of the valley, and the valley between the McCoy Mountains and the Big Maria Mountains as being McCoy Wash's drainage area. In reading the different areas of the report, this distinction is interchanged. Based on Palo Verde Irrigation District's (PVID) groundwater data, consisting of reading monthly depth to groundwater in 269 observation wells on the floodplain and monthly water surface elevations on 190 gages in gravity drains in the floodplain, there are three groundwater basins: 1] Between the Colorado River and the first canal, ground water flows back to the river; 2] between the first canal west of the River and the drains along the toe of the mesa, ground water flows into our valley drainage system and eventually back to the River; and 3] under the mesa west of the drains along the toe of the mesa, ground water could flow east into the valley or west from the drain to under the mesa. 4-1

Ground on the valley flood plain naturally slopes downhill from the River at about 1.5 feet per mile to the southwest. In the 1960's, PVID deepened the valley drains south of Hobsonway dropping the groundwater under the floodplain an additional 5 feet. The valley average depth to groundwater went from 5 feet to 10 feet below the ground surface as a result of that project. As a result of that Project, there is a drop of almost 2.5 feet in the drain water level between the north and south sides of the siphon in Rannells Drain under Hodsonway. This drop would affect the ground water under the mesa to the north west of the siphon that the modelers should account for. 4-2

2. Groundwater under the mesa is being recharged naturally by rain or by deep percolation of irrigation water pumped onto the mesa from PVID's canals at 3 locations. For groundwater modeling, the Mesa groundwater basin boundary with the Valley floodplain groundwater basin should be established along the toe of the mesa. At this boundary, the groundwater for the valley either flows west from the irrigated land to the nearest agricultural drain or into the cone of depression for a mesa well. Groundwater under the mesa either flows into a well's cone of depression or east of the mesa into a valley drain. Water in the Colorado River over 6 miles east of the mesa does not reach the mesa groundwater basin due to PVID's drains intercepting any River water flowing west toward the mesa (if there is). 4-3

   Modeling efforts should address the problem of how much groundwater to pump from under the property without the groundwater dropping below the accounting surface proposed by the United States Bureau of Reclamation (USBR). In Riverside County's report for their EIR for this Project, they indicated the groundwater at the southeast corner of the Project was at an elevation of 254 feet AMSL. In 1994, the USBR's accounting surface at that site was at elevation 252 feet AMSL. That's only a 2 foot difference. If it drops below the proposed accounting surface elevation, then pumper will need to contact the USBR or Colorado River Board in Glendale, Ca. 4-4

3. Volume 1, Table 3.20-4 on page 3.20-5: Underflow from Colorado River should be zero since PVID's drains prevent that underflow from occurring. 4-5 Irrigation Return flow is under estimated. In 2010, water users on the mesa pumped 15,501 acre feet of water for 1,882 water toll acres of crops in PVID on the mesa from PVID's canals at 3 locations. PVID does not know the acreage irrigated or volume pumped from groundwater by wells on the mesa. Water not used by the crops deep percolated into the mesa groundwater to help fill the various cones of depressions existing around various wells under the mesa. 4-6

4. Vol. 1, Tables 3.20-4 and 3.20-5: Why doesn't the Recharge from precipitation in Table 3.20-4 match one of the Infiltration values in Table 3.20-5? Aren't they the same thing? 4-7 The loss of rain to evaporation needs to be accounted for. Generally, a rain event of over an inch in 1 hour and raining for several hours is needed for runoff to reach the valley floor in many of the dry desert washes. This value is not a firm 4-8

number since many factors determine if runoff will occur. The amount of rain for each event needs to be used to determine runoff not the total annual rainfall. Please keep in mind that during rain events, any water falling on the mesa that doesn't infiltrate runs into the Valley causing damages and either infiltrates to the valley groundwater, flows into a PVID canal, or flows into a PVID drain. In a normal year, PVID doesn't have to deal with the difference 102,878 acft less 216 acft or 102,662 acft so the runoff and infiltration estimates are not of the right magnitude. 4-8 cont.

5. Vol.1, page 3.20-7, Subsurface Inflow: No direct subsurface inflow from the Colorado River to the Mesa groundwater basin occurs. Deep percolation of irrigation water applied to control salinity may intercept a cone of depression for a mesa well and then flows under the mesa into the mesa ground water basin. Or, water in a PVID drain is pulled into a cone of depression for a mesa well causing underflow under the mesa. However, no water flows directly from the Colorado River past our series of drains to reach the mesa groundwater. This was confirmed by a Bureau of Reclamation Study in 1986. 4-9 The comment "stable groundwater levels" ignores the drastic drops in mesa groundwater at the jojoba well sites during the early 1980's. Only now are their cones of depressions being filled by natural recharge and by the excess irrigation water being applied to control salinity buildup in the mesa crop lands from water pumped from PVID's canals. 4-10 When the mesa groundwater is restored to a natural condition, the mesa ground water table will be higher than the water level in the drain system along the toe of the mesa so groundwater will flow into the drains. The 1,244 acft of inflow from the Valley Groundwater Basin is questionable. It would be valley groundwater flowing into cones of depressions for wells along the easterly edge of the mesa which should gradually decrease as the cone of depressions fill unless the well is pumping that water out. 4-11
6. Vol. 1, p. 3.20-7, Groundwater Irrigation...: At the end of the paragraph, this 6,600 AFY is low. It is the typical groundwater demand 'from wells on the mesa' not 'in the PVID'. The domestic use by people in Mesa Verde and else-where on the mesa was not estimated. Irrigation efficiency determines how much water is needed to be pumped. 4-12 Crop demand determines how much water crop will use. The difference between the two is deep percolated back into the groundwater and not lost. So the net groundwater loss is only that amount used by crop and tied up in the soil.
7. Vol. 1, p. 3.20-7, Irrigation Return Flow: Estimated value of 760 acft is low. In 2010, water users on the mesa pumped 15,501 acft from 3 canals into their mesa irrigation system and storage ponds. This was used on 1,882 water toll acres. 4-13 Generally, a 40 water toll acre citrus field in the valley would represent 39 cropped acres. So this water was used on about 1,835 cropped acres. Thus the total use from valley and wells was 15,501+6,600 =22,101 acft not the 7,600 acft shown in the text. The leaching requirement for the water being applied to the mesa crops is around

15% for canal water and 20% for mesa well water to keep the crops from being damaged by salinity. Based on the Irrigation Demand section preceding this section, a 7.9 acft/ac water use value at 75% efficiency would provide an average crop need of 5.92 acft/ac. For the 1835+461+370 = 2,666 acres, they would need 2,666*5.92= 15,783 acft of water. The difference, 22,101-15,783= 6,318 acre feet of water being deep percolated to the mesa groundwater. This value is over 8 times more than the value in the text of 760 acft. 4-13 cont.

8. Vol. 1, p. 3.20-8, Groundwater Budget: Table 3.20-4 should be revised based on my prior comments. The Colorado River underflow is not the primary mechanism for recharge. Deep percolation of irrigation water applied to control salinity levels in the crop's root zone is. Recharge from the valley groundwater basin occurs where cone of depressions from mesa wells intercept the valley groundwater or drains. 4-14
9. Vol. 1, p. 3.20-9, bedrock: Parker Valley is more than 3 miles to the northeast. 4-15
10. Vol. 1, p. 3.20-9, last paragraph: The phrase 'groundwater "turns" (in response to the influence from the Colorado River)' is distorted. The low area along the toe of the mesa controls more than the River. Groundwater under the mesa is flowing into the valley and entering the drain along the toe of the mesa. The bedrock extension of the McCoy Mountains and the water surface in the drain controls the flow more than the Colorado River that is about 8 miles due east of the drain. On June 8, 2010 the water surface in the River at the I10 bridge was at an elevation of 251.83 ft. asl while in Rannells Drain along toe of mesa due west 8 miles from the River, it was 246.23 feet asl, a drop of .7 ft per mile. 4-16
11. Vol. 1, p. 3.20-10, Historic Groundwater...: See Comment 10. Due to limited groundwater data for mesa wells, a distorted position is reported. I believe that since the 1980's, after the jojoba program failed, over application of canal water to mesa crops to control salinity levels in the crop's root zone has almost filled the numerous cones of depressions under the mesa to get the picture we have now. For the mesa groundwater table to stabilize at current levels, natural recharge plus deep percolation of irrigation water and underflow from the Valley groundwater basin equals the water pumped from under the mesa thru the various wells. It has nothing to do with recharge from the River. 4-17
12. Vol. 1, p.3.20-12, Groundwater Quality: Generally, the water quality in groundwater under the mesa is better the longer it has been subject to being recharged by irrigation water pumped from the valley canals. 4-18
13. Vol. 1, p. 3.20-14, section 3.20.1.3: Surface water on the mesa drains into the Valley floodplain flooding fields, canals and drains not the River. The River is 6 miles or more farther east and its banks about 9 feet higher than the farmland at the toe of the mesa. For the 1976 flood from McCoy Wash, the flow of 4,000 cfs was only for an hour after water started flowing in the wash. The peak flow was 15,750 cfs about 3.5 hours after flow started. Water ran for about 12 hours into the valley. 4-19

This was a 1 in 17 year event with 2.11 inches of rain falling over the watershed in a 24 hour period. 4-19 cont.

14. Vol. 1, p. 3.20-15, Stormwater flows and Table 3.20-9 p. 3.20-16: I searched both volumes trying to find 'what storm intensity and for how long' was used in your calculations and could not find it. What values were used from what source? 4-20
15. Vol.1, p. 3.20-17, Table3.20-10: I'm not sure what this table is needed for. PVID has about 161.65 miles of drains and 244.23 miles of canals on the valley floodplain with road crossing at many section corners. I don't know why these are classified as "surface water sites". Generally: the water level in the canals is at least 2 feet above the adjacent farmland; and the water level in the drains at least 8 feet below adjacent farmland. The canals provide irrigation water to the crops, they do not collect irrigation runoff from the farmlands. The drains collect groundwater and a very small amount of irrigation runoff water from adjacent farmlands. The main drainage system collects ground water from under the farmland in the flood plain and carries it southwesterly thru the valley and back to the River about 17.6 miles south of the townsite of Palo Verde. For all 15 sites in Table 3.20-10, the longitude needs either a minus sign or a 'W'. Items 5 thru 8 have titles indicating they are from somewhere else, not this area. The latitude and longitude of Items 5 thru 7 are on the mesa west of the valley along the Bradshaw Trail but I have never seen any water flowing from the ground at those sites. 4-21
16. Vol. 2, Figure 3.20-1 and Figure 3a on p. G-28: It shows the Mesa Groundwater Basin extending easterly into the west half of the valley floodplain. The correct boundary between the valley floodplain and the mesa should be the east toe of the mesa or the center of the drain along the east toe of mesa. 4-22
17. Vol. 2, p.G-14 part 2.2: the correct name for USGS is 'U. S. Geological Survey'. 4-23

Sincerely,

Roger Henning

Roger Henning
Chief Engineer

The Transportation Department has reviewed the EIS and provides the following comments.

Prior to the approval of the Project, the Transportation Department would require the Project proponent to perform and provide an analysis of the pavement structure for roadways to be utilized by construction traffic. If the analysis determined the pavement would not provide sufficient load bearing capacity for the construction traffic, the Transportation Department would require the Project proponent to provide road improvements, as specified by the Director of Transportation. 5-1 The Transportation Department would further require that the Project proponent restore all public roads, easements, and rights-of-way that may be damaged due to Project-related construction activities to original or near-original condition in a timely manner. 5-2

The Transportation Department would require the Project proponent to provide evidence of primary and secondary access. Secondary onsite and offsite access would be required to provide fire protection and emergency medical response to all development areas. It is not clear how secondary access is provided to the Project. The location of the secondary access would require the concurrence and approval of both the Transportation Department and the Fire Department, and would be required to be maintained throughout any Project phasing. 5-3

The EIS did not include a copy of the full traffic study with appendices. Without the traffic study, the Transportation Department is not able to verify that the data presented in the EIS is accurate or determine whether the statements of insignificance are substantiated. A copy of the full traffic study should be provided in the EIS. 5-4

If the Project encroaches upon or utilizes County road rights-of-way, the Transportation Department would require the Project proponent to obtain an encroachment permit and enter into a franchise agreement. The franchise agreement would need to be consistent with Board Policy No. B-29. 5-5

Additional to the comments above, the following comments are offered for Section 4.17 of the EIS.

4.17-3	The text indicates the haul trucks will utilize dedicated truck routes with each jurisdiction. Please provide an exhibit to illustrate these dedicated truck routes.	5-6
	No justification or supporting documentation is provided for the use of the 1.3 percent growth rate.	5-7
4.17-4	Provide the quantitative analysis to substantiate the statements found in the last paragraph of Page 4.17-4 and first paragraph of Page 4.17-5?	5-8
4.17-5	Provide intersection and queuing analyses which substantiates the statements found in the first paragraph.	5-9
4.17-12	Mitigation measures should be expanded to include permits, pavement integrity and management, video monitoring for queuing at freeway ramps, and adequate emergency access.	5-10

Basin and Range Watch

August 20th, 2012

Jeff Childers; Project Manager, BLM California Desert District Office, 22835 Calle San Juan de Los Lagos, Moreno Valley, CA 92553

camccoysep@blm.gov

Dear Mr. Childers,

We would like to submit these comments for the Draft Environmental Impact Statement for the McCoy Solar Energy Project (CACA 48728)

Basin and Range Watch is a group of volunteers who live in the deserts of Nevada and California, working to stop the destruction of our desert homeland. Industrial renewable energy companies are seeking to develop millions of acres of unspoiled habitat in our region. Our goal is to identify the problems of energy sprawl and find solutions that will preserve our natural ecosystems and open spaces. We have visited the McCoy Solar Energy project site and are concerned about the direct and cumulative impacts that the project would have on the region.

Purpose and Need Statement:

6-1

The Purpose and Need Statements in many BLM large scale renewable project EIS documents reflect a need to develop so many megawatts on so many acres of public lands. All alternatives

are now defined by a Need reflecting the recent Secretarial Order 3283: Enhancing Renewable Energy Development on Public Lands.

The goals of Section 4 in Secretarial Order 3283 clearly state a need for environmental responsibility: *"the permitting of **environmentally responsible** wind, solar, biomass, and geothermal operations and electrical transmission facilities on the public lands;*

The McCoy Solar Energy Project in its proposed location would be inconsistent with the Best Management Practices concerning the National Environmental Policy Act, the Endangered Species Act, and the Federal Lands Management Policy Act, etc and should not be considered "environmentally responsible". 6-1 cont.

The BLM's Purpose and Need statement in the DEIS quotes FLPMA (section 10 (c)) and claims that *"public lands are to be managed for multiple use that takes into account the long term needs of future generations for renewable and non-renewable resources."* The McCoy Solar Energy site would take up over 7 square miles. Public land access would be extremely limited and other land use would be impaired. It would be impossible to manage these lands for multiple use when so much of the land is sacrificed for just one use. Mandates to use renewable energy can be compensated in the distributed generation alternative we have provided in these multiple use philosophy, the BLM should provide a sound, environmentally friendly alternative. 6-2 6-3

We would like to request that the Purpose and Need statement be rewritten to include mandates to protect sensitive biological, hydrological, cultural and visual resources. We would also like the statement to include a mandate to maintain access to public lands as well as preserve in the California Desert Conservation Area. 6-4

Part of the justification for the Purpose and Need is the goal to approve 10,000 MW capacity on public lands. This goal seems to have been met. The BLM has already suggested this:

"Paragraph 1.2.1.2 cites section 211 of the Energy Policy Act of 2005. It directs the Secretary of the Interior to approve non-hydropower renewable energy projects of at least 10,000 MW by 2015 (ten years after passage of the EPAct of 2005). The approved capacity, according to data taken on June 28, 2012 from the undated BLM website http://www.blm.gov/wo/st/en/prog/energy/renewable_energy/Renewable_Energy_Projects_Approved_to_Date.html approved capacity for these categories of renewable energy is 8,437 MW. At the current high rate of approval, the total will certainly exceed 10,000 MW by 2015, 2½ years from now. This Section does not qualify as a purpose and need for this activity."

There is no need to create more environmental conflicts if we have met this goal. 6-5

Alternatives:

A full range of alternatives should be considered in every EIS document. That is required by NEPA. This seems to be one of the biggest problems with most of them.
Following the guidelines of the National Environmental Policy Act, the final EIS should present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decision maker and the public. In this section agencies shall:

(a) Rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated.

(b) Devote substantial treatment to each alternative considered in detail including the proposed action so that reviewers may evaluate their comparative merits.

(c) **Include reasonable alternatives not within the jurisdiction of the lead agency.**

(d) Include the alternative of no action.

(e) Identify the agency's preferred alternative or alternatives, if one or more exists, in the draft statement and identify such alternative in the final statement unless another law prohibits the expression of such a preference.

(f) Include appropriate mitigation measures not already included in the proposed action or alternatives.

We would like to request that the BLM consider the following alternatives for the McCoy Solar Energy Project:

Brownfields and Degraded Lands Alternative:

The US Environmental Protection Agency has identified over 1.5 million acres of brownfields in the United States that would be suitable for utility scale solar development. See here:

http://www.epa.gov/oswercpa/

http://www.wvbrownfields.org/conferences/2010/presentations/Evans%20Paul%20-%20Jobs.pdf

The Arizona BLM is reviewing the "The Restoration Design Energy Project" http://www.blm.gov/az/st/en/prog/energy/arra_solar.html (RDEP), funded by the American Recovery and Reinvestment Act of 2009, which supports the Secretary of Interior's goals to build America's new energy future and to protect and restore treasured landscapes. The following statement is made:

6-6

"Emphasis will be on lands that are previously disturbed, developed, or where the effects on sensitive resources would be minimized. The BLM intends to use the results of the EIS to amend its land use plans across Arizona to identity areas that are considered to be most suitable for renewable energy projects.

While these amendments will only apply to BLM-managed lands, the EIS will examine all lands in Arizona and serve as a resource to the public, policy makers, and energy planners."

6-6 cont.

Palo Verde Mesa Solar Project Alternative: The Renewable Resources Group has an application with Riverside County to construct a 486 megawatt solar photovoltaic facility on 3,400 acres of land that is mostly degraded. There would be no issues with biological or cultural resources.

It is filed with the Riverside County Clerk as Environmental Impact Report No. 532, Conditional Use Permit No. 3684, Public Use Permit No. 916.

The applicant is looking for someone to build this project. Because BLM is required to consider alternatives outside of the jurisdiction of the lead agency under NEPA, we would like to request that this be considered as an alternative to protect resources on public lands.

6-7

Distributed Generation Alternative: Distributed generation in the built environment should be given much more full analysis, as it is a completely viable alternative. This project will need just as much dispatchable baseload behind it, and also does not have storage. But environmental costs are negligible with distributed generation, compared with this project. Distributed generation cannot be "done overnight," but neither can large transmission lines across hundreds of miles from remote central station plants to load centers. Most importantly, distributed generation will not reduce the natural carbon-storing ability of healthy desert ecosystems, will not disturb biological soil crusts, and will not degrade and fragment habitats of protected, sensitive, and rare species.

Alternatives should be looked at that are in load centers, not closest to the project site. There is a need to consider the "macro" picture, the entire state, to look at maximum efficiency.
A master comprehensive plan should exist before large expensive inefficient solar plants are sited and built out in the wildlands. This plan should carefully analyze the recreational and biodiversity resources on public lands. A list of assumptions should be included detailing the plan for integrating various fuels mixes and technologies into each utility's plan, an overall state plan, and a national plan. Loads should be carefully analyzed to determine whether additional capacity is needed for peaking, intermediate, or baseload purposes. Unit size, which impacts capital and operating costs and unit capacity factors, has a direct bearing on the relative economics of one technology over another. A plan might recommend that smaller units built in cities and spaced in time offer a less risky solution than one large unit built immediately.

Right now there is no utility plan, no state plan, and no national plan. Large-scale central station energy projects have been sited very far from load centers out in remote deserts, with the only criterion being nearness to existing transmission lines and natural gas lines. Very little thought

6-8

has been given to the richness of biological resources, the cumulative impacts on visual scenery to tourists, the proximity to ratepayers, or the level of disturbance of the site.

There will be a need to build many new efficient natural gas peaker or baseload plants to back up the renewable projects planned. Instead, the renewables should be distributed generation in load centers, which will provide much more efficiency, rather than inefficient remote central station plants that reduce biodiversity and require expensive transmission lines. This reduces the risk, as distributed generation is a known technology and has been proven in countries like Germany where incentive programs have been tested. Incentive programs can be designed in an intelligent manner to vastly increase distributed generation. Incentives for large remote projects are unproven to lower risk and may actually raise debt levels with runaway costs associated with poor sighting and higher-than-anticipated operating and maintenance costs. Many renewable project developers have failed to consider reasonable or viable alternatives that could serve as solutions that everybody could live with. In the case of this particular project, conflicts with endangered species, cultural resources, storm water drainage erosion, viewscapes from National Parks and wilderness areas could all be avoided with a distributed generation alternative. 6-8 cont.

Alternatives under the Desert Renewable Energy Conservation Plan: Several alternatives are now under review for the Desert Renewable Energy Conservation Plan. Among these alternatives are No Action designations for specific areas in the California Desert. The McCoy Solar Project Site should be considered for one of the DRECP conservation alternatives. 6-9

Basin and Range Watch Preferred Alternative: We would like to request a No Action Alternative that designates conservation status to the area and makes it inappropriate for large scale energy development. 6-10

Affected Environment/Environmental Consequences:

Air Quality:

Construction activity will go on for 2 to 3 years and will degrade air quality resources. 6-11

The DEIS will need to analyze the health impacts that airborne particulates from construction dust will have on the local residents of the area. Coccidioidomycosis (Valley Fever) is a common issue that impacts desert communities when dust is stirred up.

Removal of stabilized soils and biological soil crust creates a destructive cycle of airborne particulates and erosion. As more stabilized soils are removed, blowing particulates from recently eroded areas act as abrasive catalysts that erode the remaining crusts thus resulting in more airborne particulates. 6-12

The DEIS should analyze the cumulative impacts on air quality that will result from the removal so much stabilized soil and biological soil crust.

We are concerned that industrial construction in the region will compromise the air quality to the point where not only visual resources, but public health will be impacted. 6-13

We are also concerned that Next Era will have no choice but to use more water in an already over-drafted aquifer to control the large disturbance they intend to create. 6-14

Construction should not be permitted during days of high winds. Wind speeds of 10 MPH and higher should be determining factors that limit construction. Construction should also be limited during the hottest months of the year. Evaporation rates will be greatest during the months of June, July and August. 6-15

It is unfortunate that local communities are getting almost no benefit from these large, recently approved industrial developments. 6-16

The following three photos show that there is a consistent failure of large solar and wind project developers to control and mitigate the dust emissions that have resulted from the large disturbances caused by recently approved high profile renewable energy projects. In spite of the fact that all of these developers have promised that dust emissions would not be an issue, we are finding that they are falling short of their mitigation requirements. 6-17

Ocotillo Wind Express Project, May 2012

^Dust storm from the Genesis Solar Energy Project, April, 2012. Naturally occurring dust from Ford Dry Lake was combined with newly disturbed surface soils from project construction.

6-17 cont.

Desert Sunlight Project near Desert Center, California. These dust storms were reported to be rare before the construction of the project began.

Ivanpah Solar Electric Generating System, October, 2010

6-17 cont.

Flash Floods:

Some of the recently approved large energy projects on public lands have experienced damage from large flood events.

Below are photos of three projects which experienced damage from flash floods. Each one of these projects was “Fast Tracked” or “Prioritized” for approval by the Interior Department. Mitigation and planning has been deferred for many of the issues that came up. These large energy projects are being built in poorly chosen locations. While these flood events are referred to as 100 Year Floods by the applicants, it is obvious that these events take place more commonly than every 100 years. Projects that span 5 square miles may sustain flood damage on a yearly basis on different parts of the site. The McCoy Solar Project will be no exception. It has significant alluvial drainages throughout the project site especially on the west side.

These three projects received significant flood damage in less than one year under construction. It makes us wonder how wise it really is to build a project in an unstable alluvial flood zone when the goal is for that project to last three decades.

6-18

^Ivanpah Solar Electric Generating System: desert tortoise exclusion fence removed by floods. July, 2011

6-18 cont.

^Flooded wind turbine construction site; Ocotillo Wind Express project Site, June 2011

Unknown leftover foam from a chemical dust suppressant was spread everywhere when the Ocotillo Wind Express project site flooded in June, 2012

^The biggest flood took place at NextEra's Genesis Project on July 31st, 2012. The close proximity to a dry lake and alluvial fans make this project location one of the poorest choices to site a large solar project.

6-18 cont.

^Genesis Solar Project flood, July 31st, 2012

^Genesis Solar Project flood, July, 2012

6-18 cont.

Desert Pavement:

Desert pavements are found on alluvial fans and piedmonts below mountains in the Mojave and Sonoran Deserts. Stones over fine sediments may form a weak pavement, in the case of granitic stones at the Imperial Valley Solar Project site which decompose and weather more quickly, or if derived from volcanic or limestone sources, may be densely packed, inter-locking, and resistant. Wind-blown silts and sands collect in between and below the gravel pavement. Varnish usually colors the rock surfaces exposed to air a darker color, and can be useful for aging the pavement. Varnish is the result of surface evaporation of various salts on the rock, building up a crust.

Dr. Boris Poff, hydrologist at Mojave National Preserve at the time, gave testimony at the Calico Solar Project evidentiary hearing held by the California Energy Commission on August 5, 2010. The rock surface of desert pavements stabilizes fine sediments underneath, and may potentially increase rainwater infiltration. When they are disturbed, desert pavements lose this function and surface run-off increases, as does erosion and downhill sedimentation.

Many desert pavements are extremely old, taking thousands of years to develop. North of the Calico project site in San Bernardino County, a desert pavement has been dated at 7,000 years old. There can be three feet of deep sand under the rocky cap that takes millennia to build up.

Small mining roads through desert pavements have yet to recover from this disturbance.

6-19

The National Resource Conservation Service has started a soil mapping program at Mojave National Preserve, and they have found that desert pavements have not been adequately analyzed and categorized. Much of the data is out-dated. 6-19 cont.

Conversely, other desert pavements may be younger and hide archaeological treasures. At the Calico Solar Project workshop held August 12, 2010, we learned from archaeologist Dr. David Whitley, that one cannot assume that subsurface archaeological materials are absent just because a desert pavement covers the ground. "This is a myth," he told the applicant, Tessera Solar. He explained that recently scientists have learned that some desert pavements can form quickly, and ceramics have been found underneath them.
http://www.energy.ca.gov/sitingcases/calicosolar/documents/2010-08-05_Transcript.pdf

How will the removal of thousands of acres of desert pavement affect the flood potential of the region? How will this alter the local hydrology? Will existing groundwater aquifers see less recharge? Will new locations that catch water be created? How will this impact wildlife and populations of phreatophytes that depend on flood water drainage? 6-19 cont.

Socio Economics/Environmental Justice and Private Property:

While this project will be promoted as an economic win/win for everybody, nothing could be further from the truth. When you take a look at the labor crews that have been hired to work on recent federally approved solar and wind projects, it becomes obvious in many cases, that the workers are not local residents. This is because the developers make deals with Unions from larger cities. It does not seem to matter if the locals are qualified because the labor deal was made somewhere else. 6-20

After about three years of construction, an industrial photovoltaic solar project will only create about 10 to 15 full time jobs.

Large, subsidized energy projects tend to create a boom and bust effect on small communities.

Visual Resources:

This project would be built adjacent to outstanding conservation areas and the impact to visual resources will degrade the visitor experience. The project would be placed next to the Palen-McCoy Wilderness Area and the Big Maria Mountains Wilderness Area. It would also be visible from McCoy Wash which contains some of the oldest microphyll habitat in the region. 6-21

The BLM should require more KOP simulations that depict all of the visual impact scenarios. All of the most potentially visible angles of light and time of day should be considered to depict the worst case scenario. 6-22

The following BLM required factors to be considered:

(2) Angle of Observation. The apparent size of a project is directly related to the angle between the viewer's line-of-sight and the slope upon which the project is to take place. As this angle nears 90 degrees (vertical and horizontal), the maximum area is viewable.
(3) Length of Time the Project Is In View. If the viewer has only a brief glimpse of the project, the contrast may not be of great concern. If, however, the project is subject to view for along period, as from an overlook, the contrast may be very significant.
(4) Relative Size or Scale. The contrast created by the project is directly related to its size and scale as compared to the surroundings in which it is place. 6-22 cont.

The 4,700 acre size of the project is large and will have the potential to impact different VRM zones of different classes. Some of the public lands on the Palo Verde Mesa are considered a Class One Visual Resource Management Zones. These areas include the Palen-McCoy Wilderness Area and the Big Maria Mountains Wilderness Area. BLM defines the objective of this class *"to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention".* 6-23

The 4,700 acre size of the project is large and will have the potential to impact different VRM zones of different classes. Some regional public lands adjacent to the project site are considered to have Class One VRM standards. BLM defines the objective of this class *"to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention".*

All impacts should be evaluated from VRM Class One Standards due to the large visual cumulative impacts. 6-24

The following Key Observation Point simulations should be included in the Visual Resources Analysis: 6-25

1. Simulations from McCoy Wash. The old- growth microphyll has both ecological and scenic value.
2. Two more simulations from the Palen-McCoy Wilderness Area. These should be from higher elevations. Often, KOP simulations do not include higher elevation view points.
3. Simulations from the Big Maria Mountains Wilderness Area
4. Simulations of dust plumes and potential dust blackout events from construction activity.
5. Two simulations from the Big Maria Mountains Wilderness Area
6. Two dark sky simulations of construction lighting and security lighting.

Biological Resources:

The Biological Resource surveys in Appendix C are well done and detailed, although we have a few additions. We have observed a Long-eared owl in Palo verde-Ironwood stands within a few miles of the project site to the east, so it is probable this species uses the project site for foraging. 6-26 We have observed scat and a road-killed Burro deer along highway 95 to the east of of Palo Verde Mesa and beleive this deer probably regularly crosses the site and forages in vegetated areas. 6-27

Kit fox have been found on the project site. Since a canine distemper outbreak has occurred during construction on the nearby Genesis Solar Energy Project in Chuckwalla Valley, the applicant should develop a regional Kit Fox Monitoring Plan to be able to detect and prevent the spread of disease in the local kit fox population. The applicant should monitor kit foxes in cooperation with California Department of Fish and Game and develop procedures in case kit fox mortality occurs. Hazing techniques should be reviewed and modified to not cause stress to the foxes during relocation from dens during construction, and coyote urine should not be used at all until it is tested for disease. 6-28

Yuma mountain lion potential scat was found in the western translocation area. This rare Colorado Desert subspecies of mountain lion should be monitored for any direct or indirect impacts from project construction in its habitat. 6-29

A CNDDB record of a Gila monster in the northern McCoy Mountains indicates that Gila monsters may be present in the project area. The applicant should develop a Gila Monster Relocation Plan if any lizards are excavated during construction or encountered aboveground during rain events, as 6-30

Gila monster can overheat and die if mishandled in hot weather.

Bio-4 (p. 4.3-3) - Desert tortoise compensation lands should be acquired within the NECO area and as close to the McCoy Solar Energy Project as feasible to preserve similar genetic stock. 6-31

The DEIS suffers from deferred mitigation in many cases. A Weed Management Plan should be prepared now for public review, and not deferred until after project approval. Sahara mustard was found in the project area and this highly invasive weed could potentially encroach on newly disturbed areas of roads and solar panel scraped areas. How will weed invasion be avoided? Will vehicle tires be washed? Will herbicides be used? The public needs to be able to comment on these topics. This is most important for the sand dunes habitat in which Mojave fringe-toed lizards are found. How will invasive weeds be controlled here so as not to reduce habitat for this species? 6-32

A more thorough dust control plan needs to be devised before approval. 6-33

The applicant needs to prepare a Restoration Plan for vegetation now during public review and not defer this until later. 6-34

Especially egregious is the following on page 4.3-21: "**VEG-7: Biological Resources Mitigation Implementation and Monitoring Plan.**

The Applicant shall develop a BRMIMP, and shall submit two copies of the proposed BRMIMP to the BLM AO for review and approval." The applicant needs to develop this important plan now during the public review process, and not after approval. The importance of public review of such broad mitigation measures should not be neglected. 6-34 cont.

On page 4.3-9 table 4.3-1 claims only 1.5 acres of Desert dry wash woodland of Blue palo verde and Ironwood would be impacted by the project. We did a site visit to the McCoy project proposal in June 2012 and observed more Desert dry wash woodland than that number indicates. We estimate more than 100 acres is present. Also, we observed many acres of Creosote-Big galleta grass community on the solar project itself, not just on the gen-tie line route alternatives. 6-35

For rare plant mitigation, techniques for transplanting and reseeding desert species have not been proven to be effective, and the diversity and abundance of rare plants on the project site leads us to recommend avoidance of the area instead of large-scale disturbance which will degrade and fragment this botanical resource hotspot. 6-36

Compensatory mitigation for rare plants should identify areas with the same species diversity as the project site for acquisition before approval of the project instead of later. Habitat enhancements should not be prioritized over actual land acquisition, as these are not proven by studies.

We do not believe contributing to a Special status plant distribution study qualifies as proper mitigation for the wholesale destruction of rare plants and habitats. Applicants should not be able to simply contribute funds to organizations or research institutes for studies, as so much is unknown about present rare plant distribution that will likely be forever destroyed by large-scale renewable energy projects already. The emphasis should be on conserving desert ecosystems intact and in situ. Clearing, grubbing, and grading of rare plant habitat cannot be mitigated, and this project should not be approved because of the high diversity of rare plants on the site. 6-37

A Desert Tortoise Translocation Plan should be prepared now during review, and not deferred until after project approval. 6-38

Speed limits for construction-related activities should be 20 mph, not 25 mph. In areas with Mojave fringe-toed lizard the speed limit should be 10 mph to avoid road mortality, and a biological monitor should escort traffic through habitat areas. 6-39

A Raven Management Plan should be developed now and not deferred. 6-40

An Avian Protection Plan should be developed now and not deferred until after project approval. 6-41

On page 4.4-37 a Kit fox and badger hazing program is described and the potential use of coyote urine and blocking of dens is mentioned. These stressful activities to relocate kit foxes may have possibly resulted in immune system deficiency and canine distemper outbreaks on the Genesis Solar Energy Project in Chuckwalla Valley adjacent to the Palo Verde Mesa. How will the applicant monitor for canine distemper during construction activities? A regional kit fox monitoring plan should be developed before approval to make sure kit foxes are free of this contagious disease. 6-42

On page 4.4-24 the analysis for the Mojave fringe-toed lizard states that 59.7 % of all habitat in the study area could be impacted by the cumulative build-out of proposed projects:

"The analysis of cumulative Project effects to Mojave fringe-toed lizard habitat focused on known and CNDDB-documented populations within the Chuckwalla Valley and Palo Verde Valley. In these areas, populations are dependent upon areas with fine aeolian sand that occur in association with dunes, margins of dry lakes and washes, and isolated sand patches. The cumulative effects analysis identified approximately 1,098 acres of occupied Mojave fringe-toed lizard habitat in the study area, of which approximately 655 acres (59.7 percent) occurs in areas where future projects are proposed (Table 4.4-3). Under Alternatives 1 and 3, approximately 46 acres of habitat would be disturbed for the gen-tie line and associated access road. This represents approximately 4.2 percent of available Mojave fringe-toed lizard habitat that was identified in the cumulative study area and represents a contribution of 7 percent of the total cumulative effect on this resource. The implementation of Mitigation Measures VEG-7, VEG-8, VEG-10, VEG-11, VEG-12, and WIL-10 would minimize impacts to sensitive suitable compensatory habitat for habitat losses." 6-43

This is unacceptable. The coarse genetics of the broad populations of the Mojave fringe-toed lizard have been described, but many areas need finer analysis of genetic diversity. Cryptic species may be present in the study area, similar to the Amargosa population which was identified as genetically unique during more fine-grained analysis, and recommended for protection under the federal Endangered Species Act by Center for Biological Diversity. (See R.W. Murphy, T.L. Tre´panier, D.J. Morafka, 2006. Conservation genetics, evolution and distinct population segments of the Mojave fringe-toed lizard, Uma scoparia. Journal of Arid Environments 67: 226–247) There could be similar cryptic species or distinct population segments worthy of protection on the project site associated features. More genetic studies of a fine-grained nature should be carried out before approval of this project, to identify any genetic diversity that may need special mitigation and protection.

The DEIS discusses mitigation of habitat loss for the MFTL, and estimates that the cumulative foreseen projects in the Chuckwalla Valley-Palo Verde Mesa region will destroy 655 acres of the 1,098 acres of MFTL habitat. Then only 443 acres of habitat would remain. BLM asks the applicants to compensate habitat at a 3:1 ratio. The Genesis Solar Energy Project provided 3:1 compensation, and other projects will most likely be asked to as well. At 3:1 ratio, cumulative projects would have to provide 1,965 acres of compensation land. But not enough undisturbed

habitat exists in the DEIS analysis area to purchase or enhance. Therefore we recommend not disturbing any habitat where MFTL are present or potential, to avoid serious loss of population density for this species. 6-43 cont.

If the applicant chooses to pay in lieu fees as authorized under California Department of Fish and Game codes, any compensation lands should be within the Eastern Colorado Desert Recovery Unit for Desert tortoises and not in distant areas. 6-44

Cultural Resources:

Geoglyphs and intaglios are present scattered in the stony natural desert pavement, forming a continuum of past cultural legacies with present living traditions. Local tribes and residents consider these rock alignments and geometric patterns in the stony ground to be sacred, connecting the present with the past, and they are actively cared for. In spite of the fact that these sites are still actively used by people, the Bureau of Land Management has basically determined that these sites are not significant enough to be avoided by developers. So far, two of these sites have been damaged or completely destroyed by the first development of the Blythe Solar Energy Project. 6-45

^One of these geoglyphs on the McCoy Project Site is known as the El Tosco geoglyph

Conclusion: Several more environmentally friendlier alternatives exist to the proposed location for the McCoy Solar Energy Project. Approval of the McCoy Project will contribute to the cumulative larger picture scenario of replacing public lands in the California Deserts with solar energy sprawl. Specifically, the Palo Verde Mesa is threatened by several of these projects. 6-46 6-47

We support a No Action Alternative that designates the area inappropriate for utility scale solar energy. 6-48

Thank you,

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From: Jared Fuller [mailto:jgillenfuller@yahoo.com]
Sent: Tuesday, August 14, 2012 7:05 PM
To: BLM_CA_McCoySolorEnergyPlant
Subject: McCoy solar project Draft EIS comment

The McCoy solar project would highly impact vegetation, wildlife, soils, and visual resources. 7-1
The cumulative impact on these resources would be even greater because of the development's 7-2
location next to the Blythe solar project and other possible solar projects. Because of these 7-3
impacts, a no project alternative or reduced acreage alternative should be selected.
At minimum, in the interest of preserving biodiversity, the final version of the project should exclude nearly all areas occupied by two of the more sensitive plants on the site -- Las Animas colubrina and Harwood's milk vetch. This could be done by either requiring avoidance of these areas or preferably, by deletion of these and adjacent buffering areas from the project boundaries. 7-4
The mitigation measures listed in 'Veg-10' which include land acquisition or habitat enhancement/restoration may not prove to adequately compensate for population losses resulting from the project, especially without mandatory requirements for successful propagation of new populations. By excluding these areas, impacts to other vegetation and to wildlife including desert tortoise and burrowing owl could be reduced. Also, the western route option of 7-5
'Alternative 3' is preferable because of its avoidance of sensitive plants.

Thank you.

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BLC File(s): 1190.24

21 August 2012

Jeffrey Childers, Project Manager
BLM California Desert District Office
22835 Calle San Juan de Los Lagos
Moreno Valley, CA 92553

Re: McCoy Solar Project Draft Environmental Impact Statement

Dear Mr. Childers:

These comments are submitted on behalf of CAlifornians for Renewable Energy ("CARE") and La Cuna de Aztlan Sacred Sites Protection Circle Advisory Committee ("La Cuna") regarding the draft Plan Amendment/Environmental Impact Statement ("EIS") for the McCoy Solar Energy Project. These comments supplement any other comments that may have been submitted by my clients or members of my clients. CARE and La Cuna share many of the concerns already submitted for your consideration by others. Concerns that have already been brought to the agency's attention will not necessarily be repeated here.

In light of our society's dependence on fossil fuels, coupled with the threat of global warming, we recognize the long-term importance of renewable energy development to sustaining the human existence and fully support the emission reduction goals set forth in the Global Warming Solutions Act of 2006. That being said, thorough review under the National Environmental Policy Act ("NEPA") is critical in determining whether a fair balance between renewable energy development and preservation of the environment, including cultural and other resources can be achieved in allowing a large scale solar power project move forward at the current site slated for construction. Such projects can be sustainable only if they conform to the strictest environmental standards, considering local impacts, and subsequent harm on species and habitat. The following comments are submitted with the goal of promoting the balance between developing renewable energy and the protection of environmental and cultural resources.

A. The National Environmental Quality Act

The National Environmental Policy Act ("NEPA") requires that Federal agencies prepare a detailed statement on the environmental impacts of any proposed Federal action that significantly affects the quality of the human environment to the fullest extent possible. 42 U.S.C. § 4332©. This detailed statement is required in every recommendation or report on proposals for legislation and "other major Federal actions significantly affecting the quality of the human environment." *Id.* It must discuss the environmental impact of the proposed action, any adverse environmental effects which cannot be avoided should the proposal be implemented, alternatives to the proposed action, the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented. 40 U.S.C. § 4332(2)(C)(I)-(v).

1. The Purpose and Need Statements Are Too Narrowly Construed

An agency "cannot define its objectives in unreasonably narrow terms." *City of Carmel-by-the-Sea v. U.S. Dept. of Transportation*, 123 F.3d 1142 (9th Cir. 1997). The statement of purpose and alternatives are closely linked since "the stated goal of a project necessarily dictates the range of 'reasonable' alternatives." *Id.* BLM has based its purpose and need sections on an unduly restrictive reading of applicable statutes and orders.

BLM states that the purpose and need for the Proposed Action is to respond to a FLPMA ROW application submitted by the Applicant. However, this only focuses on the applicant's purpose and need and not the agency's. Such a narrow description of the purpose and needs unduly restricts the alternatives analysis. Furthermore, none of the referenced policies is as narrowly tailored as requiring the siting of a utility-scale solar energy development on public lands. Executive Order 13212 calls for energy-related projects to be expedited, while maintaining safety, public health, and environmental protections. Ex. PN 1. The Energy Policy Act of 2005 encourages the Secretary of Interior to approve non-hydropower renewable energy projects on public lands with a generation capacity of at least 10,000 megawatts of electricity. Ex. PN 2. Secretarial Order 3285A1 calls for the identification and prioritization of specific locations in the United States best suited for large-scale production of solar, wind, geothermal, incremental or small hydroelectric power on existing structures, and biomass energy (*e.g.* renewable energy zones). Ex. PN 3. 8-1

2. The EIS Fails to Look at a Reasonable Range of Alternatives

NEPA requires that an EIS contain a discussion of the "alternatives to the proposed action." 42 U.S.C. §§ 4332(2)(C)(iii) & (E). The discussion of alternatives is at "the heart" of the NEPA process and is intended to provide a "clear basis for choice among options by the decisionmaker and

the public." 40 C.F.R. § 1502.14. An agency must look at all reasonable alternatives. *Native Ecosystems Council v. U.S. Forest Serv.*, 428 F.3d 1233 (9th Cir. 2005).

Renewable Distributed Generation

Although a DG alternative may be outside BLM's jurisdiction, the alternatives analysis is not limited to an agency's jurisdiction. *See* 40 C.F.R. § 1502.14©. Distributed rooftop photovoltaics ("PV") have a much less significant environmental impact than utility-scale concentrated solar. As recognized by the National Renewable Energy Lab, distributed PV has benefits such as low land use and no transmission. Ex. A1. The National Renewable Energy Lab has further recognized that DG sources such as rooftop PV and small wind turbines have substantial potential to provide electricity with little impact on land, air pollution, or CO_2 emissions. *Id.*

If the goal is 10,000 MW of electricity by 2015 as articulated under the Energy Policy Act of 2005, distributed solar can meet that goal. On page 193 of the California Energy Commission Integrated Energy Policy Report (December 2009), it states that a 2007 estimate from the Energy Commission suggests that there is roof space for over 60,000 MW of PV capacity. Ex. A2. *See also* Exs. A3 & A4. In other words, California alone has the capacity to meet the goals of providing well over 10,000 MW of electricity through distributed generation.

8-2

California has taken great strides in promoting renewable DG with Governor Schwarzenegger's Million Solar Roofs program and the legislation that followed. Exs. A5-A15. California has also gone a long way in not only implementing legislation, but actually getting a smart-grid system into operation. Exs. A18-A22. Altogether, a renewable DG alternative would encourage cooperation between states and the federal government to implement a comprehensive renewable-energy strategy.

Furthermore, the federal government has undergone a number of projects to promote distributed PV, demonstrating that a DG alternative is a reasonable alternative. For example, photovoltaics have been installed on rooftops of federal correctional facilities, military bases, and postal service buildings. Exs. A37-A44.

Altogether, an analysis of a DG alternative or an alternative that includes at least some DG component would allow for a meaningful review of the appropriate balance to strike between environmental impacts caused by land-intensive utility-scale generation and the electricity-generation capacity. Without an analysis of this alternative, the decision-makers cannot make an informed decision about what impacts are an acceptable cost for the benefit attained.

Conservation and Demand-Side Management

Conservation, demand response and other demand-side measures can reduce congestion on the grid and meet our energy demands. *See* Exs. A47 & A48. Conservation and other demand-side alternatives are needed to provide the basis for informed decision-making about the environmental impacts of increased transmission. Therefore, this alternative should have been considered in the EIS. 8-3

Again, although a demand-side management alternative may be outside BLM's jurisdiction, the alternatives analysis is not limited to an agency's jurisdiction. *See* 40 C.F.R. § 1502.14©. The benefits of energy efficiency and demand response have landed these issues at the top of the California loading order. Ex. A30. There has been a significant amount of new research emerging on the demand side of energy management and a push both at the state and federal level for improving demand. *See* Exs. A30-A34.

Other Federal, State, or Private Land

As shown in the preceding section, there are a number of examples of siting renewable-energy developments on federal, state, or private land. Exs. A37-A44. Looking at such an alternative is reasonable here. 8-4

Alternatives were rejected as "too difficult and expensive." DEIS 2-69. However, there is no evidence justifying this conclusion. *See Columbia Basin Land Protection Ass'n .v. Schlesinger*, 643 F.2d 585 (9th Cir. 1981). More information should be provided so as to adequately justify why alternative siting, or the use of private lands, is not presented as an option for this project. 8-5

Class I land should have been considered as an alternative. 8-6

Other Technology

The project proposes the use of solar thermal technology. Other technology should be considered that could have less significant impacts. For example, other projects have found it financially feasible to use photovoltaics rather than solar thermal and photovoltaics have a less significant impact, particularly on water supply. 8-7

Other Use

The presented alternatives requiring an amendment – all alternatives except for alternative 1 and alternative A – would require a Plan amendment, and yet, are deficient in discussing the 8-8

BLM's management's desert-wide obligation to achieve and maintain a balance between resource use and resource protection. 8-8 cont.

3. Relationship with Solar Program

A programmatic EIS was recently prepared for solar energy development in the southwestern states. The EIS does not address this Project's relationship with the program. The Final EIS should address whether this project falls within one of the Solar Energy Zones identified in the programmatic EIS. 8-9

4. The EIS Fails to Adequately Analyze and Mitigate Air Quality Impacts

The EIS acknowledges the current ambient air quality within the Mojave Desert Air Basin (MDAB) is classified in the non-attainment category for state ozone and fugitive dust particulate matter (PM10) criteria. DEIS 3.2-2. If this project is carried out, on-site construction activities such as excavation, filling, grading, and vehicle travel during construction of the project would generate dust emissions, including emissions of PM 10 and PM 2.5. DEIS 4.2-3. Additionally, the use of off-road equipment during operation and maintenance of the project would consist of 35-horsepower diesel-powered emergency generators, both of which will contribute significant amounts of VOC, NOx, CO, SOx, PM-10, and PM-2.5 emissions. DEIS 4.25. Finally, motor vehicle emissions from on-site and off-site vehicles used during operation and maintenance of the project will generate VOC, NOx, CO, SOx, PM-10, and PM- 2.5 emissions. *Id.* 8-10

The DEIS fails to include feasible mitigation measures to reduce air quality impacts resulting from this project's construction activity. *See* AQ1. This includes the failure to include temporary traffic controls, such as a flag person to facilitate traffic and ensure unobstructed traffic flow. Efforts should be made to expose the least amount of sensitive receptor areas through the routing of construction vehicles away from such areas and minimizing vehicle trips. BLM should require that any electricity used during construction is generated from power poles and not temporary diesel or gasoline power generators. Lastly, only trucks with clean air engines should be used for this project. 8-11 8-12

The DEIS fails to adequately discuss the cumulative impact on air quality resulting from this project. The DEIS should have addressed the cumulative emissions from the project combined with other similar projects such as the Genesis and Palen solar projects. If any of these similar projects are not being considered by the BLM, a justification should be given as to why. If, on the other hand, these projects do have a cumulative impact on air quality, they should be identified, along with appropriate mitigation measures. 8-13

5. The DEIS Fails to Adequately Analyze and Mitigate Impacts to Vegetation

As stated in the DEIS, the unique position of the project site contributes to the presence of a number of rare and endemic plants and vegetation communities specially adapted to the region and which are not found further north in the Mojave Desert. DEIS 3.3-1, 2. Among these communities are the Sonoran creosote bush scrub, desert dry wash woodland, and vegetated ephemeral swales. *Id.*

Dry Desert Wash Woodland

The proposed project falls within an area containing the Dry Desert Wash Woodland, noted for its ecological significance in BLM's Northern and Eastern Colorado Desert Plan (NECO Plan). The NECO Plan contains conservation provisions for Dry Desert Wash Woodlands:

8-14

> "The requirements for compensation at 3:1 replacement acres would discourage project placement in Desert Dry Wash Woodland and Desert Chenopod Scrub communities. Both of these are present in small amounts, but add greatly to overall plant diversity in the planning area. Similar compensation rates for disturbance of closed dunes and playas communities would likewise discourage projects on these very rare communities." *See* Ex. B5.

Regardless of the 3:1 habitat loss compensation requirement, this project proposes no alternative, other than its no action alternative, that steers completely clear of the Desert Dry Wash Woodland communities. Considering the importance of the Desert Dry Wash Woodland to the long term conservation on public lands in this planning area, alternatives to the proposed project that completely avoid this habitat type should be included in the final EIS.

Revegetation

The project applicant proposes to implement a revegetation plan to compensate for the unavoidable impacts this project will have on vegetation. DEIS 4.3-3. However, "revegetation of disturbed, arid lands is one of the great challenges of the desert." *See* Ex. VE1. As stated in "The Challenge of a Desert: Revegetation of Disturbed Desert Lands":

8-15

> Where rainfall and temperature conditions approach or exceed those of the Great Basin desert, restoration of disturbed land will occur through natural revegetation processes within a reasonable period of time. This is not generally the case in the more arid Mojave Desert

> areas where the moisture and temperature conditions are less favorable for germination and seeding survival. *Id.*

8-15 cont.

The final EIS should address the difficulties that will inevitably arise in implementing a revegetation plan in this area and propose how these difficulties will be overcome.

Desert Tortoise Habitat Compensation Plan

Finally, the project applicant proposes to implement a desert tortoise compensation plan at a ratio of 1:1 compensation. However, this ratio should be higher when considering the thousands of acres of tortoise habitat being eradicated and that replacement habitat may not meet the same standard as the habitat being eradicated. *See* Ex. VE2. In his opinion piece, California State University Polytechnic Pomona Professor Sidney Silliman suggested a ratio of 5:1 for this precise reason. *Id.* Thus, the EIS should address concerns about quality of replacement habitat for desert tortoises. 8-16

6. The DEIS Fails to Adequately Analyze and Mitigate Impacts to Wildlife

The McCoy Project will have a number of adverse impacts to wildlife that have not been adequately analyzed and mitigated.

Desert Tortoises

BLM acknowledges that the majority of threats to the desert tortoise and its habitat are associated with human land uses. DEIS 3.4-5. Extensive research shows that all of these threats can directly kill or indirectly affect tortoises. *Id.* Among the impacts this project may have on desert tortoises are: habitat loss, fragmented habitat, loss of connectivity, and potential increases in susceptibility to predators such as ravens. *Id.* In addressing these impacts, the mitigation measures include tortoise translocation. DEIS 4.4-4. However, this measure may result in additional negative impacts to tortoises such as elevated stress hormones, changes in behavior and social interaction, spread of disease, increased predation, and death. *See* B3-B8. The risks and uncertainties of translocation of desert tortoises are well recognized in the scientific community. DEIS 4.4-9. Yet, no mitigation measures are provided for these translocation impacts and, in fact, the DEIS provides one sentence to explain the translocation plan, failing to elaborate on how it will address these negative impacts. Further, the DEIS makes no mention of conservation facilities, the estimated number of tortoises on the project site, or the site where the tortoises will supposedly be translocated. 8-17

Kit Foxes

BLM acknowledges that project construction has the potential to injure or kill desert kit foxes. The DEIS is grossly inadequate regarding kit foxes for two reasons: It does not adequately explain why the mitigation measures listed will reduce harm to kit foxes and more importantly, it fails to discuss all of the negative impacts this project can have on kit foxes. BLM proposes to erect a fence around the project site, limiting access to the site. DEIS 4.4-15. However, a fence will not protect kit foxes from construction vehicles entering and exiting the project site. In addressing this concern, BLM makes the conclusory statement that there is a "low risk that individual animals could be inadvertently injured or killed by vehicles on access roads." *Id.* BLM makes this statement without providing any supporting evidence. 8-18

The DEIS also fails to list all of the negative impacts this project may have on kit foxes. Among the possible impacts is the outbreak of canine distemper, resulting in death. There is a strong possibility this outbreak may lead to an epidemic, as is evidenced by a previous outbreak to kit foxes during the Genesis Solar Energy Project. *See* Ex. B9 & B10. 8-19

Burrowing Owls

The DEIS states that 10 recently active owl burrows and two burrowing owl pairs were observed on the solar plant site. DEIS 4.4-14. BLM proposes that all identified active burrows would be removed during project construction. *Id.* However, this measure does not address whether moving of the active burrows or removal of any burrowing owls will affect their foraging habitat, enabling them to survive upon displacement. Additionally, the DEIS fails to address any negative impacts resulting from removal of burrowing owls, such as increased risk of predation from coyotes, birds of prey, feral cats and dogs, automobiles, and construction vehicles. *See* Ex. B11. 8-20

7. The EIS Fails to Adequately Analyze Cultural Resources

There are many problems with respect to the analysis of cultural resources. First, the BLM fails to properly define "cultural resources" and therefore its analysis of cultural resources is woefully inadequate. Ex. CR1. 8-21 The DEIS also fails to properly apply the National Historic Preservation Act to its analysis of cultural resources. Ex. CR1. 8-22

The project site is on or near many significant Native American tribe and other cultural resources, including famous geoglyphs. Ex. CR1-CR5. However, there is no evidence that all of the potentially affected tribes have been contacted, and it appears that any consultation with Native American representatives and other interested people and entities has not been adequate. As pointed out by Thomas Kink, PhD, tribal views and comments on the matter have not been accurately and adequately expressed in the DEIS–so little so that the public does not really know how at least some 8-23

8-23 cont.

of the Native American tribes feel about their resources being taken away. Ex. CR1. Significantly, the project will restrict access to religious and culturally-significant sites in violation of the Religious Freedom Restoration Act (RFRA), but the DEIS fails to mention the RFRA at all. In addition, the DEIS does not adequately address the project's impacts on Native American sacred sites and culturally-significant sites and artifacts, including burial grounds. These issues need to be addressed before the project can go forward. 8-24

8. The EIS Fails to Adequately Analyze Environmental Justice Impacts

The DEIS fails to account for, analyze, and mitigate the disproportionate effect the project will have on local tribes. Firstly, the census data used in the DEIS appears to be inaccurate or outdated. For instance, the DEIS lists the Native American population in the City of Blythe at 0.7 %, and in Riverside County in general at 0.5%. However, the U.S. Census Bureau actually currently lists the Native American population in the City of Blythe at 1.2% and 1.9% in Riverside County, which is higher than the general California population of Native Americans. Exs. EJ1-EJ2. This would tend to indicate that projects in these areas would affect Native Americans at a greater rate than projects would at a different location where there is a lower Native American population. In addition, the project site is located in an area rich in Native American cultural resources. Exs. CR1-CR5. The cumulative effect on the cultural resources of the Native American people similar projects has not been analyzed or mitigated for. Ex. EJ3. A proper analysis on the cumulative effect on these groups must be conducted and the effects must be mitigated for before the project can move forward. Exs. EJ3-EJ5. The number of utility-scale solar energy projects in the vicinity are having a negative and disproportionate impact on Native Americans and other minorities in the region. 8-25 8-26 8-27

9. The EIS Fails to Adequately Analyze Impacts to Geology and Soils Resources

The project site is on or near geological resources that date back hundreds of millions of years ago, all the way from the Paleozoic to Early Jurassic eras. Ex. GS1. However, the DEIS does not adequately describe these geological resources; and thus, fails to analyze the impact that project will have on these pre- ancient resources. 8-28

10. The EIS Fails to Adequately Analyze the Project's Greenhouse Gas Emissions

The DEIS states that this project could displace electricity generated by fossil fuel combustion, with lower GHG-emitting electricity for consumers. DEIS 4.8-7. However, this claim rests on several unsupported assumptions. First, the DEIS does not quantify a total amount of energy needed to satisfy future demand. Without quantifying future demand, it is impossible to know whether another solar project is even needed to meet that demand. 8-29

Second, the DEIS fails to consider the energy output of completed solar facilities, and also, the estimated output of solar projects under construction or being considered for approval. If the final EIS quantifies future demand along with energy output of existing and projected solar facilities, it might be discovered that existing solar facilities are sufficient to meet that demand. Without such a study, the claim that this project would displace electricity generated by fossil fuel combustion will continue to be baseless. 8-30

Lastly, the DEIS claims this project will displace electricity generated by natural gas and yet, fails to identify any natural gas facilities that this project will replace, or if there are any gas facilities currently being considered in lieu of this project. 8-31

The DEIS completely ignores the circumstances surrounding this project, including the growing number of solar facilities in the area, along with the current trend of pushing for additional similar projects. If the solar facilities currently existing are sufficient to meet future energy demand, this project would result in excess energy and unnecessary GHG emissions. The final EIS must provide a proper foundation to support its claim that this project would result in a net reduction of GHG emissions per year. This includes a thorough analysis of future energy demand, the projected output of all solar facilities and projects combined, and the identification of any natural gas facilities that will actually be replaced because of such projects. 8-32

11. The DEIS Fails to Adequately Analyze and Mitigate Hazards

The DEIS fails to adequately analyze and mitigate hazards resulting from this project. More specifically, it does not address what would occur should the completed project catch on fire, and what effect a fire would have on emergency response. The fact that solar panels can catch on fire is well-documented. *See* Ex. H5-H8. Should a fire break out at the project site, the lives of employees operating the project and the lives of those providing emergency response would be at risk. *See* Ex. H7. Also, emergency response may have to be slowed because firefighters cannot spray flames backed by live current without risking electrocution. *See* Ex. H5. The EIS must provide an emergency response plan to save lives and mitigate damage should a fire occur at the project site. 8-33

12. The Project Is Inconsistent with Applicable Land Use Plans

The project is inconsistent with applicable land use plans. Under the California Desert Conservation ("CDCA") Plan, you are required "to provide for the immediate and future protection and administration of the public lands in the California desert within the framework of a program of multiple use and sustained yield, and the maintenance of the environmental quality." 43 U.S.C. § 1781(b). "Once a land use plan is developed, '[a]ll future resource management authorization and action . . . shall conform to the approved plan.'" *Oregon Natural Resources Council Fund v. Brong*, 492 F.3d 1120, 1125 (9th Cir. 2007). This project is on Class lands even though there are millions 8-34

of acres of Class I lands available. 8-34 cont.

The project is also inconsistent with the County of Riverside General Plan. A project of this size and the impacts on wildlife is inconsistent with the Open Space designation under the General Plan. 8-35

13. The DEIS Fails to Adequately Analyze and Mitigate Noise Impacts

While the DEIS addresses this project's noise impact on residences closest to the project, it does not address the issue of noise impact on wildlife or provide any mitigation measures to reduce such an impact. Animals rely on meaningful sounds for communication, navigation, avoiding danger, and finding food against a background of noise. *See* Ex. N1. For example, studies have shown that in a variety of bird species, road noise can have a negative effect on bird populations, resulting in a decrease in population densities. *See* Ex. N2. Additionally, most researchers agree that noise can affect an animal's physiology and behavior, and if it becomes a chronic stress, noise can be injurious to an animal's energy budget, reproductive, success, and long term survival. *See* Ex. N3. At the very least, the EIS must address the noise impact this project will have on the animal environment surrounding the project site and provide appropriate measures to mitigate any negative impacts. 8-36

14. The EIS Fails to Adequately Analyze Impacts to Paleontological Resources

The DEIS fails to adequately analyze the impact on paleontological resources. For instance, fossils from the Ice-Age have been found on or near the project site, and the project site is thought to be rich in other fossils. Exs. PR1-PR4. However, the DEIS makes no mention of many fossil resources that are known to be on or near the project site. 8-37

15. The EIS Fails to Adequately Analyze Impacts to Recreation and Public Access

The project is inconsistent with applicable land use plans. Under the California Desert Conservation ("CDCA") Plan, you are required "to provide for the immediate and future protection and administration of the public lands in the California desert within the framework of a program of multiple use and sustained yield, and the maintenance of the environmental quality." 43 U.S.C. § 1781(b); Ex. RP1. "Once a land use plan is developed, '[a]ll future resource management authorization and action . . . shall conform to the approved plan.'" *Oregon Natural Resources Council Fund v. Brong*, 492 F.3d 1120 (9th Cir. 2007). This project is designated to be built on highly controlled and sensitive Class L lands (limited use) as designated by the California Desert Conservation Plan, even though Class I lands are available. Ex. RP1. For no other reason than to 8-38

find a loophole in the law, you have decided to propose an amendment to the California Desert Conservation Plan simply to allow this project to take place in an area that it is not allowed to take place in. 8-38 cont.

The Federal Land Management and Policy Act (FLMPA) declares that the BLM shall take any action necessary to prevent unnecessary or undue degradation of the lands designated for conservation. *See* 43 U.S.C. §§ 1732(b) and 1781©. However, this action is doing the exact reverse of what the law says: a plan amendment directly tailored to allow this project on these lands is the exact action necessary that would allow the unnecessary or undue degradation of the lands. Amending the desert conservation plan to specifically allow a project on otherwise protected Class L lands is undue and unnecessary when Class I lands, or other more suitable locations for solar panels (such as rooftops) are available and could be utilized for this project. Exs. A1-48. 8-39

The project site is on or near popular camping grounds. However, the DEIS does not assess how it will impact public access to the camping grounds, and whether how blocked access might affect pollution, traffic, and wildlife. Instead, the DEIS merely states on several occasions that it did not see much public access, but this is not a proper study of the amount of access needed in the area, and what blockage of the access could cause. Because the DEIS fails to assess the impact construction and operation of the project will have on public access, it fails to provide mitigation measures for this impact on the environment. 8-40

In addition, the usage of off-high way vehicles create adverse affects on the plant life and wildlife in the desert. Ex. RP. 3. However, the DEIS fails to adequately assess and mitigate for an increased usage of off-highway vehicles due to blockage of routes, construction, and operation. This needs to be addressed before the project can move forward. 8-41

16. The EIS Fails to Adequately Analyze Socioeconomic Impacts

The EIS fails to address how the gas and electric bill of local ratepayers in the region would be affected. There is growing evidence that the cost of mandating renewable energy sources and providing the transmission lines to deliver it may outweigh environmental benefits, increase electricity prices, and, in the long run, reduce jobs instead of creating them. *See* Ex. PN4 & PN5. The implementation of mandates is proceeding so rapidly that energy consumers are being locked into higher rates for many years to come. *Id.* A recent study conducted by the Manhattan Institute reveals a patter of higher rates in states with renewable portfolio standards mandates compared with those states without such mandates. *Id.* A Berkeley National Laboratory study found that state implementation of renewables energy portfolio standards resulted in at least a .01% to 1% increase in ratepayer's bills. Ex. SE1. At the very least, the DEIS should have addressed the impact this project would have on rates charged to energy consumers. 8-42

17. The DEIS Fails to Justify Approval of this Project in the Designated Areas

The project site is contained on land subject to the Wilderness Act of 1964. The Wilderness Act defines wilderness as "an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions..." Public Law 88-577, Section 2 (c). Prohibited uses include commercial enterprise, permanent and temporary roads (with exceptions for administration and emergency purposes); use of motorized vehicles, equipment, motorboats, or mechanical transport; landing of aircraft; or the erection of a structure or installation. *Id.* at 4(c). Lands that are designated as Wilderness under the Act may not be altered without an Act of Congress. *Id.* at 3(2)(b). 8-43

Construction within this wilderness area would affect vegetation and wildlife, increase dust generation, weed introduction, and wildlife migration. *See* DEIS generally. Additionally, construction would create traffic and lighting that will create temporary visual distractions. *Id.* Despite these effects, along with the Act's express prohibition on commercial enterprise in this area, BLM arrives at the unjustified conclusion that the proposed action would have no effect on existing special designations. The EIS must address why this project, as presented, does not contravene Congress's mandate that this area's primeval character and influence be preserved. 8-44

18. The DEIS Fails to Adequately Analyze and Mitigate Impacts to Traffic/Transportation

The Regional Transportation Plan (RTP) is a long-range planning document that includes programs for traffic congestion, traffic, and roadways, among other things. *See* Ex. TR1. The Riverside County Congestion Management Program (RCCMP)was established to pursue the goals of alleviating traffic congestion, effectively using transportation funds, and improving air quality. *See* Ex. TR2. The DEIS completely fails to consider these plans, making no mention of them. The EIS must address whether this project coincides with the goals of the RTP and the RCCMP, and also, if the project will still allow for maintenance of the minimum level of service threshold required for this area's general plan. 8-45

Agencies need not consider potential effects that are highly speculative or indefinite. They must consider only those indirect effects that are reasonably foreseeable. *Kleppe v. Sierra Club*, 427 U.S. 390 (1992). The construction phase of this project would include the building of roads to provide access to the project's facilities. It is reasonably foreseeable that new roads providing access to the open desert area would increase off-road vehicle use in the area and access to areas that would otherwise be inaccessible. *See* Ex. H4. 8-46

19. The DEIS Fails to Adequately Analyze and Mitigate Impacts to Utilities and Service Systems

This project will generate solid waste during construction, operation, and maintenance. In order to reduce waste, this project should obtain its PV material from facilities that minimize waste, and air and water emissions. PV modules contain substances such as glass, aluminum and semiconductor materials that can be successfully recovered and reused, either in new PV modules or other products. *See* Ex. US1 & US3. This project should utilize the full product life cycle by obtaining its PV from a company that minimizes environmental impacts during raw material extraction, manufactures PV panels in a zero to little waste facility, provides future PV disassembly for material recovery for reuse and recycling; and minimizes the carbon footprint associated with the manufacture and transport of PV panels. *See* Ex. US2. 8-47

The growth of the PV industry results in greater waste and an increased need for PV recycling initiatives. *See* Ex. US2. Although recycling initiatives are less favorable economically, the lack of such initiatives will eventually result in hazardous material entering local waste streams. *Id.* This project applicant should utilize a PV recycling system, giving consideration to its environmental responsibility and not solely its economic benefit. To ignore this responsibility is to give an economic advantage to more environmentally destructive forms of energy production. *Id.* 8-48

20. The EIS Fails to Adequately Analyze Impacts to Visual Resources

The DEIS acknowledges that the project site is an excellent location for stargazing, but fails to analyze how light pollution from the operation of the solar plant will affect this visual resource. The DEIS also fails to provide any mitigation measures for light pollution that the solar plant may cause. Light pollution is a growing problem for the environment, especially for visual resources, and even the health and safety of humans and animals. Exs. VR1-VR4. The impact on the environment due to light pollution needs to be analyzed and mitigated for before the project can move forward. 8-49

21. The EIS Fails to Adequately Analyze Impacts to Water Resources

Water supply is an important consideration in utility-scale solar development. In fact, Congress required a study on methods to reduce the amount of water consumed by concentrating solar power systems. Ex. W1. 8-50 Furthermore, the Colorado River has been under an enormous amount of pressure and is anticipated to be under even more pressure in the future due to climate-change impacts. Exs. W2-W11. The DEIS needs to accurately assess and mitigate for the impact on water sources in the area. 8-51

22. The EIS Fails to Adequately Analyze Impacts to Wildland Fire Ecology

The fire hazard risk in Riverside County is severe, though the DEIS calls the fire risk of the project site moderate. Exs. WF1-WF2. In addition, the study that the DEIS relies upon falsely assumes that vehicles and lightning in the area are the main causes of fire, when this study did not factor in the main causes of fire in an area where a solar plant is being constructed or operated. Solar plants present additional unique fire hazards. Ex. WF3. Because the DEIS does not properly assess the severity of the fire hazard on the project site if a solar plant were to be built there, the DEIS does not properly mitigate for this impact on the environment. This issue needs to be addressed before the project can move forward. 8-52

23. <u>The EIS Fails to Adequately Analyze Cumulative Impacts</u>

The EIS fails to adequately analyze cumulative impacts. The purpose of a cumulative impacts analysis is to examine the specific project and its interactive and synergistic adverse environmental effects when considered in the context of similar projects. *Klamath-Siskiyou Wildlands Ctr. v. Bureau of Land Mgmt.*, 387 F.3d 989 (9th Cir. 2004). The EIS should have considered all solar energy projects within the CDCA. Congress has recognized that "the California desert environment is a total ecosystem that is extremely fragile, easily scarred, and slowly healed." 43 U.S.C. § 1781(a)(2). As a special area, Congress required that a "comprehensive, long-range plan for the management, use, development and protection of the public lands within the California Desert Conservation Area" be prepared. *Id.* at § 1781(d). Failing to look at similar projects, all requiring amendments to the CDCA Plan defies the Congressional mandate for a cohesive plan. *See* Exs. C1-7, C9-12, C23. Yet that is precisely what happened here. Section C of the attached index provides a thorough overview of the projects that should have been considered in the DEIS. 8-53

The geographic restrictions are also arbitrary with respect to cultural resources. You should have considered the impacts of all the projects on Chemehuevi, Fort Mojave and other Native American ancestral land. 8-54

24. <u>A Programmatic EIS Should Have Been Prepared</u>

A programmatic environmental impact statement ("PEIS") should have been prepared. The Bureau of Land Management's NEPA compliance handbook requires a PEIS under circumstances like those present here. "Connected actions are those actions that are 'closely related' and 'should be discussed' in the same NEPA document." Ex. P1. 8-55

The Department of Interior has implicitly acknowledged that the large number of solar energy projects being proposed in the Southwest are intimately connected and a programmatic EIS is necessary by preparing a PEIS for "Solar Energy Development in Six Southwestern States." Ex. P2. The problem is that the PEIS has not yet been approved and site-specific projects should tier off this 8-56

document. Ex. P3. Unfortunately, the McCoy Project is moving in reverse order, with a site-specific project coming before the programmatic impacts are understood. 8-56 cont.

25. The EIS Fails to Identify Appropriate Mitigation

"Implicit in NEPA's demand that an agency prepare a detailed statement on 'any adverse environmental effects which cannot be avoided should the proposal be implemented,' 42 U.S.C. § 4332(C)(ii), is an understanding that an EIS will discuss the extent to which adverse effects can be avoided." *Robertson v. Methow Valley Citizens*, 490 U.S. 332 (1989). NEPA requires that an EIS discuss mitigation measures with "sufficient detail to ensure that environmental consequences have been fairly evaluated." *Id.* A mitigation discussion must have at least some evaluation of the effectiveness of the mitigation. *South Fork Band Council of Western Shoshone v. Department of the Interior*, 588 F.3d 718 (9th Cir. 2009). 8-57

26. The EIS Fails to Take a Hard Look at Security Issues

The EIS fails to take a hard look at security issues, particularly with respect to transmission. 8-58 As was recently demonstrated in San Diego, disruption in transmission can cause severe impacts on the electrical system. Exs. S1-S2. 8-59 Furthermore, transmission systems are vulnerable as terrorism targets. Exs. S3-S4. 8-60 A DG alternative is likely to reduce this risk. Ex. A48. Th security impact should be analyzed. *See, e.g., San Luis Obispo Mothers for Peace v. Nuclear Regulatory Comm'n*, 449 F.3d 1016 (9th Cir. 2006). 8-61

B. The Project Violates the National Historic Preservation Act

Consultation for this project has been inadequate. The EIS indicates that members of certain tribes were contacted, but there is no evidence of consultation. There is no indication that other interested persons or entities, such as CARE or La Cuna, were contacted despite having expressed interest in these projects repeatedly as well as having demonstrated a knowledge of the cultural resources in the area. 8-62

C. The Project Violates the Federal Land Management and Policy Act

The Federal Land Management and Policy Act ("FLPMA") declares that public lands be managed for multiple uses in a manner that will protect the quality of the scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values. 43 U.S.C. § 1701 (a)(7) and (8). FLMPA provides a framework in which public lands are to be managed for the benefit of present and future generations. Congress required the BLM to "take any action necessary to prevent unnecessary or undue degradation of the lands." 43 U.S.C. § 1732(b). 8-63

As part of FLPMA, Congress designated 25 million acres of Southern California as the Californian Desert Conservation Area (CDCA). 43 U.S.C. § 1781(c),finding that this desert and its resources are "extremely fragile, easily scarred, and slowly healed." 43 U.S.C. § 1781(a)(2). In conjunction with this designation, Congress directed the BLM to implement a long-range plan for the management of this land within the framework of the CDCA, which is today known as the CDCA Plan. Under the CDCA Plan, BLM is required "to provide for the immediate and future protection and administration of the public lands in the California desert within the framework of a program of multiple use and sustained yield, and the maintenance of the environmental quality." 43 U.S.C. § 1781(b). "Once a land use plan is developed, '[a]ll future resource management authorization and action . . . shall conform to the approved plan.'" *Oregon Natural Resources Council Fund v. Brong*, 492 F.3d 1120, 1125 (9th Cir. 2007). The CDCA Plan also requires that where an amendment is proposed, the BLM must "evaluate the effect of the proposed amendment on BLM's management's desert-wide obligation to achieve and maintain a balance between resource use and resource protection." Ex. RP1. 8-64

Under Chapter 7 of the CDCA Plan, the BLM must analyze six criteria when considering a plan amendment. The BLM must 1) determine if the request has been properly submitted and if any law or regulation prohibits granting the requested amendment; 2) determine if alternative locations within the CDCA are available which would meet the applicant's needs without requiring a change in the Plan's classification, or an amendment to any Plan element, 3) determine the environmental affects of granting and/or implementing the applicant's request; 4) consider the economic and social impacts of granting and/or implementing the applicant's request; 5) provide opportunities for and consideration of public comment on the proposed amendment, including input from the public and from Federal, State, and local government agencies, and 6), evaluate the effect of the proposed amendment on BLM management's desert-wide obligation to achieve and maintain a balance between resource use and resource protect. *See* CDCA Plan, Chapter 7, p. 121. Lastly, the BLM failed to consider alternatives that avoid the disruption of sensitive cultural resources, including the disturbance of Native American remains, which has already occurred in past similar projects. *See* Ex. B10. 8-65

8-66

A project of this scale is inappropriate for Class L lands. The project will result in an irretrievable commitment of resources and unavoidable destruction of natural resources. For example, the project will result in unavoidable adverse effects on cultural and visual resources. 8-67

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Thank you for your consideration of my client's comments.

Sincerely,
BRIGGS LAW CORPORATION

Mekaela M. Gladden

INDEX OF EXHIBITS
McCoy Solar Energy Project

Exhibit	Description	DATE
Alternative Methods		
A1	Solar Power and the Electric Grid	Not Identified
A2	California Energy Commission, 2009 Integrated Energy Policy Report, Final Commission Report	December 2009
A3	California Rooftop Photovoltaic Resource Assessment and Growth Potential by County	September 2007
A4	Los Angeles Rooftop Solar Atlas	2011
A5	Cal. Pub. Res. Code § 25740	Not Identified
A6	Cal. Pub. Res. Code § 25780-25784	Not Identified
A7	Cal. Pub. Util. Code § 399.15	Not Identified
A8	Cal. Pub. Util. Code § 2581	Not Identified
A9	Cal. Pub. Util. Code § 2827-2830	Not Identified
A10	Cal. Rev. and Tax Code § 73	Not Identified
A11	Senate Bill No. 1: An Act to Add Sections 25405.5 and 25405.6 to, and to Add Chapter 8.8 to Division 15 of, the Public Resources Code, and to Amend Section 2827 of, and to Add Sections 387.5 and 2851 to, the Public Utilities Code, Relating to Solar Electricity	Not Identified
A12	Executive Order S-14-08	Not Identified
A13	Executive Order S-21-09	Not Identified
A14	Governor Signs Legislation to Complete Million Solar Roofs Plan	August 21, 2006
A15	About the California Solar Initiative	Not Identified
A16	Electricity and Natural Gas Regulation in California	Not Identified
A17	California Solar Initiative Success and Request for Comment on Budget Issues	July 2010
A18	San Diego Smart Grid Study Final Report	October 2006
A19	About Edison SmartConnect	Not Identified

A20	Edison SmartConnect Installation Schedule	Not Identified
A21	Smart Meter Installation Schedule	Not Identified
A22	Full Installation Schedule	Not Identified
A23	Senate Bill 17: An Act to Add Chapter 4 to Division 4.1 of the Public Utilities Code, Relating to Electricity	Not Identified
A24	"CPUC Reports on Success of California's Solar Program"	June 30, 2009
A25	"Freeing the Grid, Best Practices in State Net Metering Policies and Interconnection Procedures"	December 2010
A26	Energy Efficiency in the Power Grid	Not Identified
A27	"Optimization of Distributed Generation Capacity for Line Loss Reduction and Voltage Profile Improvement Using PSO"	2008
A28	"Quantitative Assessment of Distributed Generation Benefits to Improve Power System Indices"	Not Identified
A29	FERC, "The Potential Benefits of Distributed Generation and Rate-Related Issues that May Impede Their Expansion"	February 2007
A30	"Implementing California's Loading Order for Electricity Resources"	July 2005
A31	"Impact Assessment of Plug-In Hybrid Vehicles on Electric Utilities and U.S. Power Grids; Part 1: Technical Analysis"	Not Identified
A32	FERC's Solicitation of Comments on the Frequency Response Report: An Opportunity for Energy Storage?	February 7, 2011
A33	Energy Law Journal, "Recognizing the Importance of Demand Response: The Second Half of the Wholesale Market Equation"	2007
A34	Energy Law Journal, "Recognizing the Importance of Demand Response: The Second Half of the Wholesale Market Equation"	2007
A35	Solar Energy: Better Than Fossil Fuels, Worse than Anything Else	April 11, 2011

A36	Distributed Energy Resources Guide: Wind Turbines-Strengths and Weaknesses	January 18, 2002
A37	Federal Energy Management Program, Federal Correctional Institution-Phoenix, Arizona	April 8, 2011
A38	"Navy Region Southwest Saves Energy, Money with Solar Project"	April 30, 2009
A39	Superior Solar Systems, LLC Completes 79-Kilowatt Solar Electric Installation for NASA	April 8, 2011
A40	VanGuard Energy Partners LLC-Fairton Federal Correctional Institution	April 8, 2011
A41	United States Navy, Pearl Harbor-Case Study	
A42	"U.S. Navy's Solar Power Push"	November 22, 2010
A43	"Solar Panels for Federal Building Awaiting Final Ok"	March 18, 2011
A44	The United States Postal Service Generates Clean Energy with 4 SunPower Systems-Case Study	
A45	Solar Millennium AG Adopts Strategic Realignment	August 8, 2011
A46	Solar Panels-Solar Thermal vs. Photovoltaic	August 23, 2011
A47	"Integrated Resource Planning and Demand-Side Management in Electric Utility Regulation: Public Utility Panacea or a Waste of Energy?"	Spring 1994
A48	"Focusing on Demand Side Management in the Future of the Electric Grid"	Spring 2010
Air Quality		
AQ1	"Cleaner Diesels: Low Cost Ways to Reduce Emissions from Construction Equipment"	March 2007
AQ2	"Granite Construction & South Coast AQMD: Only Clean Trucks Can Use Liberty Quarry"	May 2011
Biological Resources		
B1	Endangered Species Law and Policy, "Fish and Wildlife Service Reinstates Proposed Listing of the Flat-Tailed Horned Lizard"	March 2, 2010
B2	UC Davis, "Preserving the Swainson's Hawk"	November 6, 1998

B3	U.S. Fish and Wildlife Service, "Translocation of Desert Tortoises From Project Sites: Development Guidance"	August 2010
B4	Thirty-Seventh Annual Meeting and Symposium: The Desert Tortoise Council	February 2012
B5	The Northern and Eastern Colorado Desert Coordinated Management Plan (NECO) Final Environmental Impact Statement, Chapter 4	August 2002
B6	Los Angeles Times, "Army Seeks to Move More than 1,100 Desert Tortoises"	August 5, 2009
B7	Los Angeles Times, "Denizen of the Desert: Desert Tortoise"	March 4, 2012
B8	Los Angeles Times, "Saving Desert Tortoises is a Costly Hurdle for Solar Project"	March 4, 2012
B9	Los Angeles Times, "Canine Distemper in Kit Foxes Spreads in Mojave Desert"	April 18, 2012
B10	Los Angeles Times, "Problems Cast Shadows of Doubt on Solar Project"	February 11, 2012
B11	Burrowing Owl Conservation Network, "Burrowing Owl (Athene Cunicularia)	Not Identified
Cultural Resources		
CR1	Memorandum by Thomas H. King, PhD.	August 2, 2012
CR2	"Yuma/Blythe Itaglios Geoglyphs" (BLM)	May 3, 2012
CR3	"World War II Training Center" (BLM)	Not Identified
CR4	"Rock Art – Who Passed This Way?" (BLM)	Not Identified
CR5	Aronsen, Gavin, "Will Big Solar Bulldoze Sacred Tribal Sites?"	April 1, 2011
Cumulative Impact		
C1	Record of Decision for the Imperial Valley Solar Project	October 2010
C2	Record of Decision for the Ivanpah Solar Electric Generating System Project	October 2010
C3	Record of Decision for Blythe Solar Power Project	October 2010

C4	Record of Decision for the Calico Solar Project	October 2010
C5	Record of Decision for the Genesis Solar Energy Project	November 2010
C6	Record of Decision for the Chevron Energy Solutions Lucerne Valley Solar Project	October 2010
C7	Record of Decision for Desert Sunlight Solar Farm Project	August 2011
C8	Final Environmental Impact Statement for Blythe Solar Power Project	August 2010
C9	Final Environmental Impact Statement for Calico Solar Project	August 2010
C10	Final Environmental Impact Statement for Ivanpah Solar Electric Generating System Project	July 2010
C11	Final Environmental Impact Statement for Topaz Solar Farm	August 2011
C12	Final Environmental Impact Statement for Imperial Solar Energy West	July 2011
C13	Final Environmental Impact Statement for Rice Solar Energy Project	June 2011
C14	Final Environmental Impact Statement for Imperial Valley Solar Project	July 2010
C15	Final Environmental Impact Statement for Chevron Energy Solutions Lucerne Valley Solar Project	August 2010
C16	Final Environmental Impact Statement for Genesis Solar Energy Project	August 2010
C17	Draft Programmatic Environmental Impact Statement for Solar Energy Development in Six Southwestern States	December 2010
C18	Draft Environmental Impact Statement for West Chocolate Mountains Renewable Energy Evaluation Area	June 2011
C19	Draft Environmental Impact Statement for Centinela Solar Energy Project	October 2011
C20	Draft Environmental Impact Statement for McCoy Solar Project	May 2012

C21	Draft Environmental Impact Statement for Ocotillo Sol Project	April 2012
C22	Draft Environmental Impact Statement for Quartzsite Solar Energy Project	October 2011
C23	Draft Environmental Impact Statement for Desert Sunlight Solar Farm Project	April 2011
Environmental Justice		
EJ1	U.S. Census Bureau - City of Blythe	2010
EJ2	U.S. Census Bureau - County of Riverside	2010
EJ3	Memorandum by Thomas H. King, PhD.	August 2, 2012
EJ4	Environmental Justice Mitigation Measures	Not Identified
EJ5	Viejas Tribal Government Letter to President Barack Obama	February 22, 2012
Geology and Soils Resources		
GS1	U.S. Geological Survey of West Blythe Quadrangle	2006
Hazards Impact		
H1	Earthquake Hazards Program: Magnitude 5.4 Southern California	July 7, 2010
H2	San Diego News, "Earthquake Rattles Borrego Springs"	April 30, 2008
H3	KPBS News, "2 Moderate Earthquakes Near Borrego Springs Shake San Diego"	June 12, 2010
H4	KESQ, "High Desert Residents Aim to Curb Illegal Off-Roading"	September 27, 2011
H5	The Star Ledger, "Trenton Firefighters Battle Rooftop Solar-Panel Blazes"	March 28, 2012
H6	The Tribune, "Rooftop Solar Panels Catch Fire at Meridian Winery East of Paso Robles"	November 10, 2010
H7	North County Times, "ENERGY: Solar Fire Raises Questions About Panel Safety"	April 10, 2010
H8	Solar Juice Blog, "Solar Panels and Fire!"	October 23, 2010
Land Use		

LU1	California Desert Conservation ("CDCA") Plan	
LU2	Riverside County General Plan	November 2007
Noise		
N1	Federal Highway Administration, "Noise Effect on Wildlife"	July 2011
N2	"Synthesis of Noise Effects on Wildlife Populations"	2005
N3	"The Effect of Noise on Wildlife: A Literature Review"	March 2007
Paleontological Resources		
PR1	"Wiley Well District – Geode Beds" (BLM)	Not Indicated
PR2	Clarke, Chris, "Solar Project May Damage Significant Fossil Deposit"	July 20, 2012
PR3	Los Angeles Times,"Ice Age Sloth Skull Found in Riverside County"	December 4, 2009
PR4	The Press Enterprise "San Bernardino: Ice Age Fossils From Joshua Tree National Park"	April 11, 2012
Programmatic EIS		
P1	BLM National Environmental Policy Act Handbook H-1790-1	January 2008
P2	Executive Summary	December 2010
P3	Comment Period for Draft Solar PEIS	April 13, 2011
Purpose and Need		
PN1	Executive Order 13212	May 22, 2001
PN2	Energy Policy Act of 2005	2005
PN3	Department of the Interior Secretarial Order 3285A1	February 22, 2010
PN4	"The High Cost of Renewable-Electricity Mandates"	February 2012
Recreation and Public Access Off Highway Vehicles		
RP1	The California Desert Conservation Area Plan, As Amended	1980
RP2	Camping (BLM)	Not Identified

RP3	Brooks, Matthew and Bridget Lair, "The Ecological Effects of Vehicular Routes in a Desert Ecosystem" (USGS)	March 2, 2005
Security		
S1	Gustafson, Craig "Unprecedented Outage Left Million in the Dark" (San Diego Union Tribune)	September 8, 2011
S2	"Power Outage Causes Sewage Spills; San Diego Area Beaches Closed" (Los Angeles Times)	September 9, 2011
S3	Abel, Amy "CRS Report for Congress: Government Activities to Protect the Electric Grid"	Not Identified
S4	Greenber Michael et al. "Short and Intermediate Economic Impacts of a Terrorist-initiated loss of electric power Case Study of New Jersey"	March 9 2006
Social and Economic Setting		
SE1	Wiser, Ryan et. al "Renewables Portfolio Standards: A Factual Introduction to Experience from the United States" (Berkeley National Laboratory)	April 2007
Transportation and Traffic		
TR1	Draft Regional Transportation Plan 2012-2035	December 2011
TR2	2011 Riverside County Management Program	December 2011
Utilities and Service Systems		
US1	"End of Life PV: Then What? - Recycling Solar PV Panels"	August 2009
US2	EPA Comment Letter re: Desert Harvest Solar Project	October 2011
US3	"End-of-Life Management and Recycling of PV Modules"	May 2000
US4	"Producer Responsibility and Recycling Solar PV Modules" available at http://mtu.academia.edu/JoshuaPearce/Papers/1540757/Producer_Responsibility_and_Recycling_Solar_Photovoltaic_Modules	December 2008
Vegetation		

VE1	"The Challenge of a Desert: Revegetation of Disturbed Desert Lands"	1980
VE2	"Endangered Desert Tortoise Must Flee the Advance of Solar"	2010
Water Supply		
W1	"Park Service Warns of Solar Projects' Impacts to Mojave Desert"	April 23, 2009
W2	"Western Reservoirs Could be Dry by 2050"	July 20, 2009
W3	Future of Western Water Supply Threatened by Climate Change	Not Identified
W4	The Colorado River's Uncertain Future	Not Identified
W5	Managing the Uncertainties on the Colorado River System	Not Identified
W6	Scripps News: Climate Change Means Shortfalls in Colorado River	Not Identified
W7	Sustainable Water Deliveries from the Colorado River in a Changing Climate	Not Identified
W8	Impact of Climate Change and Land Use in the Southwestern United States: Land Subsidence from Ground-Water Pumping	January 6, 2004
W9	Chapter 5: The Impact of Aquifer Intensive Use on Groundwater Quality	February 10, 2002
W10	DPLU Policy Regarding CEQA Cumulative Impact Analyses for Borrego Valley Groundwater Use	January 17, 2007
W11	USGS: Quality of Ground Water	Not Identified

Comment Letter 9

August 22, 2012

Jeffery Childers, MPA
Project Manager RECO
Bureau of Land Management
22835 Calle San Juan De Los Lagos
Moreno Valley, CA 92553

Re: DEIS Comments on the McCoy Solar Energy Project

Dear Mr. Childers:

Attached please find McCoy Solar, LLC's (McCoy's) comments on the Draft Environmental Impact Statement (DEIS) for the McCoy Solar Energy Project. McCoy has utilized the typical table format (Appendix A), adding Appendices B, C and D where more detail was needed.

McCoy would like to thank the BLM for what we generally believe to be a very comprehensive and thorough analysis and hope that our comments will be reflected in the Final EIS.

Sincerely,

Scott A Busa
Executive Director, Business Development
NextEra Energy Resources, LLC

Enclosures: Appendix A, B, C, D

700 Universe Boulevard, Juno Beach, Florida 33408

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Appendix A

McCoy Solar Energy Project
DEIS Comment Form

Page	Para, Section #	Issue Noted in DEIS	Suggested correction and/or additional rationale	
Chapter 2				
2-18	2.3.1.3.9, 3rd para	Well permits	County permits may or may not be required depending on the location of the well. Please change to read: "*If required,* well permits would be obtained . . ."	9-1
Chapter 3				
3.3-1	3 (after list)	Draft Environmental Impact Statement (DEIS) states that the study area is 4,948 acres	The 2011 study area was larger than the currently proposed footprint (which is 4,948 acres). If we include the area of the plant site and linears and buffer surveys, our Geographic Information System (GIS) calculates the total extent of the "study area" (or "survey area") should be approximately 13,897 acres plus an additional 1,733 acres if you include the tortoise translocation area which had 100% survey coverage. Please review the way the acreages are calculated and described.	9-2
3.3-1	3 (after list)	DEIS states that vegetation communities were characterized in the immediate footprint	Vegetation communities were characterized on the entire 13,897-acre survey area, except where they had previously been described by the Blythe Solar Power Project (BSPP). Special-status plants were identified only within the solar plant site boundary (at the time of surveys) and within the 240-foot (ft) wide linear corridor.	9-3
3.3-5	2nd para	It appears that the description is from another project	As written, this description is incorrect for McCoy. It includes species that aren't there. More importantly, this description does not appear to identify the quality or quantity of this community as it exists at McCoy. The document uses generalized descriptions for plant communities that are from Holland or other projects which could give the reader an incorrect view of the conditions at the site. Please use the descriptions written for McCoy in the Biological Assessment (BA), Biological Resources Technical Report (BRTR), and Response to Data Requests.	9-4

McCoy Solar Energy Project
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Page	Para, Section #	Issue Noted in DEIS	Suggested correction and/or additional rationale	
3.3-8	Last para	Incorrect statement about location of tamarisk	Tamarisk was only observed in one location, and not in a desert dry wash woodland (DDWW). Twenty Mediterranean tamarisk were found along an unnatural swale north of and paralleling Interstate 10 (I-10) and two were found in the southwestern corner of the Solar Plant Site.	9-5
3.3-10	2nd para	Incomplete list of special-status plant species observed	Missing *E. harwoodii* from list of species found.	9-6
3.3-17	Table 3.3-3: Arizona spurge	Last sentence in third column is incorrect	Surveys were completed. The species was not observed. Please delete the sentence.	9-7
3.3-18	Table 3.3-3: Last column	California ditaxis	Please delete the language in the last column and replace with: "This species was not observed in the Solar Plant Site footprint, although it was observed outside that footprint."	9-8
3.4-1	1st para	4900-acre Project site "study area included up to approximately 7700 acres"	There are a few inconsistencies in acreage between text and tables. In this case, change acreage to 4,938 or 4960.5 to maintain consistency with the Table 2-1 or 3.3-1, respectively. 7,700 acres is the Bureau of Land Management (BLM) Right-of-Way (ROW) application area. The study area is a different shape, and includes the extent of the buffer surveys. Our GIS calculated 13,897 acres plus an additional 1,733 acres for the tortoise translocation area.	9-9
3.4-1	1st para	Use of the terms "study area" and "survey area" in this paragraph	The reports used the term "survey area" for the area surveyed for everything except golden eagle areas (GOEA). It would be useful to stay with that terminology. The terms "study area" and "survey area" should be defined and there should be consistency in their use throughout the document.	9-10
3.4-3	Table 3.4-1	Updates needed to species designations	**Reptiles:** Chuckwalla – no longer included; not a special-status species. Should be removed throughout the document.	9-11

McCoy Solar Energy Project
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Page	Para, Section #	Issue Noted in DEIS	Suggested correction and/or additional rationale	
			Birds: Le Conte's thrasher – not BLM sensitive; not a state WL species California horned lark – not a WL species Ferruginous hawk – not BLM sensitive Mountain plover – is now Proposed Threatened BT gnatcatcher – has no status any longer Fish and Wildlife Service (FWS) BCC status is missing on many birds	9-11 cont.
3.4-3	Table	Le Conte's thrasher	The BLM Sensitive status and SSC status applies only to the San Joaquin Valley population	9-12
3.4-6	Next to last line	Number of transects is incorrect	DEIS states, "…with three additional, 30-foot-wide buffer transects every 100 ft through 500 ft., at 1310 ft (400 m) and 1970 ft (600 m)." Please rewrite to state that there should be seven transects, not three.	9-13
3.4-7	2nd full para, line 5	Number of tortoises is incorrect for the Project site	Should say: "**2** adult desert tortoise (one on the solar plant site and one on the linear)," and "…24 known or potential burrows and 220 shell fragments or fragment groups."	9-14
3.4-10	2nd full para., last sentence	Chuckwalla survey results are Incorrect	Should read: "Habitat for this species occurs west of the solar plant site and generation tie (gen-tie) route."	9-15
3.4-11	Survey Results	Couch's spadefoot surveys	Please indicate that McCoy Solar went back in fall 2011 after rains to check the potential habitat for signs of breeding but rains had not been sufficient.	9-16
3.4-11	2nd full para	Couch's spadefoot results incorrectly stated	Should read: "….was detected on the gen-tie and access road route at seven swales that may hold sufficient water, the most promising of which is at the borrow pit and graded depression north of I-10. One location was observed in the southwestern portion of the solar plant site. During sufficient rains…."	9-17
3.4-12	3rd para	Burrowing owl results incorrect due to conflicting data presentation in initial report	Should read: "…burrows and one owl pair on the solar pant, mostly from the eastern portion of the site. Two owl pairs and one active burrow…."	9-18

McCoy Solar Energy Project
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Page	Para, Section #	Issue Noted in DEIS	Suggested correction and/or additional rationale	
3.4-13	1st para	GOEA results are incomplete	Add a short paragraph after this first paragraph that says: "Two golden eagles were incidentally observed flying overhead south of the plant site, on one day during wildlife surveys in Spring 2011. No eagles were observed during focused avian point counts."	9-19
3.4-15	3rd full para	BT-gnat survey results inaccurate	Should read: "were observed 11 times during point count surveys, on the solar site and gen-tie route, occurring predominantly…."	9-20
Chapter 4				
4.2-19	1st para, Section 4.2.10	Mitigation Measure (MM) AQ-1 in Section 4.2	This measure's effectiveness on the only significant impact (temporary particulate matter, less than 10 micrometers in diameter emissions) is negligible. McCoy Solar requests that AQ-1 be deleted.	9-21
4.3-5	Sand dunes	DEIS states that permanent impacts would be 10% of the total impacts.	Unclear how this was calculated. Our numbers show 50% would be permanent: 19 acre temp and 19 acre permanent (see BA). Table 4 of BA identifies that the acreage in the table is for surface disturbance.	9-22
4.3-6	First full para, first sentence	Ephemeral channels	As written, suggests that there's a large loss of DDWW. A more appropriate presentation would be: "…values in up to 181.8 acres of vegetated and unvegetated ephemeral dry washes and 4.2 acres of desert dry wash woodland on the Project site…"	9-23
4.3-8	Last para, 2nd sentence	Impacts to species	This first part of this sentence (impacts to H. milkvetch, H. eriastrum, and ribbed cryptantha) is incorrect. Those species occur where the project would be built under Alternative 2. Please delete.	9-24
4.3-9	Table 4.3-1	Unvegetated desert pavement Creosote-Big Galleta Grass	Overall, because the BLM deleted the category of Vegetated Ephemeral Channels with sparsely scattered trees, and inserted additional cover types that are part of the original cover types, the final acreages are incorrect and misleading. Please use the original cover types throughout this table and correct the acreages. For instance, Unvegetated Desert Pavement was considered part of the Sonoran Creosote Bush Scrub community (see page 32 of the BA). This cover type in the EIS table has been used as a surrogate for unvegetated	9-25

McCoy Solar Energy Project
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Page	Para, Section #	Issue Noted in DEIS	Suggested correction and/or additional rationale	
			drainages, but this is incorrect – unvegetated drainages are not desert pavement. In the numbers provided by Tetra Tech (TT), desert pavement is included in the creosote bush scrub. There is far more than 29.1 acres of desert pavement within the solar plant site. There also must be some in the Alternative 3 routes. Similarly, there has to be some vegetated ephemeral channels w/no trees in the Alternative 3 routes. Creosote-BG G is found in some, but not all of the vegetated channels. It is part of the vegetated ephemeral channels with no trees, and vegetated ephemeral channels with sparse trees. Again, please use the original cover types and correct the acreages in the table for consistency.	9-25 cont.
4.3-9-10	Table 4.3-1 and 4.3-3	Creosote bush-big galleta grass association	This veg type was not differentiated in the BRTR so it is unclear where these data came from. It is not mapped on Figure 3.3-1.	9-26
4.3-10	Table 4.3-2	Abram's spurge – 0 plants impacted by Alternative 2 Harwood's milkvetch Desert Unicorn Plant	The numbers of each species are incorrectly calculated. Abram's spurge is not presented on Figure 3.3-3. Based on the figure in the McCoy Fall 2011 plant report (TT and Karl 2011), it appears there are more than 0 that will be affected by Alternative 2. Should also be greater than 4,000 plants (versus 4,000). Harwood's milkvetch – all would be impacted under Alternative 2 Desert Unicorn Plant – 96 is too low. Many of the occurrences are in Alternative 2	9-27
4.3-10	Table 4.3-2	Analysis for Alternative 3	1) See comment on Figure 3.3-3 below. It seems that there may be some data missing from BSPP – there is no Las Animas colubrina and few Utah cynanchum, and we would expect more desert unicorn plant on both. 2) BSPP fall surveys were completed in a poor year, which is probably why they found no Abram's spurge. Based on McCoy's survey, it is highly likely that Abram's spurge is very common on the BSPP as well.	9-28
4.3-10	Table 4.3-3	Sensitive plant communities	Add Sand Dunes	9-29

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Page	Para, Section #	Issue Noted in DEIS	Suggested correction and/or additional rationale	
4.3-10	Last para	Text states that non-listed cacti were not quantified	Text should be clarified to state that that non-listed cacti and trees were quantified but distribution not mapped and therefore exact number of individuals impacted by each alternative cannot be identified. See page 30 of BRTR (TT and Karl 2011).	9-30
4.3-11	First para	The text refers to "tree-dominated swale habitat"	No such veg community exists on-site. This should be revised to be "vegetated ephemeral channels (wash-dependent vegetation with sparsely scattered trees)" to match table 4.3-1.	9-31
4.3-12	1st para, line 3	57.3 acres	Change depending on re-analysis of Table 4.3-1 and 4.3-3.	9-32
4.3-12	3rd full para	Acreages	Change depending on re-analysis of Table 4.3-1 and 4.3-3.	9-33
4.3-12	4th para	Impacts to H. milkvetch and Utah milkvine	Change per re-analysis of Table 4.3-2 (see comments above.)	9-34
4.3-13	2nd para	Direct impacts to special-status plants would be incrementally smaller under the western route	Based on the re-analysis of Table 4.3-2, this statement may be incorrect and impacts could be larger. See comments for Table 4.3-2.	9-35
4.3-21	VEG-8	Inclusion of animal-only measures	Vegetation conditions should include plant-oriented measures only, unless they cannot be separated from animal measures. Measures 4, 8, 9, 10, 11, 12 are strictly animal conditions.	9-36
4.3-23	VEG-8.8	Noise requirements	Disagree with need for extensive requirements. Not proven to be an issue at Genesis.	9-37
4.3-24	VEG-8.12	Disposal of road-killed animals	Proper permits are required to handle Migratory Bird Treaty Act birds, which the designated biologist will obtain. This measure should be revised to say road killed birds will be reported to the DB for removal. Also note California Department of Fish and Game has made suggestions recently that a scientific collecting permit also is required to pick up roadkill.	9-38
4.3-26	VEG-9, Letter C	Weed Free Products	Please delete, "Soil will not be imported onto the Project site"	9-39
4.3-26	VEG-9, Letter E	Mechanical weed removal	Add to the end, "or where it is impractical to use mechanical weed removal."	9-40

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Page	Para, Section #	Issue Noted in DEIS	Suggested correction and/or additional rationale	
4.3-28	VEG-10	The entire VEG-10 condition appears to be copied from the National Environmental Policy Act (NEPA) document of another project without tailoring to the circumstances at the McCoy site.	Request removing this condition or making the condition project specific. Request deleting all references to activity outside of the project area, change survey timing to discretion of DB, delete hard requirements for avoidance on project site, delete all mitigation requirements in excess of 1:1. **PLEASE SEE APPENDIX B FOR A MORE DETAILED COMMENT ON THIS ISSUE.**	9-41
4.3-37	VEG-10, Last para on pg. 4.3-37	Compensation for Rank 1 plants	See above comment for Abram's spurge. A 3:1 mitigation ratio is inappropriate. Should be treated as same as desert unicorn plant (Rank 3). **PLEASE SEE APPENDIX B FOR A MORE DETAILED COMMENT ON THIS ISSUE.**	9-42
4.3-40, 41	VEG-11	Security and Timing	Please add to the end of **VEG- 11,** Provision 1, (Acquire Off-Site State Waters) the following: "If security is posted in accordance with Provision 2 below (Security for Implementation of Mitigation), the Applicant shall acquire, in fee or in easement, the land, no more than 18 months after the start of Project ground-disturbing activities."	9-43
4.3-40	VEG-11, Provision 1	Incorrect acreage	Should be 215.2 according to Table 2-7, as opposed to 213.3	9-44
4.3-42	VEG-12	Channel Decomm and Recl Plan	Specify that this plan can be produced at a later date, or that only a draft needs to be completed prior to construction.	9-45
4.3-43	First sentence	References tables	Delete reference to tables or insert tables.	9-46
4.3-43	4.3.11	• 60.4 to 194.3 acres • "..net losses in wetland and vegetation resources would occur."	• Please clarify what these numbers refer to. They are not consistent with Table 4.3-4. • There are no wetlands affected by the project. Rephrase to remove the term wetland.	9-47
4.4-4	Letter e, second line	Construction monitoring	Insert "or" prior to "on the linears"	9-48

McCoy Solar Energy Project
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Page	Para, Section #	Issue Noted in DEIS	Suggested correction and/or additional rationale	
4.4-9	Table 4.4-1; Section 4.4.3.1	Summary of impact acreage to wildlife	Unclear how these numbers were derived For Alternative 1, make acreages consistent with those in the BA. For other alternatives, please identify the source.	9-49
4.4-9	Second to last para	Potential big free-tailed bat roost.	Project is outside of known big-free tailed range[1]. Replace with pallid bat (*Antrozous pallidus*) per BRTR. Also change appropriate section in Chapter 3 and Table 4.4-2.	9-50
4.4-10	Table 4.4-2	Bighorn potentially present in Alternative 1 Other species included or not included	The McCoy mountains are an unoccupied range. This should be Unlikely instead of Potential. **SEE APPENDIX C FOR A MORE DETAILED COMMENT ON THIS ISSUE.** Delete Chuckwalla Add in BCC species if including BT Gnat and WL species.	9-51
4.4-10	Last para	Acreage	Fix acreage (see comments on Table 4.4-1, above)	9-52
4.4-11	1st 2 sentences	The DEIS states, "approximately 4,792 acres (of which 4,195 are the disturbance-related impacts described above), resulting in an additional 597-acre loss of habitat on the solar plant site."	These numbers do not appear to be included in Table 4.4-1.	9-53
4.4-12	4th para	The DEIS states, "The capture, handling, and relocation of desert tortoises from the Project site following the installation of perimeter wildlife exclusion fencing would result in the harassment and mortality of juvenile and adult desert tortoises during relocation."	It is unknown whether translocation/handling would result in mortality. Suggest changing to, "…*could* result in…" (or, "would result in the harassment and *potential* mortality…."	9-54

[1] California Wildlife Habitat Relationships (CWHR) Program. 2012. http://www.dfg.ca.gov/biogeodata/cwhr/cawildlife.aspx Life history accounts for species in the California Wildlife Habitat Relationships (CWHR) System were originally published in: Zeiner, D.C., W.F.Laudenslayer, Jr., K.E. Mayer, and M. White, eds. 1988-1990. California's Wildlife. Vol. I-III. California Depart. of Fish and Game, Sacramento, California. Updates are noted in accounts that have been added or edited since original publication.

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Page	Para, Section #	Issue Noted in DEIS	Suggested correction and/or additional rationale	
4.4-12	Last sentence	Home range	Incorrect statement. Please replace with, "…off-site tortoises that would alter their home range."	9-55
4.4-13	Mojave fringe-toed lizard (MFTL)/ Chuckwalla	Chuckwalla discussion MFTL	Chuckwalla were only found in the boulder area in the western survey area. They do not have a special-status and were therefore not mapped. Sentence about direct and indirect construction impacts being similar to those for tortoises is incorrect. Chuckwallas wouldn't occur in the construction area. Delete chuckwalla from all tables and all text (it used to be sensitive, but is no longer.) 188 was the fall count only; many were also seen in spring surveys. Direct impacts would be to 38 acres of sand habitat, not 28.7.	9-56
4.4-13	Last para	Language in second paragraph on Couch's	Change per suggestions relative to same language provided for Section 3.	9-57
4.4-14	Burrowing Owl	"It is anticipated that all identified active burrows would be removed during Project construction."	Revise to state that any burrows found along the linear corridor would be avoided where feasible. Or perhaps just specify that this refers to burrows on the Plant Site.	9-58
4.4-14	First Paragraph under big horn sheep (BHS)	Impacts to seasonal foraging habitat and regional connectivity	Bighorn don't forage in valleys; they use valleys as movement corridors from mountain range to mountain range or mountain range to another resource, such as the Colorado River. They would not forage on the Project site. Nor is there any habitat east of the solar plant site that needs to be "maintained" as a "corridor of regional connectivity." **SEE APPENDIX C FOR A MORE DETAILED COMMENT ON THIS ISSUE.**	9-59
4.4-15	Last paragraph under Nelson's Bighorn	Burro deer	Impacts are not the same as bighorn because burro deer occupy different habitats than bighorn.	9-60
4.4-15	Bat section	Species identified for roost	BTR identified California leaf-nosed and pallid bats; DEIS put in other species in Section 3, but the TT bat biologist recommends that those other species do not apply to this roost.	9-61

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Page	Para, Section #	Issue Noted in DEIS	Suggested correction and/or additional rationale	
		Loss of roost	Also the Project will not take this roost (the roost is in a wash that will be avoided) – see BA.	9-61
4.4-17	Special-status bats	The DEIS states, "There is an unquantified risk that special-status bat could collide with new monopoles, H-frame structures, or lines associated with the gen-tie line and distribution line."	Although there are some data that shows bats may collide with stationary structures, in the absence of attractants (i.e., lighting, water) to the gen-tie line, this is uncommon and therefore an unlikely impact. Please add a statement that this is an unlikely impact.	9-62
4.4-24	MFTL	46 acres of MFTL habitat impacted	Should be 38 under alternative 1 based on TT's calculations. Also 46 acre does not appear anywhere else in document that we could find. WIL-10 says 28.7.	9-63
4.4-25	Next to last para	Burrowing Owls etc.	Delete last sentence about chuckwallas.	9-64
4.4-26	First para, last half	Discussion of spring foraging habitat on site	This is not accurate. Please see earlier comments.	9-65
4.4-27	4.4.10	PAR for Flat-tailed horned lizard	Should be revised to be MFTL	9-66
4.4-27	Last para, Line 3	Fencing	Change language: "Temporary fencing *may* be installed…" "All fencing shall be flagged…" It is unclear why this is necessary, please delete.	9-67
4.4-28, 29	Desert Tortoise clearance surveys	Desert Tortoise clearance surveys	Language should be modified as follows using the BA and Translocation Plan as references: Change: "Each separate survey shall be walked in a different direction *or parallel, but offset,* to allow opposing…" Change: Clearance surveys of the remaining portions of the power plant site may only be conducted when tortoises are most active in the Project vicinity (*March through May or September through mid-November*). Burrow collapse – see translocation plan. Only on last pass and only if not occupied by other wildlife. Monitoring following clearance – DB must be present, but does not have to monitor grading activities.	9-68

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Page	Para, Section #	Issue Noted in DEIS	Suggested correction and/or additional rationale	
4.4-31	WIL-4	Security and Timing	Please add to the second paragraph of **WIL-4**, after the first sentence: "However, if security is posted in accordance with 3.g. below (Mitigation Security), the Applicant shall acquire, in fee or in easement, the land, no more than 18 months after the start of Project ground-disturbing activities."	9-69
4.4-31	WIL- 4, Provision 1.a	Selection Criteria for Compensation Lands	Should be revised to state that lands shall be within the Colorado Desert Recovery Unit only. Because the project will not be impacting tortoise connectivity or linkages [and McCoy Solar went to great lengths to avoid such areas], mitigation lands should not be required to compensate for connectivity or linkages. **SEE APPENDIX D FOR A MORE DETAILED COMMENT ON THIS ISSUE.**	9-70
4.4-35	WIL-7	Construction	Change "would occur" to "would begin".	9-71
4.4-36	WIL-8	Natal Dens	Specify that an active natal den is a natal den with pups (not a natal den occupied by one kit fox).	9-72
4.4-38	WIL-10	MFTL	Should be 38 acres.	9-73
4.4-39	WIL-11	Compensation for loss of spring foraging habitat for bighorn	McCoy Solar disagrees with compensation for loss of alleged spring foraging habitat for bighorn. **SEE APPENDIX C FOR A MORE DETAILED COMMENT ON THIS ISSUE.**	9-74
4.4-43	WIL-14	Measures to protect Couch's spadefoot	Please delete #1. Habitat surveys were completed. Need to specify mitigation will be required only for confirmed breeding ponds – not potential breeding ponds.	9-75
4.4-45	4.4.11	Reference to Chuckwalla	Please delete Chuckwalla.	9-76
4.5-5	4.5.3.1. para 1	The paragraph states that only 6 within the area of potential effect (APE) have not been evaluated.	The BLM has also found that 38 evaluated archaeological and historic sites within the Project APE would be avoided by Project design and through the imposition of site management conditions.	9-77

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Page	Para, Section #	Issue Noted in DEIS	Suggested correction and/or additional rationale	
4.5-8	Para 4, 4.5.9	The Project would directly affect three National Register of Historic Places (NRHP)-eligible archaeological sites that may be contributing elements to the potential PTNCL.	What sites does this refer to? Only 7 sites cannot be avoided and only 1 of those is prehistoric.	9-78
4.5-10	Para 2, 4.5.9	In addition, a historic properties treatment plan (HPTP shall be prepared and implemented and shall contain procedures to mitigate impacts to historic properties.	Is a stand-alone HPTP necessary? The Memorandum of Agreement, as defined above, will "contain measures to avoid, minimize, and mitigate adverse effects to historic properties".	9-79
4.5-10	Para 3, 4.5.9	On the basis of preliminary California Register of Historical Resources eligibility assessments, NRHP eligibility assessments, or existing NRHP eligibility determinations, the BLM may require the relocation of project components to avoid or reduce damage to cultural resource values.	The project has already been redesigned. At the very least, need to make it clear that a re-design would not be required in the middle of construction.	9-80
4.5-10	Para 6, 4.5.9	Data recovery on most resources would consist of sample excavation and/or surface artifact collection, site documentation, curation, public interpretation, use or creation of historic contexts (especially for the potential PTNCL and DTCCL), and report distribution.	As written, data recovery would include ALL of the listed efforts. Suggest deleting the words “public interpretation” as a form of data recovery.	9-81
4.9-3	4.9.3.1, Para 3	Federal Aviation Administration (FAA) No Hazard Determination	Standard practice is that an FAA “No Hazard Determination” be obtained prior to commencing construction on the gen-tie, not prior to BLM’s approval of the proposed action. Change to read: “This would be required *prior to the construction of* the Proposed Action.”	9-82
4.9-4	Para 3	DEIS states that the Storm Water Pollution Prevention Plan must be approved by the Regional Water Quality Control Board (RWQCB) prior to construction.	Any reference to RWQCB jurisdiction over Stormwater management should be deleted. Because the project does not have the potential to impact “waters of the US” (see U.S. Army Corps of Engineer letter), the RWQCB has stated that they don’t have National Pollutant Discharge	9-83

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Page	Para, Section #	Issue Noted in DEIS	Suggested correction and/or additional rationale	
			Elimination System jurisdiction over the project since that program is federally-delegated. This was the case for both the Genesis and Desert Sunlight projects.	9-83 cont.
4.14-2	1st full Para	DEIS states that the project is traversed by Off Highway Vehicle route 661085 which connects the project site to I-10.	Our understanding is that the route was closed through the BSPP (as part of that ROW approval) and, therefore, there is no longer a link between the McCoy site and I-10 that would somehow be interrupted.	9-84
4.14-9	REC-2	Measures introduce too much construction schedule uncertainty for a project to be financed	Request deletion of, "The applicant shall schedule construction activities to avoid heavy recreational use periods . . ." The measure already requires that construction be coordinated with the AO on this issue.	9-85
4.14-10	REC-6	Requires the project to do surveys to find out what BLM should do to make up for the loss of the project site as open area.	The impact analysis does not appear to justify this measure. Impacts on recreation would be negligible. As is, the mitigation measure is open-ended such that the cost of compliance cannot be calculated.	9-86
4.19-22	VIS-1.4 (also VIS-3.4)	**VIS-1** states that "solar panel backs shall be color-treated to reduce visual contrast with the landscape setting."	Please delete this requirement for the reasons stated below: There is no evidence to suggest that the backs of the panels would cause a significant visual impact to any sensitive receptors. In any event, McCoy Solar disagrees with this requirement for several reasons. Most industry-provided solar modules have white backs for a reason. The backing of the panel is an integral part of the panel's performance. Cell temperature is an important aspect for power generation from the solar module; the higher the temperature the lower the output. In desert environments, darker colors will run hotter and as a result lose output. Panels that are not white in back tend to use highly reflective glass in the front instead to keep the cells running cooler. Because any color other than white is not a standard product, specification of such would require a special order product resulting in much higher cost, if it is even an option. To date we are not aware of any major panel manufacturer that offers back color options. Post manufacturing color addition would be a double problem. Not only would any color other than white tend to run hotter, but the added coat of paint would add another insulating layer between the cells and ambient air, and may become a maintenance problem due to flaking of paint.	9-87

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Page	Para, Section #	Issue Noted in DEIS	Suggested correction and/or additional rationale	
			The technology chosen for McCoy is likely to be primarily tracker designs. In other words the "back" of the panel would move throughout the day. In the morning it would be facing at a western angle and in the afternoon at an eastern angle, so the background would constantly change. A color selected to match the western background would not necessarily match the eastern background. Also of note is that as the panels track east to west, they are always facing the sun. For a land based observer, looking at the back of the panels would also mean looking into the sun. The background beyond the panels would be largely lost in that situation. For a fixed panel, the situation is similar. The panels would be facing south with the backs northward. During most daylight hours the sun would be tracking around the panels and would be the dominant feature to a south facing observer. For a near field ground based observer, only the first few rows are visible in either case. Perimeter fencing with intermittent slatting to break up the linear viewshed and colors would probably be more effective than adding color to the backs of panels.	9-87 cont.
Chapter 5				
5-2	5.1.5	Implies that New Source Review permitting is relevant to the project.	Request deletion of the 2nd sentence.	9-88
Figures				
Figure	3.3-1	Vegetation communities DDWW on the Alternative linear routes Agriculture is not mapped on the Project	Figure doesn't include all the veg communities/cover types that are in Table 3.3-1 DDWW is not mapped on the Alternative linear routes. Map DDWW on the alternatives Map agriculture per BRTR	9-89
Figure	3.3-1	Dune Habitat	Doesn't match what is in BRTR and therefore impacts would be less than 38 acres. If the mitigation is for MFTL habitat then we should go with BRTR calculations as it encompasses where MFTL were observed.	9-90
Figure	3.3-3	Harwood's Eriastrum and Harwood's Phlox	These are common names for the same species and can be combined.	9-91

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Page	Para, Section #	Issue Noted in DEIS	Suggested correction and/or additional rationale	
Figure	3.3-3	Lack of observations on BSPP	The BSPP surveys did not find species that were present, based on McCoy surveys. They found no Colubrina, few Cynanchum, few desert unicorn plants. Same comment as previous – perhaps there is missing data? Otherwise, suggest discussing why surveys between projects had different results (e.g., bad rainfall year for fall plants = no Abram's spurge on BSPP).	9-92
Figure	3.3-3	Abram's spurge	Plant species is missing from figure.	9-93
Figure	3.4-1	Project site is opaque	Suggest making polygon transparent to the tortoise habitat layer can been seen.	9-94

Appendix B

TECHNICAL MEMORANDUM

TO: Ms. Emily Mix, Tetra Tech, Inc.
Cc: Kenneth Stein, McCoy Solar, LLC

FROM: Alice E. Karl, Ph.D.

DATE: August 22, 2012

SUBJECT: **Abrams' spurge analysis**

1.0 Introduction

Mitigation Measure **VEG-10** in the Draft Plan Amendment and Environmental Impact Statement (DEIS) for the McCoy Solar Energy Project (MSEP)[1] requires that (1) a Special-Status Plant Mitigation Plan be prepared with the goal of avoidance of California Natural Diversity Database (CNDDB) Rank 1 plants, where possible, while retaining at least 75% of the local population, and (2) off-site compensatory mitigation (acquisition or habitat restoration and enhancement) for CNDDB Rank 1 plants at a 3:1 ratio, if avoidance protects less than 75% of the local population.

Abrams' spurge (*Chamaesyce abramsiana*) is a CNDDB Rank S1.2 species that grows on the MSEP site. However, the data and discussion presented in this memorandum demonstrate that Abrams' spurge does not meet the criteria for a CNDDB Rank 1 designation and there is nothing in the Northern and Eastern Colorado Coordinated Management (NECO) Plan[2] requiring a 3:1 mitigation ratio for this species. Abrams' spurge also is not a U.S. Bureau of Land Management (BLM) special-status plant species. Therefore the proposed mitigation measures in the DEIS, and the proposed compensation ratio of 3:1 for impacts to Abrams' spurge, are not warranted for this plant species.

2.0 Abrams' Spurge Ranking Analysis

Abrams' spurge was initially ranked by the California Native Plant Society (CNPS) in January 2001, when only eight occurrences in California were recorded (Table 1). For most of these, the number of individuals was not recorded, so the population size was unknown, but the geographic range included three counties. Between January 2001 and Fall 2011, another seven occurrences, and a fourth county, were added. During Fall 2011 surveys, another 12 occurrences were added and many thousands of Abrams' spurge plants were found both on MSEP and in several locations in the region. More than 4,000 individuals of Abrams' spurge were observed on the MSEP north of Interstate-10 (I-10). A short search of

[1] United States Bureau of Land Management. 2012. McCoy Solar Energy Project Draft Plan Amendment and Environmental Impact Statement. May 2012. CACA #048728. Palm Springs South Coast Field Office, Palm Springs, CA.

[2] BLM and CDFG. 2002. Final Environmental Impact Statement. Proposed Northern & Eastern Colorado Desert Coordinated Management Plan. Bureau of Land Management, California Desert, Riverside, CA.

likely habitats (swales and playas) in the Blythe area and Chuckwalla Valley found thousands of plants along Ford Dry Lake and also on Hayfield Dry Lake, approximately 20 and 60 miles west of MSEP, respectively. Abrams' spurge was the dominant or co-dominant understory species in both locations.

These survey results demonstrate that Abrams' spurge has been undersampled in California. It grows only in the fall, when relatively few fall plant surveys have been conducted, especially on sites of the magnitude of solar facilities. The Fall 2011 MSEP surveys account for 39% of the known occurrences of the species in California (Table 1), strongly suggesting that if fall surveys were conducted in autumns following sufficient summer rainfall, then more Abrams' spurge would be detected. Historically, efforts and funds have primarily been directed toward spring surveys in the desert, when most annuals bloom. There are relatively few species that germinate in response to summer rains and even fewer in low-elevation locations with typically low rainfall and low return for the effort, such as the Blythe area. For example, in 2010 when there was negligible summer rain in Blythe, fall surveys on the Blythe Solar Power Project (BSPP) immediately south of the MSEP were truncated to a reconnaissance level because summer annuals had failed to germinate. Not unexpectedly, there were no observations of Abrams' spurge[3].

2.1 Ranking Definitions and Methodology

Currently, Abrams' spurge is ranked as follows:

- CNDDB Element Rank S1.2/G4[4]
- CNPS Rare Plant Rank 2.2[5]

The CNDDB uses the ranking methodology originally developed by the Nature Conservancy and now maintained by NatureServe[6]. All CNDDB plant ranks are reviewed and ultimately assigned by the Rare Plant Status Review Committee. CNDDB and CNPS jointly manage the Rare Plant Status Review contributors (botanical experts from government, academia, non-governmental organizations [NGOs], and the private sector) and the ranks are the product of a collaborative effort between CNDDB and CNPS.

While **VEG-10** refers to CNDDB-ranked species, both CNDDB and CNPS rankings are discussed below due to the organizations' collaborative effort to determine the rankings, and to provide a more thorough understanding of the ranking methodology.

CNDDB Ranks

CNDDB ranks adhere to the following criteria:

[3] Graham, W. 2010. Blythe Solar Power Project - fall botanical surveys. Memorandum to Alice Harron, Solar Millennium. 09-AFC-6C BSPP BIO-19 Survey Submittal to the CEC and BLM. 12 pp.

[4] California Department of Fish and Game, Natural Diversity Database. 2012. Special vascular plants, bryophytes and lichens list. May 2012. Available online at: http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/SPPlants.pdf. 72 pp.

[5] California Native Plant Society. 2012. Inventory of Rare and Endangered Plants (online edition, V8-01a). Sacramento, CA. Available online at http://www.cnps.org/cnps/rareplants/inventory.

[6] Faber-Langendoen, D., L. Master, J. Nichols, K. Snow, A. Tomaino, R. Bittman, G. Hammerson, B. Heidel, L. Ramsay and B. Young. 2009. NatureServe conservation status assessments: methodology for assigning ranks. NatureServe, Arlington, VA

"G" or "Global" Ranking

G1 = Critically Imperiled: At high risk of extinction due to extreme rarity (often ≤5 populations), very steep declines or other factors.
G2 = Imperiled: At high risk of extinction due to very restricted range, very few populations (often ≤20), steep declines, or other factors.
G3 = Vulnerable: At moderate risk of extinction due to restricted range, relatively few populations (often ≤80), recent and widespread declines, or other factors.
G4 = Apparently Secure: Uncommon but not rare; some cause for long-term concern due to declines or other factors.
G5 = Demonstrably Secure: Common; widespread and abundant.

"S" or "State" Ranking

These are identical to the global rankings with the exception that the rank refers to the imperilment status only with California.

Threats Ranking

Decimal places identify the threat ranking in California, similar to CNPS, below.

.1 = Very threatened in California
.2 = Threatened in California
.3 = No current threats known in California

CNPS Rare Plant Ranks

CNPS Rare Plant Ranks adhere to the following criteria[5]:

Rank 1A = Presumed Extinct in California.

Rank 1B = Rare, Threatened, or Endangered in California and Elsewhere. Rank 1B plants are rare throughout their range, with the majority of them endemic to California. Most have declined significantly over the last century. All meet the definitions of Section 1901 (Native Plant Protection Act) or Sections 2062 and 2067 (California Endangered Species Act) of the California Department of Fish and Game (CDFG) Code – i.e., they are eligible for state listing.

Rank 2 = Rare, Threatened, or Endangered in California, but More Common Elsewhere. Except for being common beyond the boundaries of California, Rank 2 plants would be ranked 1B. Rank 1B plants all meet the definitions of Sections 1901, 2062 and 2067 of the CDFG Code – i.e., they are eligible for state listing.

Rank 3 = Plants About Which We Need More Information – A Review List. Rank 3 species are plants for which the necessary information to assign them to a rank or reject them is lacking.

Rank 4 = Plants of Limited Distribution– A Watch List. Rank 4 species are watch list species that are uncommon enough that their status should be monitored regularly.

Decimal places identify the threat ranking in California:

.1 = Seriously threatened in California (over 80% of occurrences threatened)
.2 = Fairly threatened in California (20-80% of occurrences threatened)
.3 = Not very threatened in California (<20% of occurrences threatened).

2.2 Revised, Accurate Rank for Abrams' Spurge

CNDDB Rank

The new information from the 2011 surveys and all surveys since the initial ranking, which vastly increased the numbers of occurrences and the population size, was incorporated into a re-calculation of the rank for this species. The revised NatureServe/CNDDB Rank was re-calculated based on requisite criteria from NatureServe[7]:

- Abrams' spurge occurs in four counties in California: San Diego, Imperial, Riverside and San Diego. The **Geographic range extent** in California encompasses approximately 21,000 square miles, which **equals Rarity 1 Factor Group "F" (= 8,000 – 80,000 square miles).**
- **Area of occupancy:** Unknown
- **Number of occurrences**: 28 occurrences in California (includes two not yet entered in CNDDB data base) which **equals Rarity 2 Factor Group "C" (= 21-30 occurrences). (Note: If count MSEP occurrences on the solar site as one occurrence, then there are 21 occurrences and still Rarity 2 Factor Group "C".)**
- **Population size in California:** Over 8,000-10,000 individuals which **equals Rarity 2 Factor Group "E" (= 2,500-10,000 individuals) or, more likely Group "F" (= 10,000 – 100,000 individuals).** With focused autumn surveys in years of adequate summer rainfall, the population size would probably be at least Group F, if not more (>10,000 individuals).
- **Number of occurrences with good viability:** There are at least eight occurrences with good viability: six in national or state parks and at least two more that are unlikely to be extirpated. **This equals Group "C" (= 4-12 occurrences with excellent or good viability or ecological integrity).** Furthermore, because this species is enhanced by disturbance that produces compacted areas that hold water (tillage, road shoulders, agricultural sites [Arizona]), as long as the seed source is available and there are available microsites, even if (especially if?) disturbed, then the species should persist in areas where it has been found.
- **Trends:** Unknown
- **Threat Impact –** 32.1% of the known populations (9 of 28) are subject to serious to extreme threats, in which the occurrences are likely to be eliminated or seriously degraded. Accordingly, the **Threat Impact is borderline High** (= 31-70% of the occurrences are subject to extreme degradation/elimination), but 8 of these 9 are on the MSEP solar plant site. If all occurrences on the MSEP solar plant site are counted as one, then 9.5% of the known populations (2 of 21) are subject to serious to extreme threats in which the occurrences are likely to be eliminated or seriously degraded, and the resulting **Threat Impact Category is Low.**

The resulting NatureServe Ranks are S3, if the MSEP solar site occurrences are counted separately, and S4 if they are combined into one occurrence (Attachments 1 and 2, respectively). The S3 rank is

[7] NatureServe. 2009. NatureServe Conservation Status Assessments: Rank Calculator Version 2.0.

arguable because of undersampling (see above); S4 should be considered a more appropriate ranking, which would agree with the second calculated rank after the MSEP solar site occurrences are counted as one occurrence.

Not only is the species undersampled, but the seed bank is apparently present in some or many locations where the habitat is appropriate but sampling has not occurred (e.g., Hayfield Dry Lake). Also, while disturbance is generally considered a threat, Abrams' spurge populations are not necessarily degraded and actually may be enhanced by lower levels of disturbance that create suitable growth sites (e.g., tillage, road cuts). In southern Arizona and northwestern Sonora, Mexico, Abrams' spurge is "seasonally abundant …and an urban and agricultural weed"[8]. Accordingly, unless a site is completely bladed, a population may persist in the face of some disturbance, if the seed bank is present and appropriate microsites remain.

CNPS Rare Plant Rank

According to CNPS[5], Rare Plant Rank 2 plants would be ranked as 1B plants if except for the fact that they are common outside of California. All Rank 1B plants "are rare throughout their range" and meet the definitions of Section 1901 (Native Plant Protection Act) or Sections 2062 and 2067 (California Endangered Species Act) of the CDFG Code – i.e., they are eligible for state listing as threatened or endangered:

- Per Section 1901 – A species "is rare when, although not presently threatened with extinction, it is in such small numbers throughout its range that it may become endangered if its present environment worsens." A species "is endangered when its prospects of survival and reproduction are in immediate jeopardy from one or more causes." Under the Native Plant Protection Act, plants can be considered for protection without regard to their distribution outside the state.

- Per Section 2062 - A species is endangered when it "is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes...."

- Per Section 2067 - A species is threatened if "although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of the special protection and management efforts required in this chapter."

Abrams' spurge does not meet the criteria for listing and therefore does not meet the requirements for a Rank 1B species. It is not rare throughout its range, either globally, where it is seasonally abundant and a common urban and agricultural weed outside California, or in California, where its populations number in the many thousands, and it has been easily found where preferred habitat exists. At best, Abrams' spurge should be considered a CNPS Rank 3 species, and possibly a Rank 4 species.

Using the same values as those used for the CNDDB Threat Impact, above, either 32.1% (9 of 28) or 9.5% (2 of 21) of the known populations are subject to serious to extreme threats in which the occurrences are likely to be eliminated or seriously degraded. The former would result in a CNPS Threat Rank of 0.2 (= 20-80% of the occurrences threatened); the latter would result in a Threat Rank of 0.3 (= <20% of the occurrences threatened).

[8] Felger, R. 2000. Flora of the Gran Desierto and Rio Colorado of Northwestern Mexico. Univ. of Arizona Press. 673 pp.

3.0 BLM Special-Status Species

Abrams' spurge is not a BLM special-status plant (i.e., BLM Sensitive or federally or state-listed)[9]. Nor did the NECO Plan identify Abrams' spurge as a special-status species.

4.0 CEQA Considerations

Under CEQA §15380, a species is considered to be endangered, rare or threatened if: (1) "its survival and reproduction in the wild are in immediate jeopardy from one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, disease, or other factors;" or (2) "although not presently threatened with extinction, the species is existing in such small numbers throughout all or a significant portion of its range that it may become endangered if its environment worsens; or (3) the species is likely to become endangered within the foreseeable future throughout all or a significant portion of its range and may be considered 'threatened' as that term is used in the federal Endangered Species Act" (FESA)[10]. A plant species is presumed to be endangered, rare or threatened if it is listed under California Code of Regulations (CCR) Title14 670.2[10] (i.e., listed under the California Endangered Species Act [ESA]), or 50 Code of Federal Regulations (CFR) 17.12[11] (i.e., listed under FESA). As discussed above, Abram's spurge does not meet any of these criteria under CEQA for a threatened, endangered or rare species and is not currently a listed species under CESA or FESA.

Under CEQA §15126.4(a)(3)), mitigation measures are required only for effects that are significant. A significant effect is "a substantial, or potentially substantial, adverse change"[12]. For effects to be significant relative to plants, the project must "…threaten to eliminate a plant or animal community" or "substantially reduce the number or restrict the range of an endangered, rare or threatened species" (§15065) [12].

As discussed in Section 2.2, above, Abrams' spurge does not meet the criteria for an endangered, rare or threatened species. Nor will the Project threaten to eliminate Abrams' spurge. Accordingly, mitigation for impacts to Abram's spurge is not required.

5.0 NEPA Considerations

Under §1508.27 of the Council on Environmental Quality (CEQ) Regulations for the National Environmental Policy Act (NEPA), a significant impact is determined based on both context and intensity[13]. Context requires consideration of the impact based on the affected region, affected interests and the locality (§1508.27(a)). Intensity is determined by "the degree to which an 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" (§1508.27(b)(9)).

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[9] BLM. 2011. BLM Special Status Plants under the jurisdiction of the California State Office as of November 2, 2011. Available online at http://www.blm.gov/pgdata/etc/medialib/blm/ca/pdf/pa/botany. 13 pp.

[10] State of California Office of Administrative Law. California Code of Regulations, Title 14. Accessed online at http://weblinks.westlaw.com on 22 July 2012.

[11] Office of the Federal Register, National Archives and Records Administration. Code of Federal Regulations, Title 50, Part 17. Accessed online at http://www.archives.gov/federal-register on 30 July 2012.

[12] Legislative Council of California. Public Resources Code 21068. Accessed online at http://www.leginfo.ca.gov on 30 July 2012.

[13] Council on Environmental Quality (CEQ). Regulations and Guidance. Accessed online at http://ceq.hss.doe.gov on 30 July 2012.

As discussed in Section 2.2, above, Abrams' spurge does not meet the criteria for an endangered or threatened species. Consequently impacts to Abrams' spurge would not be considered to be significant under NEPA, and mitigation is not required.

6.0 Compensation Ratios

In the permitting of recent (since 2008) solar projects, a 3:1 ratio has been applied to compensate for impacts to state and/or federally listed species, either for single species (e.g., Ivanpah Solar Energy Project [ISEGS]) or as a combined ratio for multiple listed species (e.g., Beacon Solar Energy Project, Rice Solar Energy Project, Palmdale Hybrid Power Project [PHPP], Victorville 2 Hybrid Power Project [VV2]). This ratio also has been applied to BLM Sensitive habitats, specifically Sand Dunes and Desert Dry Wash Woodlands (Genesis Solar Energy Project [GSEP], Blythe Solar Power Project [BSPP], Palen Solar Power Project [PSPP]).

Requirements for Rank 1 or other non-listed special-status species have varied, but a 3:1 ratio has been used on only a few projects: GSEP, BSPP, and PSPP. It is critical to note that those projects were in relatively unique circumstances that do not apply to the MSEP. On those three projects, fall plant surveys had not yet been conducted prior to the conclusion of permitting and, as a result, the California Energy Commission took a conservative approach to mitigation.

Rank 1 and Rank 2 plants *may* meet the criteria for state listing, but they are not listed and may never be listed. Therefore, a more thorough analysis is warranted to ensure that a compensation ratio typically reserved for a listed species is not erroneously applied to a non-listed species, regardless of precedent. Such an analysis was completed for Abrams' spurge, above, and concludes that the actual rank should be substantially lower.

7.0 Conclusion

Although Abrams' spurge occurs on MSEP, data from only one brief survey demonstrated that it is far more widespread and common in California than formerly known. The species does not meet the criteria for (1) state or federal listing under CESA or FESA, respectively, or (2) a CNDDB or CNPS Rank 1 or species. Using the CNDDB methodology for assigning ranks and incorporating new data, Abrams' spurge would be correctly ranked as S3 or S 4 (i.e., vulnerable or apparently secure in California, respectively). Impacts to this species do not reach the level of "significance" under CEQA or NEPA. Accordingly, mitigation in the form of offsite compensation is not warranted for this species.

Table 1. Occurrences of Abrams' spurge in the CNDDB database[1].

CNDDB Occurrence No.	Date	Number of Plants	Location	Ecological	CNDDB Origin Note	Comments
1	1902	Not recorded	4 mi. north of Calexico, Imperial Co.	No information	Natural, native occurrence	Abrams original collection; presumed extant
3	1904	Not recorded	Near Heber, Imperial Co.	No information	Natural, native occurrence	Type locality; may be same as Occurrence 01; presumed extant
4	1912	Not recorded	Brawley, Imperial Co.	No information	Natural, native occurrence	Possibly extirpated (based on?)
5	2000	Substantial population	Riverside Co., gas line road south of I-10 and east of Ford Dry Lake exit	In road depressions and local washes; enhanced by compacted roads, flow off roads	Natural, native occurrence	Extant; revisited in 2009, 2010, 2011 for McCoy surveys
6	1912	Not recorded	Either near Alamo River or "Old Beach" area, in Salton Basin near Calexico, Imperial Co.	No information	Natural, native occurrence	Presumed extant
7	1990	Not recorded	Near Essex Rd., San Bernardino Co.	Native scrub	Natural, native occurrence	In Mojave National Preserve; presumed extant
8	1990	Not recorded	Near Lanfair Rd., S. Bernardino Co.	Native scrub	Natural, native occurrence	In Mojave National Preserve; presumed extant
9	2006	Not recorded	Vallecito Ck.; San Diego Co.	In highly disturbed field, subject to past grazing	Natural, native occurrence	Anza-Borrego State Park; presumed extant
10	2003	Not recorded	North end of Blair Valley, San Diego Co.	Along margin of dry lake; assumed native	Natural, native occurrence	Anza-Borrego State Park; presumed extant

CNDDB Occurrence No.	Date	Number of Plants	Location	Ecological	CNDDB Origin Note	Comments
11	2007	Not recorded	Earthquake Valley, San Diego Co.	Along margin of dry lake in native habitat, adjacent to parking area	Natural, native occurrence	
12	2008	>100 plants	San Felipe Valley, San Diego Co.	In road shoulder, native habitat	Natural, native occurrence	At entrance to CDFG property
13	1968	Not recorded	Country Club Rd., Palm Desert, Riverside Co.	Unknown	Natural, native occurrence	
14	2001	Common	Along Hwy 62, San Bernardino Co.	Native scrub	Natural, native occurrence	
15	2005	50 plants	Near Winkle Springs, east Mojave Desert; San Bernardino Co.	Native scrub	Natural, native occurrence	
16	2004	Fewer than 10 plants	In JTNP near Hwy 62, San Bernardino Co.	Native scrub	Natural, native occurrence	Joshua Tree National Park
17	2011	10 plants	MSEP linear route, north of I-10 at southeast end of McCoy Mts.	Native scrub	Natural, native occurrence	MSEP occurrence on linear. Occurrence notes say threatened by Off-Highway-Vehicle (OHV) use and development but there is little OHV use in area, except in borrow pit. This location would be a linear, which can avoid specific, small sites.
18	2011	2 plants	MSEP solar plant site; NW 1/4 of S3	Native scrub	Natural, native occurrence	MSEP occurrence. Pending solar plant site. States invasive species and OHV use but this is misleading. Negligible OHV use and invasive species are in some, not all washes; occasional to common to abundant.
19	2011	40 plants	MSEP solar plant site; SE 1/4 of S34	Native scrub	Natural, native occurrence	Typos in occurrence form - SE1/4 of S34 is correct. MSEP occurrence. Pending solar plant site. States invasive species and OHV use but this is misleading. Negligible OHV use and invasive species are in some, not all washes; occasional to common to abundant.

CNDDB Occurrence No.	Date	Number of Plants	Location	Ecological	CNDDB Origin Note	Comments
20	2011	196-246 plants (combined occurrences)	MSEP solar plant site SE 1/4 of S33	Native scrub	Natural, native occurrence	MSEP occurrence. Pending solar plant site. States invasive species and OHV use but this is misleading. Negligible OHV use and invasive species are in some, not all washes; occasional to common to abundant.
21	2011		MSEP solar plant site; SW 1/4 of S34	Native scrub	Natural, native occurrence	MSEP occurrence. Pending solar plant site. States OHV use but this is misleading. Negligible OHV use.
22	2011	>1698 plants (combined occurrences)	MSEP solar plant site; S27	Native scrub	Natural, native occurrence	MSEP occurrence. Pending solar plant site. States OHV use but this is misleading. Negligible OHV use.
23	2011		MSEP solar plant site; SE 1/4 of S27	Native scrub	Natural, native occurrence	MSEP occurrence. Pending solar plant site. States OHV use but this is misleading. Negligible OHV use.
24	2011	>2000 plants (combined occurrences)	MSEP solar plant site; N part of S28	Native scrub	Natural, native occurrence	MSEP occurrence. Pending solar plant site. States OHV use but this is misleading. Negligible OHV use.
25	2011		MSEP solar plant site; NW 1/4 of S28	Native scrub	Natural, native occurrence	MSEP occurrence. Pending solar plant site. States OHV use but this is misleading. Negligible OHV use.
26	2011	~75 plants	MSEP linear route	Native scrub	Natural, native occurrence	Mis-mapped by CNDDB as NW of McCoy Mts., although location instructions also are contradictory
27	1963	Not recorded	East of El Cajon on I-8; Riverside Co.	Foothills; native scrub	Natural, native occurrence	
X1[2]	2011	1000s of plants	Ford Dry Lake , Riverside Co.	Common to abundant in washes along gas line road	Natural, native occurrence	Not likely to be further disturbed, or if so, would not decrease population unless all swales and washes were eliminated, which does not seem feasible for any kind of linear facilities development there.
X2	2011	1000s of plants	Hayfield Dry Lake, Riverside Co.	In tilled lakebed	Due to watering of the lake (water injection/storage project)	Without water influx, population might not exist except in average to above-average rainfall years. But, the large population here indicates that the seed source is in the area, so there are undoubtedly other, undiscovered populations in this area.

1. Source: CNDDB. 2011. Rarefind Version 3.1.0. Commercial version dated 2 July 2011.
2. Occurrences in red font are in CNDDB unprocessed data base.

Attachment 1. NatureServe rank calculator for Abrams' spurge, with all MSEP occurrences in Table 1 counted as separate occurrences.

Rank Calculator Form

Remember to adopt a moderate attitude, taking care to identify the most likely plausible range of values, excluding extreme or unlikely values.

Change to return GRanks, NRanks, or Sranks: S — change using dropdown; also affects Calculator Table

Enter values below, text in off-white and light-green cells and dropdowns in yellow and blue cells.
Scroll down in dropdowns for additional choices.
To clear an individual value, put your cursor in the drop-down cell and press Delete.

		Species or Ecosystem Scientific Name	Chamaesyce abramsiana	
		Type (enter "infraspecies" for a T-Rank)		
		Optional Information: Element ID		global, national, or subnational
		Elcode		
		Common Name	Abrams spurge	
		Classification		**COMMENTS (Place cursor in cell to see full text.)**
Rarity1	1	Range Extent	F	F = 20,000-200,000 sq km (~8,000-80,000 sq mi)
	2	Area of Occupancy:		FILL OUT ONLY 1 OF FOLLOWING 3 FIELDS
		Direct estimate (ecosystems) *OR*		
		4 km² grid cells (species) *OR*		
		1 km² grid cells (linear species)		
Rarity2	1	Number of Occurrences	C	C = 21 - 80
	2	Population Size	E	E = 2,500 - 10,000 individuals
	2	Good Viability/Ecological Integrity:	C	FILL OUT ONLY 1 OF FOLLOWING 2 FIELDS
		Number of Occurrences *OR*	C	C = Few (4-12) occurrences with excellent or good viability or ecological integrity
		Percent Area		
X	1	Environmental Specificity (opt.)		
Trend/Threat	2	Short-term Trend		
	1	Long-term Trend		
	1	Threat Impact	BC	BC = High - Medium
X	1	Intrinsic Vulnerability (opt.)		
		Minimum factors requirement met?	TRUE	

Calculated Rank	S3	Always review the calculated rank.
Assigned Rank*	S4	**Adjusted Rank**
Rank Adjustment Reasons	If all occurrences on the solar site are counted as 1 occurrence (1 population), then the threat impact is Low and the calculated rank is S4	
Assigned Rank Reasons	The species is undersampled in California: 39% of the occurrences were found in a single year due to focused surveys. Accordingly, the species would be expected to occur in other locations/years as well, given focused sampling. The seed bank appears to be present where the habitat is appropriate for a population to exist, because the species was found in places that were not previously known but might be expected due to habitat. Finally, the species is enhanced by a certain degree of disturbance, so unless a site is largely razed, then the population there may persist, assuming a seed source is present.	
Rank Author	Alice Karl	
Rank Date	15-Jul-2012	Enter Ctrl ; for today's date.
Rank Calculator Internal Notes		

*In this field, enter the calculated rank if you agree with it, or enter an adjusted rank.

Reasons to Adjust a Calculated Rank ***(be sure to document the details in the 'Rank Adjustment Reasons' field):***

J-90

Attachment 2. NatureServe rank calculator for Abrams' spurge, with all MSEP occurrences on the solar plant site combined into one occurrence.

Rank Calculator Form

Remember to adopt a moderate attitude, taking care to identify the most likely plausible range of values, excluding extreme or unlikely values.

Change to return GRanks, NRanks, or Sranks: **S** change using dropdown; also affects Calculator Table

Enter values below, text in off-white and light-green cells and dropdowns in yellow and blue cells.
Scroll down in dropdowns for additional choices.
To clear an individual value, put your cursor in the drop-down cell and press Delete.

			Species or Ecosystem Scientific Name	Chamaesyce abramsiana	
			Type (enter "infraspecies" for a T-Rank)		
			Optional Information: Element ID		global, national, or subnational
			Elcode		
			Common Name	Abrams spurge	
			Classification		**COMMENTS (Place cursor in cell to see full text.)**
Rarity weight: 0.5	Rarity1	1	Range Extent	F	F = 20,000-200,000 sq km (~8,000-80,000 sq mi)
		2	Area of Occupancy:		FILL OUT ONLY 1 OF FOLLOWING 3 FIELDS
			Direct estimate (ecosystems) *OR*		
			4 km² grid cells (species) *OR*		
			1 km² grid cells (linear species)		
	Rarity2	1	Number of Occurrences	C	C = 21 - 80
		2	Population Size	E	E = 2,500 - 10,000 individuals
		2	Good Viability/Ecological Integrity:	C	FILL OUT ONLY 1 OF FOLLOWING 2 FIELDS
			Number of Occurrences *OR*	C	C = Few (4-12) occurrences with excellent or good viability or ecological integrity
			Percent Area		
	X	1	Environmental Specificity (opt.)		
Trends 0.3	Trend/Threat	2	Short-term Trend		
		1	Long-term Trend		
Threats 0.2		1	Threat Impact	D	D = Low
	X	1	Intrinsic Vulnerability (opt.)		
			Minimum factors requirement met?	TRUE	

Calculated Rank	S4	Always review the calculated rank.
Assigned Rank*	S4	**Verified Rank**
Rank Adjustment Reasons		
Assigned Rank Reasons		
Rank Author	Alice Karl	
Rank Date	15-Jul-2012	Enter Ctrl ; for today's date.
Rank Calculator Internal Notes		

***In this field, enter the calculated rank if you agree with it, or enter an adjusted rank.**

Reasons to Adjust a Calculated Rank ***(be sure to document the details in the 'Rank Adjustment Reasons' field):***

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Appendix C

TETRA TECH EC, INC.

TECHNICAL MEMORANDUM

FROM: Emily Mix (Tetra Tech Inc.) and Dr. Alice Karl

DATE: August 20, 2012

SUBJECT: **McCoy Solar Energy Project Comments on the Bighorn Sheep Impact Analysis in the Draft Environmental Impact Statement**

Introduction

This technical memorandum has been prepared to provide comments on mitigation requirement WIL-11 for impacts on Nelson's bighorn sheep (*Ovis canadensis nelsoni*) in the Draft Plan Amendment/Draft Environmental Impact Statement for the McCoy Solar Energy Project (DEIS MSEP; Bureau of Land Management [BLM] 2012). WIL-11 stipulates that McCoy Solar, LLC would be obligated to compensate for the loss of 186 acres of bighorn sheep spring foraging habitat[1]. This memo provides scientific support to demonstrate that this mitigation requirement is not necessary or appropriate for the following reasons: (1) there is no existing Nelson's bighorn sheep spring foraging habitat on the Project site because bighorn are not present within the MSEP or the adjacent McCoy Mountains, (2) even if bighorn sheep occupied the McCoy Mountains, there is no evidence that bighorn sheep would use this valley's drainages for foraging; in fact, bighorn sheep behavior indicates otherwise, and (3) future reintroduction or re-occupation of the McCoy Mountains is mere speculation and the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA) do not require mitigation for impacts that do not exist or are purely speculative.

Bighorn Status

Nelson's bighorn sheep is a BLM Sensitive species and a state-managed game species (i.e., hunting of this species is managed by the California Department of Fish and Game [CDFG]). The DEIS erroneously states that this subspecies is a California Fully Protected species; the only two subspecies of *Ovis canadensis* that are Fully Protected are the peninsular bighorn sheep, which is a Distinct Population Segment [DPS] of the subspecies *O. c. nelsoni*, and the Sierra Nevada bighorn (*O. c. nelsoni sierrae*) (CDFG 2011).

Bighorn Sheep Analysis

Bighorn sheep are not present within the MSEP or the McCoy Mountains to the west; therefore, the MSEP would have no impacts on bighorn sheep. Bighorn sheep have been documented as extirpated from the McCoy Mountains since 1957 (Weaver 1957, Torres et al. 1994, Epps et al.

[1] WIL-11 also includes a compensation option to create a new water source for the Southern Mojave metapopulation of bighorn sheep; however, based on recent conversation s with BLM, we understand that this measure is not preferred and will likely be removed from WIL -11 in the Final EIS. Therefore, it is not addressed in this memo. If it were to remain; however, the Project applicant would oppose it for the same reasons set forth in this memorandum regarding the remainder of WIL-11.

2003, Bleich and Weaver 2007). Spring 2011 biological resources surveys of the MSEP and vicinity (Tetra Tech and Karl 2011) and helicopter surveys conducted for golden eagles (*Aquila chrysaetos)* in 2010 and 2011 (Wildlife Research Institute [WRI] 2010, 2011*)* found no bighorn sheep or their sign in the McCoy Mountains or the MSEP survey area, confirming that this range is still unoccupied*.* The Spring 2011 surveys (Tetra Tech and Karl 2011) were systematic ground surveys designed to achieve 100% visual coverage of the survey area. The survey area encompassed a larger area than the currently proposed MSEP footprint, extending west into the toe slopes of the McCoy Mountains (Tetra Tech and Karl 2011). The helicopter surveys conducted by WRI for golden eagles, during which all sightings of bighorn sheep were recorded, detected no bighorn in the McCoy Mountains. However, three ewes were observed in the Little Maria Mountains, approximately three miles north of the McCoy Mountains (10 miles north of MSEP).

The DEIS states that "Repopulation in the McCoy Mountains could happen naturally or could happen deliberately via translocation and development of new water sources." The Little Maria Mountains are an adjacent, occupied range and there are no existing barriers to movement to the McCoy Mountains; however, bighorn sheep do not currently occupy the McCoy Mountains. Arlington Mine Road, a dirt road, travels east/west between the two ranges but is not a barrier to sheep movement. Because there is no barrier, other unknown factors must preclude the sheep from inhabiting the McCoy Mountains. Without site-specific data we can only speculate that these factors may include inadequate amounts of forage, water, security, and cover, and/or existing disturbance. Regardless of why bighorn do not currently occupy the McCoy Mountains, they are not currently present despite having unobstructed access, and even if bighorn sheep reintroduction to the area was attempted in the future, there is no reason to believe that reintroduction would be successful.

Requiring compensation based on a speculative future occupation is not supported in the Northern and Eastern Colorado Desert (NECO) Plan (BLM and CDFG 2002) or in any law, regulation or land use plan governing the MSEP. Mitigation for impacts to special-status species under NECO (or under any federal or state regulatory program or land use plan governing special-status species) is consistently only required for impacts to *occupied* habitat, or habitat where "presence" is assumed when there are insufficient data to support "absence." For MSEP, data unquestionably support that bighorn do not occupy the McCoy Mountains or MSEP and, therefore, not only is mitigation unwarranted, requiring mitigation would be a substantial departure from historical and current practices where mitigation is required.

If bighorn sheep were to repatriate the McCoy Mountains in the future, it is highly unlikely that they would use any part of the MSEP to forage. This is because bighorn require steep, rocky mountain slopes that offer an escape from predators, and when foraging in open areas, they stay close to the rugged terrain and do not venture out into valleys (Wehausen 2005, Zeiner et al. 1988-1990). Although bighorn have been observed on bajadas, flat areas such as valley floors are used as movement corridors between mountain ranges (USFWS 2000) or between other resource patches, like water sources. Habitat use (e.g., foraging patterns) may vary depending on the herd's needs, which hinge on many site-specific factors, including the condition of the mountain range, health of the individuals, and level of disturbance to the population (Steel and Workman 1990). But, it is highly speculative to assume and, moreover, highly unlikely that bighorn, even if present in the adjacent mountains, would forage within the MSEP. Therefore, based on preferred bighorn habitat in relation to the location of the MSEP, and lack of site-specific data to support the claim that bighorn would use the MSEP to forage, mitigation for potential impacts is unsupported.

The MSEP would be developed outside of the BLM-designated bighorn sheep Wildlife Habitat Management Area (WHMA) that encompasses the McCoy Mountains. As stated in the DEIS, "The NECO Plan addresses the conservation of the bighorn sheep through the designation of Bighorn Sheep WHMAs, which overlay the *entire range of their occurrence (*emphasis added) and movement corridors" (BLM 2012), which implies that BLM considered foraging habitat when establishing WHMAs. During initial siting, McCoy Solar intentionally avoided the WHMA, and based on early feedback from BLM, CDFG, and FWS (U.S. Fish and Wildlife Service), pulled the western solar plant site boundary farther east from the McCoy Mountains to avoid potential impacts to desert tortoise, which would also benefit bighorn sheep should repatriation into the McCoy Mountains be attempted in the future. Consequently, at its nearest point, the MSEP solar plant site would be approximately 0.5 mile east of the boundary of the bighorn sheep WHMA. Because the entire potential range of bighorn sheep is accounted for within the WHMA and the MSEP will be outside of this WHMA, mitigation to compensate for impacts on bighorn, should they inhabit the McCoy Mountains in the future, is unwarranted.

McCoy Solar would also like to point out that it appears that the 186 acres of compensation lands called out in WIL-11 was inadvertently derived from the acres of "Ephemeral 'Riparian' Drainages" that would be disturbed by *all* components of the Project: Unit 1, Unit 2, the gen-tie, gen-tie access road, and the distribution line (see Table 3.3-1 on page 3.3-3 in the DEIS). McCoy Solar questions whether the BLM intended to suggest that mitigation for the Nelson's bighorn sheep should be linked to all Project drainages, both north and south of Interstate 10.

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Appendix D

TETRA TECH EC, INC.

TECHNICAL MEMORANDUM

FROM: Dr. Alice Karl and Emily Mix (Tetra Tech Inc.)

DATE: August 22, 2012

SUBJECT: **Desert Tortoise Connectivity Issues**

1.0 Introduction

WIL-4 (Compensatory Mitigation for Desert Tortoise Habitat Losses) in the McCoy Draft Environmental Impact Statement (DEIS)[1] (Page 4.4-31), prescribes selection criteria for Desert Tortoise compensation lands. The Project Applicant, McCoy Solar, LLC ("McCoy Solar") respectfully requests that the first criterion be changed as follows:

> a. be within the Colorado Desert Recovery Unit; ~~with potential to contribute to desert tortoise habitat connectivity and build linkages between desert tortoise designated critical habitat, known populations of desert tortoise, and/or other preserve lands;~~

Rationale for this change is that the desert tortoise habitat impacted by the McCoy Solar Energy Project (MSEP) does not contribute to desert tortoise population/genetic connectivity or in any way serve as a linkage between desert tortoise designated critical habitat, known populations of desert tortoise, and/or other preserve lands. To address this requested change, this memorandum discusses: (1) connectivity, both how connectivity is defined relative to desert tortoises and how connectivity, and thus the tortoise population, may be affected cumulatively by the MSEP and Blythe Solar Power Project (BSPP); and (2) the location of compensation lands to mitigate the loss of desert tortoise habitat resulting from construction of the MSEP.

McCoy Solar also questions whether the MSEP and BSPP would "create a 5-mile-long wildlife movement barrier that …..would pose an impediment to east-west desert tortoise movement near the two project sites" (see Page 4.4-26). Given the lack of recent desert tortoise sign on most of the project footprint, the DEIS correctly recognizes that:

> "The desert tortoise occurs in low population densities in the Palo Verde Valley, with sparse populations noted at the base of the McCoy Mountains and limited presence east of the MSEP and BSPP." Further, "…the remaining 1-mile-wide movement corridor is of sufficient size that remaining tortoise populations may be sustained and would not be

[1] United States Bureau of Land Management. 2012. McCoy Solar Energy Project Draft Plan Amendment and Environmental Impact Statement. May 2012. CACA #048728. Palm Springs South Coast Field Office, Palm Springs, CA.

isolated from the regional populations. With substantial habitat connectivity remaining following the cumulative development scenario, the reduced size of the movement corridor presents an adverse, though not substantial impact to the desert tortoise" (Page 4.4-26)."

2.0 Desert Tortoise Connectivity Analysis

Connectivity is the genetic continuity within a population. It can be maintained when a species lives in contiguous habitat patches and/or when it moves easily among disjunct, often distant, habitat patches. Relatively low-mobility species, such as the desert tortoise, exhibit the first pattern of connectivity, while highly mobile species, such as many ungulates, regularly move among habitat patches. Tortoise movements are primarily within suitable habitat patches, with tortoises either moving within their home ranges or during dispersal. The latter have been observed in large immature tortoises (i.e., older "teenagers"), which may disperse long distances as they reach sexual maturity, and an occasional adult female, which may travel a few miles to lay her eggs[2]. For the most part, however, adult tortoises exhibit fairly tight, long-term fidelity to their home ranges and, once a home range is established, have not been observed to move long distances (miles) to new areas. Accordingly, for connectivity to function for desert tortoises, tortoises must live and interact within connected suitable habitat patches, thereby maintaining the genetic continuity among population segments. The U.S. Fish and Wildlife Service (FWS) recognizes this in their connectivity model[3], wherein the linkages are potential habitat patches between conservation areas that have higher potential for occupation. Population linkages are popularly termed "corridors," possibly because linkages for highly mobile species are often thought to be relatively linear, possibly to comprise the shortest, safe distance between resource patches. For desert tortoises, the term "corridor" is probably a misnomer, since habitat patches with lower tortoise densities ("linkages") may be any shape, depending on the available habitat, rather than a linear passageway or "corridor."

While the MSEP, or the MSEP combined with the BSPP, would present some degree of barrier to east-west movement by tortoises, to assess this barrier's effect on population functioning one has to consider (1) how much east-west movement there might be and (2) if truncation of this movement would inhibit genetic continuity and thereby compromise the population.

Surveys for both the MSEP and BSPP observed very little evidence of tortoise use on the lower bajada in the east (Attachments 1 and 2). This is consistent with the low quality habitat there, which further deteriorates to the east along with increasing agricultural development. The very low tortoise densities and poor habitat quality in the east demonstrate that there are very few tortoises that may be moving in or to that area. More importantly, MSEP alone or MSEP and BSSP combined do not comprise a linkage between higher quality habitat patches. In summary, there is a negligible, if any, effect on genetic continuity from the projects' minor barrier to local movement.

This conclusion is consistent with the FWS connectivity model, which does not identify either project as being in a Priority 1 or 2 linkage zone (Attachment 3). Priority 1 areas are "potential habitat linkages between existing conservation areas that have the best chances of sustaining connectivity for desert tortoise populations." Priority 2 areas are "other blocks of habitat with the

[2] Karl, A.E. Ward Valley tortoise relocation project - field notes
[3] FWS. 2012. Explanation of map of FWS-identified priority desert tortoise connectivity areas. Unpublished memo. Available online at http://www.fws.gov/cno/energy.html. 1 pp.

greatest potential to support populations of desert tortoises, outside least cost corridors, (which) may also have important value to recovery."[3]

The greatest tortoise densities in both project vicinities occur near the McCoy Mountains. Both projects left this area, with its higher quality habitat and highest local occupancy, intact, thereby maintaining the population's genetic continuity in the projects' vicinity.

3.0 Selection Criteria for Compensation Lands

Selection Criterion 1.a. in WIL-4 (i.e., the criterion in question; see Section 1.0, above) appears to essentially re-state the other criteria found later in the selection criteria list, so it simply may be an unclear attempt to summarize those other criteria. Because of this uncertainty, the analysis of selection criteria is re-visited below.

McCoy Solar recognizes that compensation lands for desert tortoises must be valuable to the population and species. The Project Biological Assessment[4] (also presented as an "applicant-proposed measure in the DEIS) states that compensation lands must meet the following criteria (font color changed for emphasis):

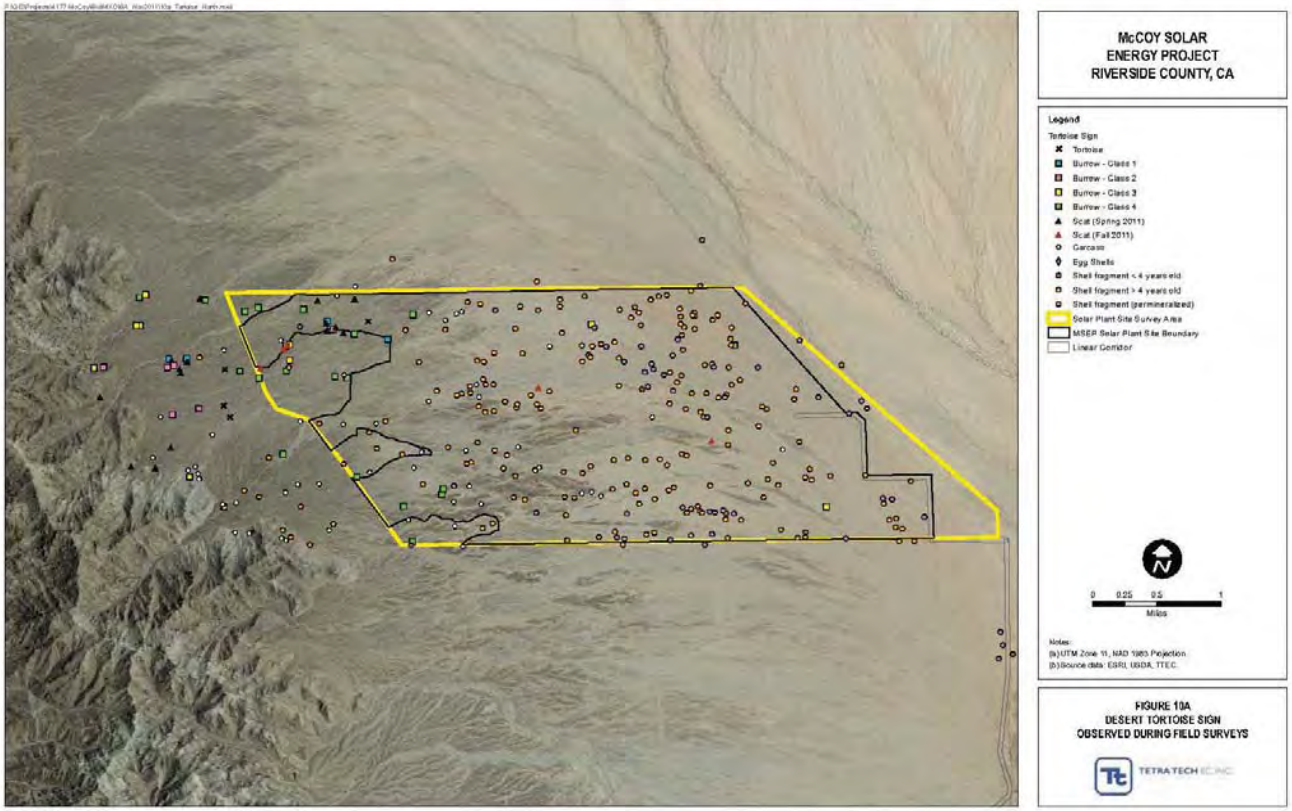
- Compensation lands should be part of a larger block of lands that are either already protected or planned for protection, or feasibly could be protected by a public resource agency or a private biological reserve organization.
- Parcels should provide habitat that is of the same or higher quality for desert tortoise than the habitat being impacted by the Project. Preferably, the lands would comprise sufficiently good habitat that they are either currently occupied or could be occupied by the desert tortoise once they are protected from anthropogenic impacts and/or otherwise enhanced.
- Parcels should not be subject to such intensive recreational, grazing, or other uses that recovery is rendered unlikely or lengthy. Nor should those invasive species that are likely to jeopardize habitat recovery (e.g., Sahara mustard be present in uncontrollable numbers, either on or immediately adjacent to the parcels under consideration.)
- The parcels should be connected to occupied desert tortoise habitat or in sufficiently close proximity to known occupied tortoise habitat such that an unencumbered genetic flow is possible. Preferably, the existing populations of desert tortoise on these lands would represent populations that are stable, recovering, or likely to recover.
- The parcels should be consistent with the goals, objectives, and recovery actions of an accepted recovery strategy (e.g., recovery plan) for the desert tortoise, if possible.

Certainly, lands also should be within the same population and/or recovery unit, as stated in the DEIS. These criteria ensure that compensation lands will assist in population persistence and recovery. MSEP lands are not, however, within a biologically significant or FWS-recognized desert tortoise linkage, as discussed in Section 2.0 above. Nor are they near critical habitat or a DWMA, much less linking these and/or other preserve lands. Therefore, compensation lands should not be held to a standard of contributing to linkages between critical habitat units or contributing to an FWS potential connectivity linkage as expressed in their model, specifically. Accordingly, McCoy Solar should not be required to secure mitigation lands that contribute to such connectivity/linkages.

[4] TetraTech EC, Inc. 2012. McCoy Solar Energy Project Biological Assessment. Prepared for the U.S. Bureau of Land Management, California Desert District Office, Moreno Valley, CA. 92 pp.

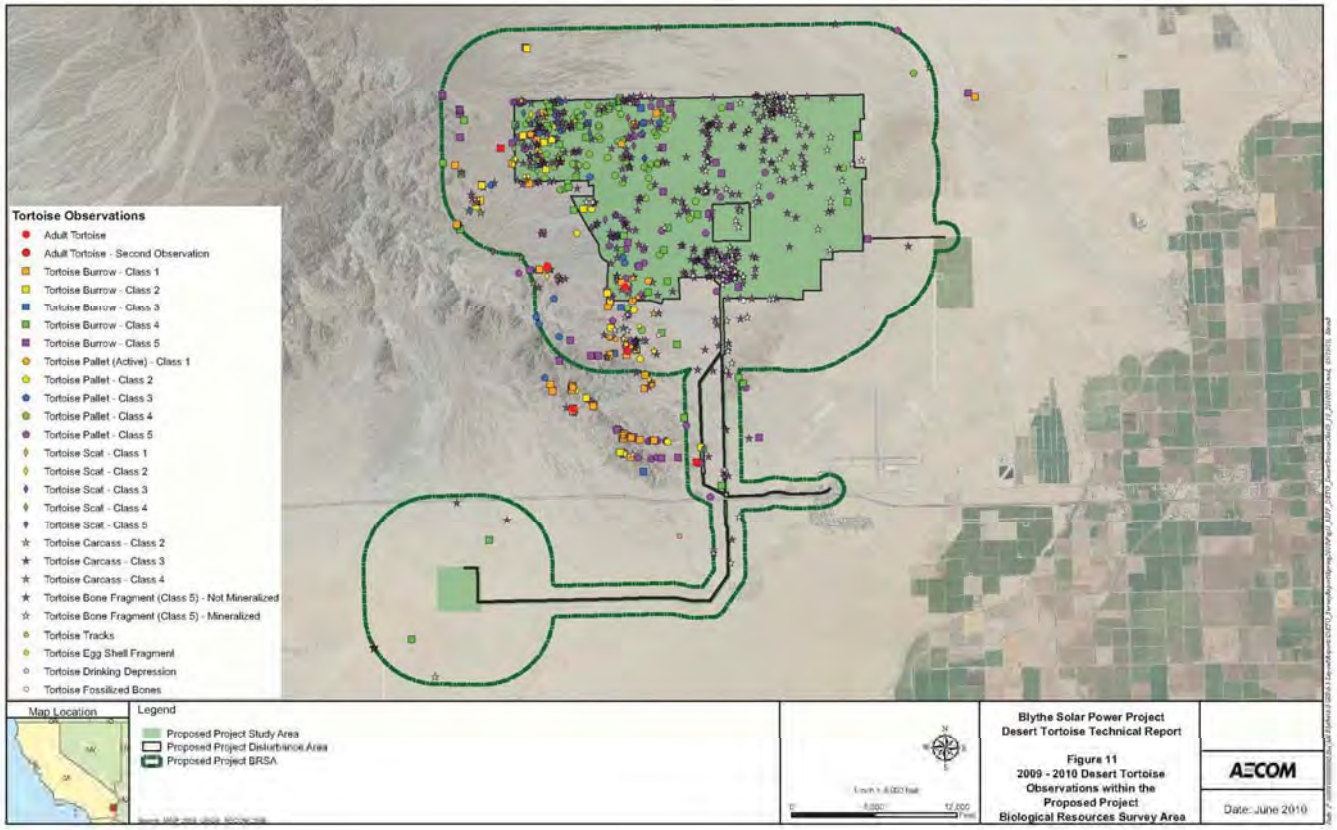
The applicant-proposed criteria listed above for connectivity to occupied habitat, on lands of equal or better habitat quality, to ultimately consolidate a block of protected tortoise habitat, comprise a reasonable representation of compensation lands criteria for MSEP. If the BLM chooses not to adopt the applicant-proposed selection criteria, McCoy Solar requests that the BLM adopt the criteria that BLM proposed in the DEIS, as modified in Section 1.0 above.

Attachment 1. Desert tortoise survey results on the MSEP[5]



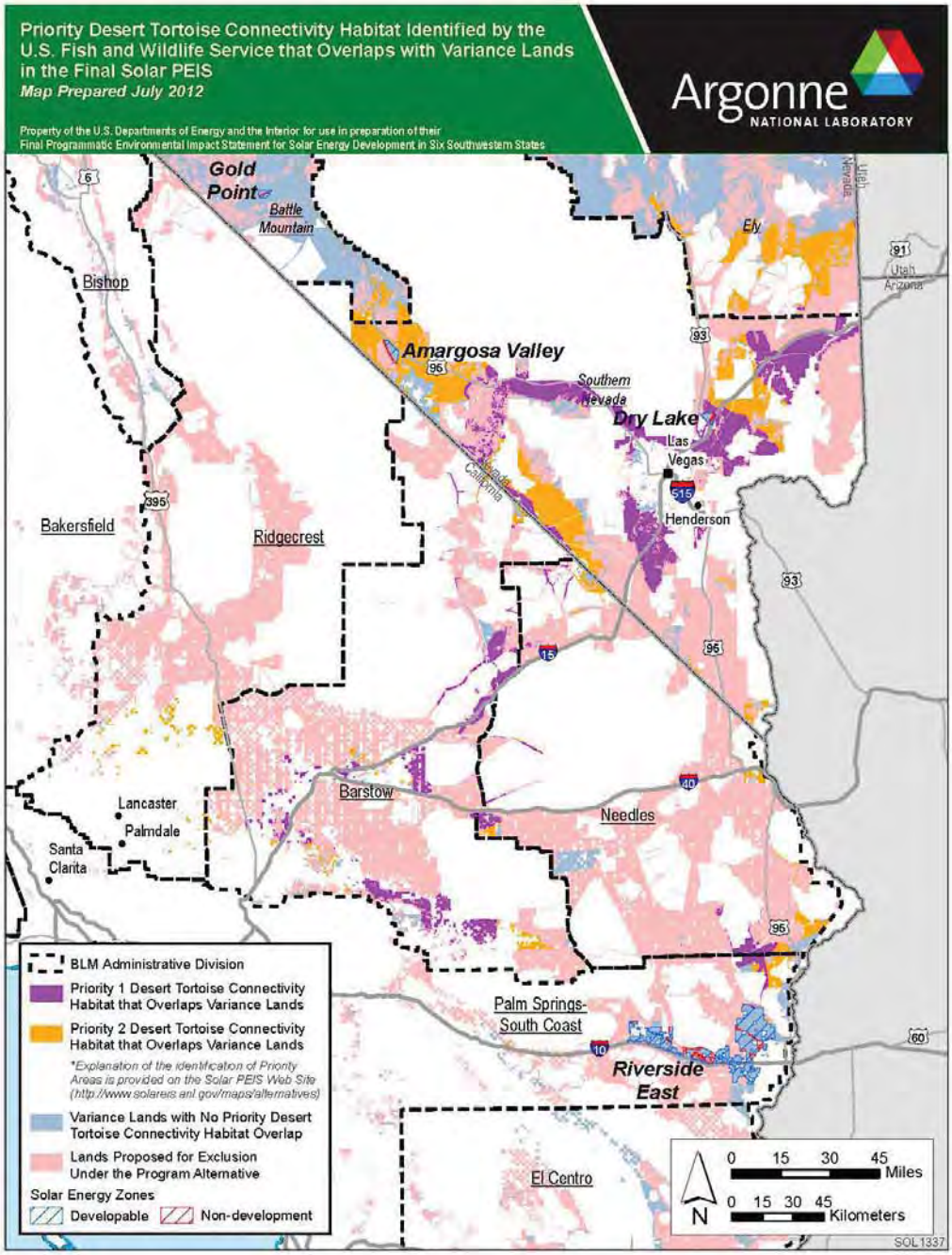
[5] Source: Tetra Tech EC, Inc. 2012. McCoy Solar Energy Project Biological Assessment. Prepared for the U.S. Bureau of Land Management, California Desert District Office, Moreno Valley, CA. 92 pp plus figures.

Attachment 2. Desert tortoise survey results on the BSPP[6].



[6] Source: AECOM. 2010. Blythe Solar Power Project biological resources technical report, June 2010. Prepared for Palo Verde Solar 1, LLC., Berkeley, CA. 983 pp.

Attachment 3. FWS desert tortoise connectivity model.



Supplemental Comment Related to Special Status Plants from McCoy Solar, LLC.

Mitigation Measure VEG-10 in the Draft Plan Amendment and Environmental Impact Statement (DEIS) for the McCoy Solar Energy Project (MSEP) requires that (1) a Special-Status Plant Mitigation Plan be prepared with the goal of avoidance of California Natural Diversity Database (CNDDB) Rank 1 plants, where possible, while retaining at least 75% of the local population, and (2) off-site compensatory mitigation (acquisition or habitat restoration and enhancement) for CNDDB Rank 1 plants at a 3:1 ratio, if avoidance protects less than 75% of the local population.

As explained below, and in more detail in Attachment B to McCoy Solar's DEIS comments filed on August 22, the BLM should not automatically require mitigation for impacts to Rank 1 plants.

The CA rankings referred to in the DEIS are published/maintained by the CNDDB Program in close collaboration with the California Native Plant Society (CNPS). The CNDDB is a Natural Heritage Program and is part of a nationwide network of similar programs overseen by NatureServe. NatureServe is "a non-profit conservation organization whose mission is to provide the scientific basis for effective conservation action."

McCoy Solar does not question the value of the CNDDB Program in providing an important forum for collecting and publishing information on plants. However, the CNDDB rankings are calculated by a somewhat informal process that is not part of any official regulatory program or subject to public comment. A key criterion for a plant's rank is simply the number of times the plant has been reported to the Program on official CNDDB forms by anyone surveying for plants, which means that a plant can be assigned a higher (i.e., more sensitive) rank simply because either no one has looked for it or no one has filled out and submitted the proper CNDDB forms for the plant. Accordingly, many plants may not, in fact, be rare but are simply under-surveyed and/or under-reported to the CNDDB Program. In addition, once a plant receives a certain ranking, the CNDDB Program does not, as a matter of course, update those ranking based on new data pursuant to any particular timeframe, and the process for updating a plant's rank can take months (if not years) depending on the resources and priorities of the CNDDB and CNPS organizations. Accordingly, a plant's current ranking could be based on very old data and a plant that is currently ranked S1, for example, may actually be a rank S3 or S4 if the ranking was updated. A perfect example is the current ranking for Abram's Spurge. While CNDDB currently ranks Abram's Spurge as S1, it would be ranked S3 or S4 based on current data (see Appendix C to McCoy Solar DEIS comments filed on August 22, 2012).

It is our understanding that BLM Manual 6840 "Special Status Species Management" represents BLM's current guidelines for managing special status species (including plants) and it defines BLM "special status species" as:

> "(1) species listed or proposed for listing under the Endangered Species Act (ESA), and (2) species requiring special management consideration to promote their conservation and reduce the likelihood and need for future listing under the ESA, ***which are designated as Bureau sensitive by the State Director(s)***. All Federal candidate species, proposed species, and delisted species in the 5 years following delisting will be conserved as Bureau sensitive species." (emphasis added)

Based on this definition, CA rank S1 plants such as Abram's Spurge that are not otherwise "listed" (or proposed for listing) or officially designated as "BLM Sensitive" are currently *not* deemed "Special Status" per BLM Manual 6840, and the DEIS does not provide any justification for BLM's deviation from that guidance document by treating them as "Special Status" in the DEIS.

For these reasons, the BLM should not, in the context of the MSEP EIS, deem that mitigation is automatically warranted for all CA rank S1 plants, Abram's Spurge in particular; doing so is not consistent with current BLM policy governing special status species and is not scientifically supportable.

Comment Letter 10

August 22, 2012

ATTN: Jeffery Childers, Project Manager
BLM California District Office
22835 Calle San Juan de Los Lagos
Moreno Valley, California 92553-9046
Email: camccoysep@blm.gov

Re: Soboba Band of Luiseño Indian's Comments on the Draft Environmental Impact Statement for the McCoy Solar Energy Project and Possible California Desert Conservation Area Plan Amendment (Federal Register, May 25, 2012 Notices, Vol. 77, No. 102: 31386)

Dear Mr. Childers:

The Soboba Band of Luiseño Indians (Soboba Band), a federally recognized Indian tribe, submits the following comments on the Draft Environmental Impact Statement (DEIS) for the proposed McCoy Solar Energy Project (MSEP). The Soboba Band appreciates the Bureau of Land Management's observance of and the stated intent to preserve Tribal Cultural Resources during the construction, operation and decommissioning of the MSEP. The information provided to the Soboba Band on the MSEP has been assessed through our Cultural Resources Department, where it was concluded that although it is outside the Soboba Band's reservation, the project area does fall within an area of concern for the Soboba Band. The project location is in close proximity to known ancestral village sites and is located along a traditional route of migration and trade between tribes. The village sites and the migration and trade route are of cultural and religious significance to the Soboba Band and its members. Therefore the project location is regarded as highly sensitive to the people of Soboba. The Soboba Band is committed to ensuring that BLM's observance of Tribal Cultural Resources and the preservation of those resources in place are carried out for this project. 10-1

The Soboba Band requests that the BLM, the project proponent and their environmental and archeological consultants provide the Soboba Band with a thorough review of the comments submitted by the Soboba Band and that face-to-face informational and proper government-to-government consultation meetings with the Soboba Band and its Cultural Resources Department continue as required by Section 106 of the National Historic Preservation Act (NHPA), executive orders and Department of Interior and BLM regulations and policy. 10-2

The Soboba Band is concerned with the physical preservation of the ancestral village sites, the traditional tribal route of migration and trade, and the physical environment in which these historic properties/Tribal Cultural Resources are located. The physical environment surrounding these ancestral places have supported the Soboba Band's and other tribal peoples' ancestors since time immemorial. The Soboba Band maintains strong traditional ties with the land in the project area and with the Tribal Cultural Resources located there. 10-3

For these reasons, it is imperative that as America transitions to a cleaner energy future, we all do it in a manner that respects and preserves the remaining natural environment, 10-4

the animal and plant species that rely on those environments, our water resources and our historic and cultural resources. It is likewise imperative that we seek to strike a balance between near and long term impacts of large scale solar energy development on historic and cultural resources, species and the natural environment with the long term impacts of climate change.

The Soboba Band strongly supports the goals of energy independence and a move to clean renewable energy. The methods used to achieve these goals should strive for balance and sustainability. The DEIS does not manifest this type of consideration or balanced approach. The MSEP has an anticipated useful life of 30-40 years; however, after it is decommissioned it will leave behind a permanent scar of wind and water erosion, habitat degradation in a fragile desert ecosystem, and irreversible harm to historic and cultural resources. The MSEP's lasting legacy will not be one of sustainable clean energy, but one attesting to the continuing American legacy of "expediency at any cost" to Native Peoples, historic and cultural resources, species and the natural environment in the rush to achieve America's new destiny of energy independence and renewable energy. 10-4 cont.

The Soboba Band's comments are specifically directed at the DEIS and the provisions relating to Tribal Cultural Resources in particular. The Soboba Band understands that numerous environmental groups and individuals will submit comments relating to the unreasonably narrow statements of the BLM's purpose and need, the constrained consideration of alternatives, the insufficient depth of discussion of cumulative impacts, and the project impacts to biological resources, desert geology and soils resources, and water resources. To the extent that the Soboba Band shares their interests and beliefs, the Soboba Band supports the environmental groups and the individuals in their efforts to protect those resources.

The Soboba Band's specific comments, questions and concerns regarding the potential impacts on Tribal Cultural Resources discussed in Section 4.5 of the DEIS are as follows:

1. Page 4.5-1, Bullet Number 2, Under ***Area of Potential Effects***: Change from 0.5-mile buffer to a one-mile buffer. 10-5

2. Page 4.5-2, Paragraph 3; Under ***Evaluation of Historical Significance, NHPA § 106***: Please be specific when referring to the interested Indian tribes, as to how many tribes, as well as which ones, etc. 10-6

3. Page 4.5-2, Paragraph 3; Under ***Evaluation of Historical Significance, NHPA § 106***: There is no mention of the Tribal Historic Preservation Officers (THPO) amongst those whom the BLM is in consultation with for the development of the MOA. Interested tribes may differ from tribes that have official THPO programs. 10-7

4. Page 4.5-3, example "e", Under ***Assessing Effects to Historic Properties***: Please add "foreclosure" to the list. 10-8

5. Page 4.5-4, Under ***4.5.2 Applicant Proposed Measures***: Change wording from "cultural resources" to "historic properties". These proposed measures need to be sufficiently detailed out and included in the analysis. 10-9

6. Page 4.5-4, Paragraph 1, Under ***4.5.1 Direct and Indirect Impacts, Construction***: Change wording from "cultural resources" to "historic properties". 10-10

7. Page 4.5-4, Paragraph 1, Bullet 4, Under ***4.5.1 Direct and Indirect Impacts, Construction***: Please include the dimension of the width for the base of the pole. Understanding specifics can be a deciding factor when evaluating any impacts. 10-11

8. Page 4.5-4, Paragraph 2, Under ***4.5.1 Direct and Indirect Impacts, Construction***: Please change wording to "Constriction activities could, and in some cases will, diminish site integrity of historic properties…" 10-12

9. Page 4.5-4, Paragraph 2, Under ***4.5.1 Direct and Indirect Impacts, Construction***: Please change the last sentence so that it reads "In addition, indirect effects to architectural historic properties and places of traditional importance could, and in some cases will, occur". 10-13

10. Page 4.5-4, Paragraph 3, Under ***4.5.1 Direct and Indirect Impacts, Construction***: The 6 archaeological sites that have yet to be evaluated for listing in the NRHP need to be evaluated, and their determination shall be included in the Final EIS. 10-14

11. Page 4.5-5, Paragraph 4; The Soboba Band attaches a cultural tie to the areas on and near the project area. Documented within the tribe's oral histories, a migratory route in coincidence with Cahuilla Birdsongs extends through these locations. A more in-depth description can be provided confidentially during consultation with the Soboba Band. 10-15

12. Page 4.5-5, Paragraph 5; The issue of adverse affects on historic properties cannot be resolved unless there is complete avoidance. Please change the wording in this sentence to read "Mitigation Measure CUL-1 would serve as an attempt to lessen adverse effects to historic properties as a result of the specific provisions. Provisions to lessen the adverse effects will be described in a MOA prepared in accordance with *§106.* 10-16

13. Page 4.5-6, Paragraph 1, Under ***Operation and Maintenance***: Change the wording throughout this paragraph from "cultural resources" to "historic properties". 10-17

14. Page 4.5-6, Paragraph 1, Under ***Operation and Maintenance***: There is in fact anticipated damage that could be done to known sites, therefore, please change the wording to read, "…under Alternative 1 is from anticipated potential damage of known sites, as well as unanticipated damage to inadvertently discovered archaeological sites. 10-18

15. Page 4.5-6, Paragraph 1, Under ***Operation and Maintenance***: Limiting the operation and maintenance activities to the project footprint would not guarantee that no additional impacts to historic properties would be expected, **rather**, by limiting operation and maintenance to footprint, **these impacts could be lessened** (please clarify and correct this in the text). 10-19

16. Page 4.5-6, Paragraph 2, Under ***Operation and Maintenance***: Please specify which tribes are participating in the government-to-government consultation for this project. 10-20

17. Page 4.5-6, Paragraph 2, Sentence 2, Under ***Operation and Maintenance****:* This comment is repetitive of Page 5, Paragraph 4. 10-21

18. Page 4.5-6, Paragraph 1, Under ***Decommissioning***: Change the wording throughout this paragraph from "cultural resources" to "historic properties". 10-22

19. Page 4.5-9, Paragraph 1, Under ***Decommissioning***: Change the wording throughout this paragraph from "cultural resources" to "historic properties". 10-23

20. Pages 4.5-8 and 9, Paragraph 4, Under ***Cumulative Impacts***: These provisions will not resolve the impact issues, they can only be lessened. The tribe feels that there are no absolute resolutions. 10-24

21. Pages 4.5-8 and 9, Paragraph 8, Under ***Cumulative Impacts***: Change the wording from "cultural resources protective requirements " to "cultural resources/historic properties protective requirements"; Also second sentence should read, "….therefore, any related impacts on cultural resources/historic properties would be subject to cultural resources/historic properties -protective requirements" 10-25

22. Page 4.5-9, Under ***Mitigation Measures, CUL-1***: Please be specific when referring to various Indian tribes, as to how many tribes, as well as which ones, etc. 10-26

23. Page 4.5-9, Under ***Mitigation Measures, CUL-1***: There is no mention of the Tribal Historic Preservation Officers (THPO) amongst those whom the BLM is in consultation with for the development of the MOA. 10-27

24. Page 4.5-10, Paragraph 1: Please change sentence to read, "Resolution of adverse effects to historic properties will be developed in consultation and will include research documentation, data recovery excavations,…" 10-28

25. Page 4.5-10, Paragraph 2: Please change sentence to read, "…a HPTP shall be prepared and implemented and shall contain procedures to avoid and/or mitigate impacts to historic properties". 10-29

26. Page 4.5-10, example "a": Change the wording from "the BLM may require" to "the BLM will require or shall require". 10-30

27. Page 4.5-10, example "a": Change the wording from "cultural resources values" to "historic properties values". 10-31

28. Page 4.5-10, example "b": Where is the SHPO review in this? 10-32

29. Page 4.5-10, example "c": Please change wording to "…shall be monitored by a qualified archaeologist and designated tribal monitors". 10-33

30. Page 4.5-10, example "f": Change the wording to read, "A tribal cultural consultant will be required at culturally sensitive locations…" 10-34

31. Page 4.5-10, example "f": Change the wording to read, "The Applicant shall retain all required tribal consultants." 10-35

32. Page 4.5-11, example "g": Change the wording to read, "…recordation and evaluation of the find by a qualified archaeologist and tribal consultants, notification of the find to the BLM within 12 hours of the find, and appropriate treatment measures, including avoidance and data recovery. 10-36

33. Page 4.5-11, Under ***Residual Impacts after Mitigation Incorporated***: Change the wording throughout the paragraph from "cultural resources" to "cultural resources/historic properties" 10-37

Overall, the DEIS discussion of impacts to cultural resources is incomplete and inadequate under both NEPA and the NHPA. In the consideration of alternatives and discussion of impacts to cultural resources in Sections 4.5.3 through 4.5.8, the DEIS provides that mitigation measure CUL-1 "would serve to resolve adverse effects to historic properties as a result of the Project." The description of mitigation measure CUL-1 in Section 4.5.10 provides that this measure will be prepared by BLM in a MOA and HTPT in consultation with the SHPO, Indian tribes and other identified consulting parties. Thus, at this time, the extent of the adverse impact to more than 95 known archeological sites/cultural resources due to damage to artifacts or features is unknown. 10-38

In addition, the Prehistoric Trails Network Cultural Landscape (PTNCL) identified in Section 3.5.1.6 of the DEIS remains unevaluated and the full impact of the project on this potential NRHP-eligible cultural landscape is unknown. As stated above, the Soboba Band ascribes cultural and religious significance to the PTNCL and an additional migratory route that coincides with Cahuilla Birdsongs. The lack of information on the impact to known cultural resources/historic properties, unevaluated resources and properties, and the lack of development of mitigation measures to address the harm to these resources fails to satisfy the requirements of NEPA and NHPA to take a "hard look" and renders the DEIS legally insufficient. 10-39 10-40

In relationship to the consideration of alternatives in Section 4.5.3 through Section 4.5.8, the primary request of the Soboba Band is avoidance of all cultural resources. In terms of the project footprint, with the exception of Alternative 4 (No Action Alternative), Alternative 1 appears to provide the best alternative for avoidance of cultural resources at this time. The Soboba Band will continue to discuss the project alternatives and the mitigation of impacts with the BLM, SHPO and other consulting parties, in appropriate government-to-government consultation. 10-41 10-42 10-43

Therefore, the Band formally requests that a face-to-face, government-to-government consultation meeting be scheduled in order to address these comments of the Soboba Band and other concerns. Please provide possible dates of availability for this meeting at your earliest convenience. 10-44

Thank you for your consideration of the Soboba Band's comments. If you have any questions please contact me by phone or email using the contact information provided below.

Sincerely,

Joseph Ontiveros
Cultural Resource Director
Soboba Band of Luiseño Indians
P.O. Box 487
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August 23, 2012

VIA E-MAIL [ORIGINAL TO FOLLOW VIA OVERNIGHT MAIL]

Jeff Childers, Project Manager
Bureau of Land Management
22835 Calle San Juan De Los Lagos
Moreno Valley, CA 92553
Email: jchilders@blm.gov

Re: Comments on Draft Environmental Impact Statement for McCoy Solar Energy Project

Dear Mr. Childers:

On behalf of California Unions for Reliable Energy ("CURE"), we submit these comments on the Draft Environmental Impact Statement, prepared pursuant to the National Environmental Policy Act,[1] for McCoy Solar LLC's ("Applicant") proposed 750-MW McCoy Solar Energy Project ("Project"). The Project requires an amendment to the California Desert Conservation Area Plan, a right-of-way from the Bureau of Land Management to construct, operate and decommission the facility, Riverside County permits, a programmatic agreement, a streambed alteration agreement and incidental take permits, among other agency actions. As explained more fully below, the DEIS does not comply with the requirements of NEPA. Therefore, BLM may not approve the CDCA Plan amendment or right-of-way until an adequate DEIS is prepared and circulated for public review and comment. 11-1

CURE is a coalition of labor unions whose members construct, operate, and maintain power plants throughout California. CURE encourages sustainable development of California's energy and natural resources. Environmental

[1] 42 U.S.C. §§ 4321 et seq. (2010).

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degradation jeopardizes future growth and jobs by causing construction moratoriums, depleting limited air pollutant emissions offsets, consuming limited fresh water resources, and imposing other stresses on the environmental carrying capacity of the state. This in turn reduces future employment opportunities for CURE's members. Additionally, union members live and work in the communities and regions that suffer the impacts of projects that are detrimental to human health and the environment. CURE therefore has a direct interest in enforcing environmental laws to minimize the adverse impacts of projects that would otherwise degrade the environment. Finally, CURE members are concerned about projects that risk serious environmental harm without providing countervailing economic benefits. The NEPA process allows for a balanced consideration of a project's socioeconomic and environmental impacts, and it is in this spirit that we offer these comments.

We have reviewed the DEIS and its technical appendices with assistance from the following technical consultants: Petra Pless (air quality), Scott Cashen (biological resources impacts), Matt Hagemann (hazardous materials impacts) and Thomas King (cultural resources impacts). Their comments and qualifications are appended hereto as Attachment A ("Pless Comments"), Attachment B ("Cashen Comments"), Attachment C1 ("King Comments"), Attachment C2 ("King 106 Comments") and Attachment D ("Hagemann Comments"). We request that you consider and respond to these consultants' comments separately and individually. 11-2

I. INTRODUCTION

Since 2010, BLM has approved the development of renewable energy projects on more than 46,000 acres in California's desert.[2] That is just the beginning. Currently, BLM is reviewing applications for renewable energy projects to be developed on more than 50,000 acres in the California desert.[3] Recently, President Obama "fast-tracked" the development of some renewable projects in the California desert, including the Project.[4] While these projects will employ solar thermal, solar photovoltaic, or wind technology, each one will unavoidably tax the State's limited air, water, land, and biological resources to a potentially significant cumulative extent. The final toll taken by this historic energy boom on California's environment, public health, and natural resource base may not be known for 11-3

[2] http://www.blm.gov/ca/st/en/prog/energy/Approved_Projects.html.
[3] http://www.blm.gov/ca/st/en/prog/energy/fasttrack.html.
[4] *See* http://www.whitehouse.gov/the-press-office/2012/08/07/we-can-t-wait-obama-administration-announces-seven-major-renewable-energ.

several years or longer, but evidence shows that the effects may be severe. For example, during construction of NextEra's Genesis Solar Energy Project, an "'unprecedented' discovery of significant cultural resources" occurred.[5] Specifically, "[g]rading activities associated with Project development had revealed and possibly destroyed numerous cultural items associated with a prehistoric human settlement."[6] The discoveries included a cremation site.[7] 11-3 cont. 11-4

Now, it is even more imperative that BLM's environmental review document adequately identify and analyze all foreseeable direct, indirect, and cumulative Project impacts. It is equally, if not more, imperative that any and all reasonable alternatives that are less environmentally damaging be presented and discussed as thoroughly as possible, together with any and all feasible mitigation measures. The strictures of NEPA and the maxims of sound public policy and informed environmental planning require nothing less. Based on these concerns, CURE and its members have a strong interest in ensuring that this Project complies with all applicable federal, State and local laws and regulations.

As explained below, the Project will generate a multitude of impacts in a number of impact areas, including: air quality, biological resources, cultural resources, water resources, and hazardous materials. The DEIS either mischaracterizes, misanalyzes, underestimates, or fails to identify many of these impacts. The DEIS, for example, fails entirely to identify the impacts associated with the construction of an engineered channel. Furthermore, many of the mitigation measures described in the DEIS will not in fact mitigate impacts to the extent claimed and in some instances may generate additional impacts that are not evaluated. For example, the DEIS requires the Applicant to construct Couch's spadefoot toad breeding ponds and a new water source for bighorn sheep to mitigate significant impacts to these species. However, the DEIS does not evaluate potential impacts associated with these Project features. The DEIS must be revised to resolve these inadequacies and must be recirculated for public review and comment. 11-5 11-6 11-7

[5] Attachment E, Letter from Eldred Enas, Chairman of the Colorado River Indian Tribes to John Kalish, BLM, January 19, 2012, p. 1 (quoting Holly L. Roberts, Associate Field Manager, BLM, South Coast Field Office, regarding nature of discoveries at Genesis Solar Energy Project, during telephonic conference on December 6, 2011); *see also* Attachment F, Notice to Implement Controlled Grading Plan, February 24, 2012.
[6] *Id.* at p. 2.
[7] *Id.* at p. 5.
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II. THE DEIS FAILS TO SATISFY NEPA'S PURPOSE AND GOALS

NEPA requires that agencies take a "hard look" at the environmental consequences of a proposed action.[8] A hard look is defined as a "reasoned analysis containing quantitative or detailed qualitative information."[9] The level of detail must be sufficient to support reasoned conclusions by comparing the amount and the degree of the impact caused by the proposed action and the alternatives.[10] An EIS must provide a "full and fair discussion of significant environmental impacts and shall inform the decision-makers and the public of the reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment."[11] "General statements about 'possible' effects and 'some risk' do not constitute a 'hard look' absent a justification regarding why more definitive information could not be provided."[12] "[L]ack of knowledge does not excuse the preparation of an EIS; rather it requires [the agency] to do the necessary work to obtain it."[13]

NEPA review makes information on the environmental consequences of a proposed action available to the public, which may then offer its insight to assist the agency's decision-making.[14] An EIS is more than just a disclosure device, however; it is an "action-forcing device" which ensures that NEPA's requirements are infused into the ongoing programs and actions of the federal government.[15] An EIS must provide a full and fair discussion of every significant impact, as well as inform decision-makers and the public of reasonable alternatives which would avoid or minimize adverse impacts.[16] The impacts analysis must include a discussion of the relationship between short-term uses of the environment and the maintenance and

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[8] *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 350 (1989); *Dubois v. U.S. Dep't of Agric.*, 102 F.3d 1273, 1284 (1st. Cir. 1996); see also *South Fork Band Council Of Western Shoshone Of Nevada v. U.S. Dept. of Interior*, 588 F.3d 718, 727 (9th Cir. 2009) ["NEPA requires that a hard look be taken, if possible, *before* the environmentally harmful actions are put into effect"].

[9] BLM, NEPA Handbook, P. 55 (Jan. 2008) ("NEPA Handbook"), available at: http://www.blm.gov/pgdata/etc/medialib/blm/wo/Information_Resources_Management/policy/blm_handbook.Par.24487.File.dat/h1790-1-2008-1.pdf.

[10] NEPA Handbook, p. 55; *see also* 40 C.F.R. § 1502.1 (2009).

[11] 40 C.F.R. § 1502.1.

[12] *Neighbors of Cuddy Mountain v. U.S. Forest Service*, 137 F.3d 1372, 1380 (9th Cir. 1998).

[13] *National Parks & Conservation Association v. Babbitt*, 241 F.3d 722, 733 (9th Cir. 2001), *abrogated on other grounds by Monsanto Co. v. Geertson Seed Farms*, 2010 WL 2471057, 12 (U.S.) (U.S., 2010) [An injunction should issue only if the traditional four-factor test is satisfied].

[14] *See Robertson*, 490 U.S. at 350; *Dubois*, 102 F.3d at 1284.

[15] 40 C.F.R. § 1502.1.

[16] *Id.*

enhancement of long-term productivity, and any irreversible or irretrievable commitments of resources which would be involved in the proposal should it be implemented.[17] The discussion of impacts must include both "direct and indirect effects (secondary impacts) of a proposed project."[18] The agency need not speculate about all conceivable impacts, but it must evaluate the reasonably foreseeable significant effects of the proposed action.[19] In this context, reasonable foreseeability means that "the impact is sufficiently likely to occur that a person of ordinary prudence would take it into account in reaching a decision."[20]

In addition to a scientifically defensible analysis of project impacts, an EIS must also include a discussion of "appropriate mitigation measures not already included in the proposed action or alternatives."[21] An EIS is not complete unless it contains "a reasonably complete discussion of possible mitigation measures."[22] Mitigation includes "avoiding the impact altogether by not taking a certain action or parts of an action."[23] It also includes "minimizing impacts by limiting the degree or magnitude of the action and its implementation."[24] The mandate to thoroughly evaluate all feasible mitigation measures is critical to NEPA's purposes.[25] Hence, a "perfunctory description" or a "mere listing" of possible mitigation measures is not adequate to satisfy NEPA's requirements.[26] That individual harms are somewhat uncertain due to limited understanding of the Project characteristics and baseline conditions does not relieve BLM of the responsibility under NEPA to discuss mitigation of reasonably likely impacts at the outset.[27]

Finally, an EIS should be "concise, clear, to the point, and supported by evidence that the agency has made the necessary environmental analyses."[28] A concise and clear EIS that is supported by evidence ensures that federal agencies

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[17] *Id.* at § 1502.16.
[18] *Id.* at § 1502.16(b); *see also Sierra Club v. Marsh*, 976 F.2d 763, 767 (1st Cir. 1992).
[19] *Sierra Club v. Marsh*, 976 F.2d at 767.
[20] *Id; see also Dubois v. Dept. of Agriculture*, 102 F.3d 1273, 1286 (1st Cir. 1996).
[21] 40 C.F.R. § 1502.14(f).
[22] *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 352 (1989).
[23] 40 C.F.R. § 1508.20(a).
[24] *Id.* at subd. (b).
[25] *Id.* at § 1500.1(c).)
[26] *Neighbors of Cuddy Mountain*, 137 F.3d at 1380; *Idaho Sporting Cong. v. Thomas*, 137 F.3d 1146, 1151 (9th Cir. 1998).
[27] *See South Fork Band Council of Western Shoshone of Nevada*, 588 F.3d at 727, citing *National Parks*, 241 F.3d at 733.
[28] *Id.*

are informed of environmental consequences ***before*** making decisions and that the information is available to the public.[29] As the Council on Environmental Quality ("CEQ") explains in its regulations, "[e]nvironmental impact statements shall serve as the means of assessing the environmental impact of proposed agency actions, rather than justifying decisions already made."[30]

The DEIS for the proposed Project fails to comply with these basic requirements. The DEIS fails to accurately and completely describe the Project. In addition, the BLM failed to take a hard look at all of the Project's impacts. The DEIS also fails to adequately mitigate the Project's significant adverse impacts. As a result, the DEIS precludes a meaningful analysis of the Project, and the BLM must revise and recirculate the DEIS for public review and comment before making a decision. 11-8

III. THE DEIS FAILS AS AN INFORMATIONAL DOCUMENT

The purpose of NEPA is to ensure that every federal agency prepares an EIS for major federal actions significantly affecting the quality of the human environment.[31] An EIS must provide a "full and fair discussion of significant environmental impacts and shall inform the decision-makers and the public of the reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment."[32]

The DEIS fails to address the magnitude of the impacts that will be posed by this Project on public lands in the fragile desert environment. The Project's disturbance of more than 4,900 acres of desert lands will dramatically impact every aspect of the ecosystem on the Project site and surrounding area. Many of these impacts were not identified, disclosed, analyzed, or mitigated in the DEIS. 11-9

For example, the Project would potentially result in direct, indirect, and cumulative effects on numerous special-status plants, including BLM sensitive species.[33] However, because the Applicant has not conducted adequate surveys for these species,[34] the DEIS did not (and could not) adequately analyze and mitigate

[29] *Inland Empire Pub. Lands Council v. U.S. Forest Serv.*, 88 F.3d 754, 758 (9th Cir. 1996).
[30] 40 C.F.R. § 1502.2(g).
[31] 42 U.S.C. § 4332; 40 C.F.R. § 1501.
[32] 40 C.F.R. § 1502.1.
[33] DEIS, p. 4.3-6 - 7.
[34] *Id.* at p. 3.3-10 ("[r]are plant surveys are pending for the gen-tie line corridor").

11-9 cont.

impacts to these species, and thus fails to disclose impacts. Similarly, the Project could result in significant impacts to Couch's spadefoot toad, a California species of concern and BLM sensitive species.[35] However, because the Applicant conducted Couch's spadefoot toad surveys outside of the proper identification season for the species, the DEIS did not (and could not) adequately analyze impacts to Couch's spadefoot toad and the DEIS' mitigation strategy for reducing any impacts to less than significant is completely meaningless. Additionally, the Project will adversely affect hundreds of cultural resources including cultural landscapes and buried cultural resources. The DEIS fails to adequately analyze impacts to these resources and provides no meaningful mitigation for impacts to any cultural resources. Instead, the DEIS explains that a future memorandum of agreement and historic preservation treatment plan would work out the details of a mitigation proposal[36] – a process that clearly violates the basic tenets of NEPA.

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Many of these significant environmental resources on the Project site are irreplaceable. Once these resources are destroyed, they will be lost forever. The DEIS fails as an informational document because it does not adequately describe many of these resources. The DEIS fails to establish the Project setting, it does not fully and fairly describe the proposed action, it wholly omits discussion of a number of potentially significant environmental impacts, and it fails to adequately mitigate the Project's adverse impacts. As described below, the DEIS must be revised to fully describe the Project setting, the Project, the impacts from the Project, and mitigation. Once the DEIS' inadequacies are rectified, the revised DEIS must be circulated for public review and comment, as required by NEPA.

11-12

IV. THE DEIS MUST ACCURATELY DESCRIBE THE PROPOSED ACTION

A complete and consistent description of the proposed action is necessary for the public and decision makers to understand the effects of the proposed action.[37] A clear description results in more focused and meaningful public input and BLM participation, a more complete identification of issues, development of reasonable

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[35] *Id.* at p. 3.4-11.
[36] *Id.* at pp. 4.5-9 – 11.
[37] *See* 40 C.F.R. § 1502.15; *see also State of Cal. v. Block*, 690 F.2d 753. 761 (9th Cir. 1982) [starting point for analysis of whether a "critical decision" with respect to site development is "to describe accurately the 'federal action' being taken"].

alternatives, sound analysis and interpretation of effects, focused analysis, and a sound and supportable decision.[38]

It follows that information in the DEIS that is incomplete and/or inaccurate will skew the environmental consequences analysis and prevent informed public input. Courts have held that "[w]here the information in the initial EIS was so incomplete or misleading that the decisionmaker and the public could not make an informed comparison of the alternatives, revision of an EIS [was] necessary to provide a reasonable, good faith, and objective presentation of the subjects required by NEPA."[39]

Major Federal actions include not only those actions undertaken by federal agencies, but also "actions with effects that may be major and which are potentially subject to Federal control and responsibility."[40] This includes "projects and programs entirely or partly financed, assisted, conducted, regulated, or approved by federal agencies . . . ."[41] Thus, when evaluating a project's environmental impacts under NEPA, a federal agency must consider the entire project. "Proposals or parts of proposals which are related to each other closely enough to be, in effect, a single course of action shall be evaluated in a single impact statement."[42] This principle was established early in the development of NEPA law, and applies even when the federal involvement is limited to approving a relatively small aspect of the project.[43]

Further, the DEIS must address closely related "connected actions," as well as similar actions and cumulative actions.[44] Under NEPA, actions are connected if they:

(i) Automatically trigger other actions which may require environmental impact statements.
(ii) Cannot or will not proceed unless other actions are taken previously or simultaneously.

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[38] NEPA Handbook pp. 42-45.
[39] *Natural Res. Def. Council v. U.S. Forest Serv.*, 421 F.3d 797, 811 (9th Cir. 2005), citing *Animal Def. Council v. Hodel*, 840 F.2d 1432, 1439 (9th Cir. 1988).
[40] 40 C.F.R. § 1508.18.
[41] *Id.* at § 1508.18, subd. (a).
[42] *Id.* at § 1502.4, subd. (a).
[43] *E.g., Maryland Conservation Council, Inc. v. Gilchrist*, 808 F.2d 1039, 1042 (4th Cir. 1986); *Sierra Club v. Hodel*, 544 F.2d 1036, 1040-41 (9th Cir. 1976); *Cady v. Morton*, 527 F.2d 786, 795 (9th Cir. 1975).
[44] 40 CFR §1508.25(a).

(iii) Are interdependent parts of a larger action and depend on the larger action for their justification.[45]

Finally, where mitigation measures would, themselves, cause significant environmental impacts, NEPA requires an evaluation of those secondary (indirect) impacts.[46]

The DEIS completely fails to identify and analyze impacts related to the following Project components and connected actions: (1) the engineered channel,[47] (2) breeding ponds for Couch's spadefoot toad[48] and (3) a new water source for bighorn sheep.[49] These components are necessary parts of the Project and must be analyzed as part of the Project. The DEIS must be revised to consider these Project components and connected actions, and recirculated for public review and comment. 11-13

V. THE DEIS FAILS TO ADEQUATELY DESCRIBE THE AREA AFFECTED BY THE PROPOSED ACTION

The BLM must analyze the Project's impacts on the affected environment.[50] This process begins by describing "the present condition of the affected resources within the identified geographic scope" and by providing "a baseline for cumulative effects analysis."[51]

Once a project begins, the "pre-project environment" becomes a thing of the past, thereby making evaluation of the project's effect on pre-project resources

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[45] *Id.* at §1508.25(a)(1).
[46] 40 C.F.R. § 1502.16(h).
[47] *See* DEIS, p. 4.3-28 (Mitigation measure VEG-10 states "[d]esign the engineered channel discharge points to maintain the natural surface drainage patterns between the engineered channel and the outlet of the natural washes that flow toward the south and east, downstream of the Project"). The DEIS contains no description of the proposed engineered channel or any analysis of impacts associated with it.
[48] *See* DEIS, pp. 4.3-43 – 44 (Mitigation measure WIL-14 requires the Applicant to create breeding ponds for Couch's spadefoot toads if breeding sites cannot be avoided). The DEIS contains no description of the ponds and no analysis of impacts associated with them (such as ground disturbance activities, habitat conversion, or water use).
[49] *See* DEIS, pp. 4.3-39 – 40 (Mitigation measure WIL-11 requires the Applicant to create a new water source to compensate for loss of bighorn sheep spring foraging habitat). The DEIS contains no description of the new water source or any analysis of impacts associated with it.
[50] NEPA Handbook, p. 53.
[51] *Id.*
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impossible.[52] Without establishing the baseline conditions which exist in the vicinity of the proposed Project before it is built, there is simply no way to determine what effect the proposed large-scale solar facility will have on the environment and, consequently, no way to comply with NEPA.[53]

An accurate description of the affected environment is an essential prerequisite for an adequate analysis of Project impacts. For example, information on the type(s) and level(s) of habitat disturbance in the Project area is necessary to make inferences about the presence, abundance, and distribution of the special-status species that may be impacted by the Project. Here, however, some baseline information was ***collected at the wrong time*** and, in some instances, is ***yet to be collected.*** 11-14

A. The DEIS Fails to Adequately Describe the Area Affected for Biological Resources

The DEIS fails to accurately and adequately describe the area affected for numerous biological resources. Without an accurate description of the affected environment, there is no way to determine the Project's impacts to biological resources and, therefore, no way to apply appropriate mitigation for those impacts. To comply with NEPA, the DEIS must be revised to include accurate and complete descriptions of baseline conditions. 11-15

1. The DEIS Fails to Disclose the Ecological Value of the Project Site

According to the DEIS, the Northern and Eastern Colorado Desert Coordinated Management Plan ("NECO Plan") is "a landscape-scale, multi-agency planning effort approved in 1992 that protects and conserves natural resources while simultaneously balancing human uses of the California portion of the Sonoran Desert ecosystem."[54] The DEIS recognizes that the NECO Plan provides protections to wildlife and plants beyond that of the CDCA Plan.[55] Yet, the DEIS largely ignores ecological values established by the NECO Plan. 11-16

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[52] *Half Moon Bay Fishermans' Marketing Ass'n v. Carlucci* 857 F.2d 505, 510 (9th Cir. 1988), citing *LaFlamme v. FERC*, 842 F.2d 1063, 1071 (9th Cir. 1988).
[53] *Id.*
[54] DEIS, p. 3.3-24.
[55] *Id.* at p. 3.3-24.
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Specifically, the DEIS completely omits the fact that the Project lies in an "ecological hotspot" designated by the NECO Plan.[56] The DEIS ignores that, under the NECO Plan, the Project site is one of the largest unfragmented areas in the NECO Plan area[57] (which covers over 5 million acres).[58] Finally, the DEIS fails to disclose that the Project site has high animal and plant species richness compared to other locations in the NECO Plan area.[59] As expert biologist Scott Cashen explains in his comments, given the high ecological values of the Project site, "[t]he effects of the Project on plants, animals, and the ecological integrity of the region would be severe."[60] Further, Cashen shows how the DEIS' conclusion that there would be no adverse effect from the Project following mitigation is unsupported by any evidence.[61] Rather, "ecological consequences of eliminating a broad expanse of relatively undisturbed Colorado Desert habitat cannot be mitigated to the point of no adverse effect."[62]

11-16 cont.

11-17

2. The DEIS Fails to Adequately Describe the Area Affected for Sensitive Natural Vegetation Communities

The DEIS provides inconsistent information on the sensitive natural communities (as recognized by the CNDDB) that occur on the Project site. Specifically, the DEIS states the Project site contains two sensitive natural communities -- Desert Dry Wash Woodland and Creosote Bush-Big Galleta.[63] This conflicts with information provided to the BLM by the Applicant's consultant, which indicates there are four sensitive natural communities on the Project site -- Palo Verde-Ironwood Woodland Alliance, Mesquite Bosque Alliance, Desert Lavender Scrub Alliance, and Big Galleta Shrub Steppe Alliance.[64] Also, table 3.3-1 in the DEIS suggests the Creosote Bush-Big Galleta Grass Association does not occur on the solar plant site.[65] This conflicts with text in the DEIS that states the solar plant site contains "ephemeral swales (supporting a desert wash scrub of creosote

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[56] *See* Cashen Comments, p. 2 and Figure 1.
[57] *See Id.* at p. 2 and Figure 2.
[58] DEIS, p. 3.3-24.
[59] *See* Cashen Comments, p. 2 and Figures 3 and 4.
[60] Cashen Comments, p. 2.
[61] *Id.* at pp. 2-3.
[62] *Id.* at p. 2.
[63] DEIS, p. 3.3-2.
[64] *See* Attachment G, MSEP Response to BLM's Biological Resources Data Requests, January 11, 2012.
[65] DEIS, p. 3.3-2.

bush and big galleta grass)."[66] These inconsistencies must be rectified in a revised DEIS. 11-19 cont.

Desert dry wash woodlands are designated a special natural community by the California Department of Fish and Game and the BLM, and they are designated as Waters of the State. As Cashen states in his comments, "[t]he importance of desert wash and desert riparian habitats to wildlife populations cannot be overstated. For example, these habitats support more bird species at greater densities than any other desert habitats with the possible exception of some palm oasis habitats."[67] The DEIS indicates there are 4.2 acres of the Blue Palo Verde-Desert Ironwood Woodland Alliance (or "Desert Dry Wash Woodland" vegetation community) on the Project site.[68] Cashen obtained evidence that shows the BLM greatly underestimated the amount of Desert Dry Wash Woodland on the Project site, including vegetation surveys and the classification scheme that were used to prepare the NECO Plan, Google Earth imagery, LANDFIRE data, vegetation mapping that was conducted for the Blythe Solar Power Project, and the DEIS itself.[69] Because the DEIS underestimates the amount of Desert Dry Wash Woodland, it follows that the DEIS also underestimates the Project's adverse effect on Desert Dry Wash Woodland. The DEIS must be revised to reflect the accurate baseline conditions for Desert Dry Wash Woodland and an accurate analysis of the extent of the Project's effect on it. 11-20 11-21

3. <u>The DEIS Fails to Adequately Describe the Area Affected for Rare Plants</u>

The DEIS fails to adequately describe the area affected by the Project for numerous rare plant species. First, CDFG survey guidance states that buffer areas should be surveyed for special-status plants when indirect project effects could potentially extend offsite.[70] The DEIS states that the Project may indirectly impact special-status plant species offsite,[71] but the special-status species surveys that were conducted for the Project did not incorporate a buffer around the solar plant site.[72] 11-22

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[66] *Id.* at p. 3.3-5.
[67] Cashen Comments, p. 5.
[68] DEIS, Table 3.3-1.
[69] Cashen Comments, pp. 5-8.
[70] *Id.* at, p. 10.
[71] DEIS, p. 4.3-7.
[72] Attachment G; *see also* BRTR, Figure 5A.
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Second, the Applicant's consultant did not conduct special-status plant surveys or vegetation mapping along the gen-tie line and access road routes proposed for Project Alternative 3.[73] Nevertheless, without any evidence, the DEIS concludes Project Alternative 3 (Central and Western Routes) would result in slightly reduced impacts to Harwood's milk-vetch and Utah milkvine, but direct impacts to other special-status plants would be largely the same as Alternative 1.[74] The DEIS appears to suggest that surveys for the Blythe Solar Power Project ("BSPP") enable the BLM to evaluate impacts of the various gen-tie routes that are being considered for the Project.[75] As Cashen explains in his comments, the BLM cannot use survey data collected for another project (i.e., the BSPP) as the basis for its conclusion here because the Western Route was not surveyed for the BSPP, the consultant that surveyed the BSPP failed to conduct appropriately timed fall plant surveys and the surveys conducted for the BSPP are outdated.[76]

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Third, the DEIS fails to identify plants to the taxonomic level necessary to determine rarity. *Chaenactis carphoclinia* was detected on the Project site.[77] In his comments, Cashen explains there are two varieties of *C. carphoclinia* -- *C. carphoclinia* var. *carphoclinia* and *C. carphoclinia* var. *peirsonii* – and both varieties have the potential to occur on the Project site.[78] *C. carphoclinia* var. *peirsoni* is listed as a CNPS 1B.3 species with a "Heritage Rank" of G5T1/S1.3 (which indicates it is critically imperiled in the State because of extreme rarity).[79] The DEIS does not identify the plant variety on the Project site to the taxonomic level necessary to determine rarity and, therefore, the DEIS does not provide the information needed to evaluate Project impacts to these special-status plant species.

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Finally, the DEIS itself states that some of the rare plant surveys for the Project have not been completed.[80] Rather than include pre-project conditions as determined by pre-project surveys, the DEIS requires that "[a]t least 30 days prior to construction, the Applicant shall ensure that botanical surveys have been fully

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[73] Cashen Comments, p.10.
[74] DEIS, pp. 4.3-12 -13.
[75] *Id.* at p. 4.4-18.
[76] Cashen Comments, p. 11.
[77] *Id.*
[78] *Id.*
[79] *Id.*
[80] DEIS, p. 3.3-10.

performed and reported for the Project area."[81] Similarly, the DEIS requires post-approval report of "the number or percent of the occurrence that will be directly affected, and indirectly affected by changes in drainage patterns or altered geomorphic processes."[82] Post-project data does not provide the necessary baseline conditions to conduct an adequate impact analysis prior to Project approval. 11-27 cont. 11-28

In short, the Applicant's rare plant survey effort to date does not provide an adequate basis for determining the Project's impacts to rare plants. The Applicant must complete adequate rare plant surveys ***prior to*** Project approval in order to establish the environmental baseline for the Project site. This information is fundamental to evaluating impacts and formulating mitigation, and must be provided in a revised DEIS. Although the DEIS attempts to analyze the potentially significant impacts and formulate mitigation measures for rare plant species, this analysis may bear little resemblance to the analysis and mitigation that will be required after significant impacts to rare plants are actually identified through an adequate survey effort. Hence, the DEIS fails to provide an adequate description of the area affected, analysis of the potential impacts and identification of mitigation for these rare plants. Once the Applicant submits the results of the rare plant surveys and all parties have an opportunity to review this analysis, the DEIS must be revised and recirculated for public review and comment. 11-29 11-30

4. <u>The DEIS Fails to Adequately Describe the Area Affected for Mojave Fringe-Toed Lizard</u>

The DEIS acknowledges that many Mojave fringe-toed lizard populations are quite small and that Mojave fringe-toed lizards were detected along the gen-tie route south of I-10 (75 and 188 lizards during the spring and fall surveys, respectively).[83] The DEIS further acknowledges Mojave fringe-toed lizards: (a) have patchy distribution; (b) are vulnerable to local extirpations from habitat disturbance and fragmentation; and (c) are dependent on fragile ecosystems requiring protection against both direct and indirect disturbance.[84] Aside from the population on the Project site, the DEIS fails to describe the distribution and status of Mojave fringe-toed lizard populations in the region. Cashen explains that this failure precludes 11-31

[81] *Id.* at p. 4.3-29.
[82] *Id.* at p. 4.3-30.
[83] DEIS, pp. 3.4-8 - 9.
[84] *Id.*

the ability to evaluate the relative significance of Project impacts to the population that occurs south of I-10.[85] 11-31 cont.

In addition, the DEIS states the Mojave fringe-toed lizard is an obligate to loose sand.[86] However, the map of survey results shows that a considerable number of Mojave fringe-toed lizards were detected along the gen-tie route east of the area that has been mapped as habitat for the species.[87] It is Cashen's opinion that this evidence suggests that habitat for the species was not accurately mapped.[88] "This is especially problematic because the BLM's proposed mitigation is based on impacts to stabilized or partially stabilized desert dune habitat, not on impacts to habitat actually occupied (or potentially occupied) by the species."[89] 11-32 11-33

5. The DEIS Fails to Adequately Describe the Area Affected for Golden Eagles

The DEIS fails to adequately describe the affected environment for the golden eagle because the Applicant did not provide sufficient information. The Applicant conducted surveys for golden eagles in 2010 and 2011.[90] However, the U.S. Fish and Wildlife's Draft Eagle Conservation Plan Guidance suggests ***at least three years*** of golden eagle data be collected[91] (and, according to a U.S. Fish and Wildlife Service biologist, "three years may not be enough to develop a good trend-line on occupancy and productivity").[92] Since the Applicant failed to conduct sufficient surveys, BLM could not establish an accurate baseline for the golden eagle. 11-34

Although the DEIS attempts to analyze the potentially significant impacts and formulate mitigation measures for the golden eagle, this analysis may bear little resemblance to the analysis and mitigation that will be required after considering the survey results. Hence, the DEIS fails to provide an adequate description of the affected environment, analysis of the potential impacts and identification of mitigation for the golden eagle. 11-35

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[85] Cashen Comments, p. 13.
[86] DEIS, p. 3.4-8
[87] DEIS, Figure 3.4-3.
[88] Cashen Comments, p. 13.
[89] *Id.*
[90] DEIS, p. 3.4-13.
[91] Available at http://www.fws.gov/windenergy/docs/ECP_draft_guidance_2_10_final_clean_omb.pdf.
[92] *See* Attachment H, email from Joel Pagel to Tannika Engelhard, April 20, 2011.
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6. The DEIS Fails to Adequately Describe the Area Affected for Bats

The NECO Plan requires the Applicant to identify all significant bat roosts within one mile of the Project's boundaries in order to identify potential impacts from loss of foraging habitat to core population units.[93] The BRTR acknowledges that the Applicant's consultant did not conduct focused bat surveys, and thus did not identify bat roosts within one mile of the Project site in accordance with NECO Plan requirements.[94] The BRTR rationalizes the omission of focused surveys because, "no bats are known to roost or hibernate in the sparse creosote bush scrub that typifies this [Project] area" and surveys are not required to conclude that the Project may permanently reduce bat foraging opportunities.[95] This rationale does not excuse the Applicant from complying with the NECO Plan. Thus, at a minimum, the Project does not comply with the requirements of the NECO Plan. 11-36

Cashen explains that the BRTR's rationale also includes partial and incorrect information.[96] First, scientific literature does not support the statement that no bats are known to roost or hibernate in the sparse creosote bush scrub habitat. To the contrary, some bats are known to roost in creosote bush habitat. For example, the Revised Staff Assessment prepared for the Genesis Solar Energy Project indicates the California leaf-nosed bat (a BLM Sensitive Species and a CDFG Species of Special Concern) has been documented "near the McCoy Mountains in *creosote bush scrub habitat* where approximately 300 adults were observed roosting."[97] Other special-status species, such as the spotted bat (a BLM Sensitive Species and a CDFG Species of Special Concern), are also known to roost in desert scrub habitat.[98] 11-37

Second, the BRTR acknowledges some bat species may roost in trees or rock crevices.[99] Trees are clearly present on the Project site, and arguably, so are rock crevices.[100] 11-38

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[93] BRTR, pp. 20 and 25.
[94] *Id.* at p. 25.
[95] *Id.*
[96] Cashen Comments, pp. 15-17.
[97] *Id.* at pp. 16-17, quoting California Energy Commission. 2010 Jun. Revised Staff Assessment for the Genesis Solar Energy Project, Biological Resources Table 4, p. C.2-59 (emphasis added).
[98] Cashen Comments, p. 16.
[99] BRTR, p. 25.
[100] Cashen Comments, p. 16.
2553-020cv

Finally, a bat roost was documented on the Project site. The BRTR states, "[a] natural cavity with a small amount of bat guano, but no current use by bats, was found within the southwest corner of the Solar Plant Site (Figure 13). Based on the small amount of guano, it would not be considered a biologically significant roost."[101] It also states, "[c]ave with guano. Cave in north caliche bank of large wash. One meter wide by 2 meter high with depth of > 2 m. Guano on walls and ledges."[102] Cashen explains that a "small amount" of guano is no basis to conclude the roost is biologically insignificant. [103] According to the Organization for Bat Conservation, "[i]f you have a large roost of bats there is a chance that guano might build up just a little, however natural elements such as rain, sun, and wind will break down the guano naturally."[104] Evidence shows that there are suitable bat roosting substrates on the Project site and within 1-mile of its boundaries. The DEIS must be revised accordingly. 11-39

Hence, the DEIS fails to provide an adequate description of the affected environment, analysis of impacts and identification of mitigation for bats.

7. The DEIS Fails to Adequately Describe the Area Affected for Morrison's Blister Beetle

Morrison's blister beetle has a NatureServe rank of G1G2 S1S2, indicating it is critically imperiled at both the global and State level.[105] The CNDDB has only 10 records of this species occurring in California.[106] 11-40

Morrison's blister beetle was documented on the Project site during the 2011 survey effort.[107] This constitutes an extremely significant discovery[108] that was not disclosed or analyzed in the DEIS.

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[101] BRTR, p. 49.
[102] *Id.*, Appendix K.
[103] Cashen Comments, p. 16.
[104] Cashen Comments, p. 16, quoting Organization for Bat Conservation. 2012. Bat House FAQ [online]. Available at: http://www.batconservation.org/drupal/bat-house/faq.
[105] Cashen Comments, p. 17.
[106] *Id.*
[107] BRTR, Appendix F. *See also* 2011 Fall Plants and Supplemental Wildlife Survey Report, Appendix B.
[108] Cashen Comments, p. 17.

Hence, the DEIS fails to provide an adequate description of the affected environment, analysis of impacts and identification of mitigation for Morrison's blister beetle. 11-40 cont.

8. The DEIS Fails to Adequately Describe the Area Affected for Desert Rosy Boa

According to the DEIS, the Project site does not contain the preferred substrate for the desert rosy boa, and thus the species is unlikely to occur onsite. This conclusion conflicts with scientific literature, information provided in the NECO Plan, and the DEIS' discussion of habitat associated with the species.[109] 11-41

Hence, the DEIS fails to provide an adequate description of the affected environment, analysis of impacts and identification of mitigation for desert rosy boa.

9. The DEIS Fails to Adequately Describe the Area Affected for Ferruginous Hawk

The DEIS concludes that the ferruginous hawk is not expected to occur on the Project site. The ferruginous hawk is a USFWS Bird of Conservation Concern and a CDFG Watch List species.[110] These designations apply to birds on their wintering grounds; ferruginous hawks do not breed in California.[111]

The DEIS indicates ferruginous hawks were not observed during Project surveys. However, the Applicant's consultant did not conduct surveys during the months that ferruginous hawks occur in California.[112] Ferruginous hawks have been documented at the adjacent BSPP site on several occasions, and as the DEIS acknowledges, the Project site contains suitable wintering habitat for the species.[113] There is no evidence to support the DEIS' conclusion that the species is "not expected to occur" on the Project site.[114] To the contrary, evidence shows that the ferruginous hawk will occur on the Project site. 11-42

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[109] *Id.*
[110] *Id.*
[111] *Id.*
[112] *Id.*
[113] *Id.* at pp. 17-18.
[114] *Id.* at p. 18.
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10. The DEIS Fails to Adequately Describe the Area Affected for Burro Deer

The BRTR states "[t]here is marginal habitat for the burro deer on the Solar Plant Site, and suitable habitat within the larger washes that cross the Linear Corridor (north of I-10)."[115] Evidence shows otherwise. Evidence shows that burro deer are almost totally dependent on microphyll woodlands (desert washes with trees, usually ironwood and palo verde), which are present throughout much of the Project site.[116] The DEIS must be revised to include an adequate description for the area affected for burro deer. Without an accurate baseline description, the Project's impacts to burro deer cannot be adequately assessed or mitigated. 11-43

11. The DEIS Fails to Adequately Describe the Area Affected for Burrowing Owl

The DEIS and BRTR provide inconsistent information regarding the baseline conditions for burrowing owl. The DEIS states that surveys identified 11 active burrows and three owl pairs on the Project site.[117] The BRTR reports that at least 18 active burrows were detected on the Project site.[118] This is a significant difference that must be rectified in a revised DEIR. 11-44

Further, it appears that even the 18 active burrows identified in the BRTR underestimates the number of active burrows on the Project site. Cashen explains that, in accordance with CDFG recommendations, four independent surveys are necessary to provide reliable information on the presence of burrowing owls.[119] According to the DEIS, only three protocol-level burrowing owl surveys were conducted.[120] Even if the Applicant had performed a sufficient number of surveys, in Cashen's opinion, the surveys conducted were inadequate.[121] 11-45

The California Burrowing Owl Consortium Guidelines requires all burrows to be surveyed four times and that the Project buffer area be surveyed.[122] Cashen 11-46

[115] BRTR, p. 48.
[116] Cashen Comments, p. 21.
[117] DEIS, p. 4.4-38.
[118] BRTR, Figures 11 and Appendix J.
[119] Cashen Comments, p, 14.
[120] DEIS, p. 3.4-12.
[121] Cashen Comments, p. 14.
[122] *Id.*, pp. 14-15.
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reviewed the survey data in the BRTR and found that the surveys did not meet these requirements.[123]

Adequate surveys for burrowing owls must be conducted in accordance with the California Burrowing Owl Consortium Guidelines prior to Project approval. Only then can an accurate analysis of the Project's impacts on burrowing owls be performed. 11-46 cont.

12. The DEIS Fails to Adequately Describe the Area Affected for Gila Woodpecker

The Gila woodpecker is listed as endangered under the California Endangered Species Act. The BLM has concluded that this woodpecker is not expected on the Project site because it is outside of the Gila woodpecker range, it does not contain suitable nesting habitat and the nearest record of the species is 9.4 miles east of the Project site.[124] Cashen reviewed the literature and documentation provided by the Applicant and found that does not support the conclusion that the Gila woodpecker does not occur on the Project site.[125] 11-47

The information reveals that Gila woodpeckers were recently documented at the adjacent BSPP during construction monitoring surveys.[126] According to Cashen, the presence of these birds during the breeding season strongly suggests they were nesting on, or in close proximity to, the BSPP site.[127] The DEIS completely fails to disclose this information.

The information also shows that Gila woodpeckers have been documented in Palo Verde–Ironwood woodlands at other sites west of the Colorado River.[128] Based on recent scientific literature, Cashen concludes that Gila woodpeckers are known to occur in mature xeric riparian woodlands, just like those that occur in the Project area.[129] 11-48

[123] *Id.*
[124] DEIS, Table 3.4-3.
[125] Cashen Comments, p. 18.
[126] *Id.*
[127] *Id.*
[128] *Id.*
[129] *Id.*
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Finally, the information shows that the DEIS does not accurately report nesting habitat for Gila woodpeckers. Cashen notes that several studies and surveys have documented Gila woodpeckers breeding in dry desert wash woodlands such as those that occur in the Project area.[130] In fact, according to the California Natural Diversity Database, 9 of the 34 (26%) documented occurrences of Gila woodpeckers within California are associated with vegetation communities similar to those present on the Project site.[131] 11-49

The DEIS fails to accurately describe baseline conditions for the Gila woodpecker. Without an adequate description, there is simply no way to analyze the Project's impacts to this species. Thus, the DEIS must be revised. 11-50

13. The DEIS Fails to Adequately Describe the Area Affected for Couch's Spadefoot Toad

The DEIS does not adequately describe the affected area for Couch's spadefoot toad, a BLM sensitive species, because the Applicant failed to provide sufficient information on Couch's spadefoot toads to enable BLM to determine significant impacts under NEPA. The DEIS states that the Applicant's surveys for Couch's spadefoot toads "were ***conducted outside the proper identification season*** for this species, which is after summer rains."[132] The DEIS admits that ***"[i]t is difficult to assess the potential for direct and indirect impacts to Couch's spadefoot toads without species-specific survey results for this species***."[133] Rather than require the Applicant to provide the necessary information prior to Project approval, "mitigation was developed to determine the potential presence of Couch's spadefoot toads in and near Project facilities..."[134] BLM's approach is all wrong. The presence or absence of Couch's spadefoot toad must be determined, through adequate surveys, ***prior*** to Project approval. Without establishing the baseline conditions for Couch's spadefoot toad before the Project is 11-51

[130] *Id.* at p. 19.
[131] *Id.*
[132] DEIS, p. 3.4-11 (emphasis added).
[133] *Id.* at p. 4.4-13.
[134] *Id.* at p. 4.4-24.
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built, there is simply no way to determine what effect the Project will have on the species and, consequently, no way to comply with NEPA.[135] 11-51 cont.

This is exactly what happened at the Genesis Solar Energy Project. Focused surveys for Couch's spadefoot were not conducted prior to project approval. Surveys and reporting were deferred until after approval. The report that was eventually prepared by the applicant stated that no potential breeding habitat exists on the Genesis site and, therefore, no impacts on the species were expected. The applicant's assessment was wrong. During construction of the project, two Couch's spadefoot toads were found.[136] Here, the Applicant should be required to provide focused survey data for public review prior to Project approval. 11-52

Although the DEIS attempts to analyze the impacts and formulate mitigation measures for Couch's spadefoot toad, this analysis may bear little resemblance to the analysis and mitigation that will be required after significant impacts to Couch's spadefoot toads are actually identified through an adequate survey effort. Hence, the DEIS fails to provide an adequate description of the affected environment, analysis and identification of mitigation for Couch's spadefoot toad. Once the Applicant submits the results of the surveys and all parties have an opportunity to review this analysis, the DEIS must be revised and recirculated for public review and comment. 11-53

In sum, without adequate pre-Project site surveys, the DEIS does not and cannot contain accurate or reliable analyses of the Project's significant impacts to biological resources. Surveys must be conducted and survey results considered prior to the approval of the Project so that the public and decision-makers will have an accurate picture of the biological resources that will be impacted. Only after these surveys are complete and the results included in the DEIS, can the DEIS adequately describe the affected environment, and analyze and identify mitigation measures for special-status plants and wildlife. 11-54

B. The DEIS Fails to Adequately Describe the Area Affected for Cultural Resources

The DEIS' description of baseline conditions for cultural resources is grossly inadequate. For starters, the DEIS erroneously defines "cultural resource." As 11-55

[135] *Half Moon Bay Fishermans' Marketing Ass'n v. Carlucci*, 857 F.2d at 510, citing *LaFlamme v. FERC*, 842 F.2d at 1071.
[136] Cashen Comments, p. 38.

explained by expert archaeologist Thomas King in his comments, BLM's definition of "cultural resource" is extremely narrow, emphasizing only specific, small sites and isolates on or in the ground that are recognized, identified, and valued by archaeologists through archaeological surveys. BLM's definition of "cultural resource" excludes "larger, more inclusive phenomena like landscapes, viewsheds...and 'districts.'"[137] In doing so, the DEIS "distorts and devalues even the physical, land-linked 'cultural resources' that BLM recognizes" and "discriminates against the interests of tribes and other minorities..."[138] 11-55 cont.

BLM's narrow "definition of 'cultural resources' allows it to ignore an unknowably large range of such resources that do not happen to fit within its definition."[139] For example, the DEIS fails to describe the following cultural resources: the beliefs and values of local residents and visitors (particularly as they relate to the land, air and water), the cultural values ascribed by local residents to the desert environment in general, the desert environment as expressed in art and literature, the value of desert viewsheds and natural quiet, the spiritual associations that tribes and others may have with specific locations and expansive viewsheds and landscapes, the roles played by animal and plant species in tribal and other cultural beliefs and traditions, the roles played by minerals and mineral deposits in the cultural lives of tribes and others.[140] 11-56

The DEIS' description of the baseline for cultural resources is also inadequate because it states that "under federal and state historic preservation law, cultural resources generally must be at least 50 years old to have sufficient historical importance to merit consideration of eligibility for listing in the NRHP or in the California Register of Historic Places."[141] Not only is this statement incorrect, but it also wrongly limits the DEIS' consideration of cultural resource impacts. The National Historic Preservation Act ("NHPA") (under which the National Register of Historic Places ("NRHP") is maintained) deals only with historic resources, a narrow class of cultural resources comprising parcels of real property.[142] By applying the NHPA historic property characterization to its NEPA analysis, the "BLM leads the reader to think that historic properties are the only kinds of 'cultural resources' that exist" and "the DEIS gives no attention to any type of 11-57

[137] *See* King Comments, p. 3.
[138] *Id.*
[139] *Id.*, p. 4.
[140] *Id.*, p. 3.
[141] DEIS, p. 3.5-1.
[142] King Comments, p. 4.
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cultural resource that is not a known or possible historic property."[143] "Cultural aspects of the environment that are not 'buildings, sites, structures, objects, and districts' are simply not recognized in the DEIS, and impacts on such cultural resources, if they exist, are ignored."[144] 11-57 cont.

The NHPA does not say that places less than 50 years old are not eligible for the NRPH. The NHPA states that properties that have achieved significance in the last 50 years are *ordinarily* not eligible *unless* they have "exceptional" significance.[145] Rather than consider whether a less than 50 year old property is exceptionally significant, and therefore eligible for the NRHP, the DEIS dismisses these resources as too young. As a result, the DEIS completely ignores any younger property with exceptional significance that may be adversely affected by the Project. 11-58

In short, the DEIS portrays an extremely narrow view of "cultural resources." It focuses only on a subset of historic properties -- archaeological sites recognized and valued by archaeologists and identified through archaeological surveys. "There is no evidence of attention even to historic properties that might be important for non-archaeological reasons, to non-archaeologists."[146] 11-59

VI. THE DEIS MUST DISCLOSE, ANALYZE, AND MITIGATE ALL PROJECT IMPACTS

The environmental consequences of a proposed action must be described in the DEIS. NEPA regulations require that this section of an EIS describe any direct, indirect and cumulative adverse environmental effects which cannot be avoided should the proposal be implemented; the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity; and any irreversible or irretrievable commitments of resources which would be involved in the proposal should it be implemented.[147] The DEIS must also describe possible conflicts between the proposed action and the objectives of Federal, regional, State, and local land use plans, policies and controls for the area concerned.[148]

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[143] *Id.* at p. 5.
[144] *Id.* at p. 5.
[145] 36 C.F.R. § 60.4.
[146] King Comments, p. 6.
[147] 40 C.F.R. § 1502.16.
[148] *Id.*
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The DEIS does not consider all of the Project's significant and foreseeable environmental impacts to air quality, biological resources, cultural resources, water resources, and impacts from hazardous materials, among others. The BLM's failure to take a hard look at the Project's impacts violates the basic requirements of NEPA. The BLM must revise its impacts analysis and issue a substantially revised or supplemental DEIS for public review and comment. 11-60

A. The DEIS Fails to Adequately Disclose, Analyze, and Mitigate Impacts to Air Quality

Air quality expert Dr. Petra Pless reviewed the DEIS and technical reports related to air quality. In her attached comments, Pless concluded that the DEIS significantly underestimated emissions from Project construction, failed to indentify significant impacts from nitrogen oxide and particulate matter emissions, and failed to adequately mitigate the Project's impacts to air quality. 11-61

1. The DEIS Underestimates Emissions of Air Pollutants During Project Construction

Project construction would result in significant impacts to air quality from on- and off-site emissions of fugitive dust particulate matter and air pollutants contained in combustion exhaust of construction equipment, haul trucks and construction worker commuter vehicles. The DEIS presents estimates for daily maximum emissions in pounds per day ("lbs/day") and maximum annual emissions for the four-year construction period in tons per year ("tons/year").[149] Dr. Pless reviewed the technical report supporting these estimates and found that the estimates are based "on a number of unrealistic assumptions and are substantially underestimated."[150] 11-62

Specifically, the DEIS greatly underestimates the daily hours of construction. The DEIS states emissions from construction equipment will occur for four to eight hours per day.[151] However, elsewhere in the DEIS it states that construction activities would occur for 12 to 24 hours per day.[152] Clearly, the DEIS' estimates of

[149] DEIS, Table 4.2-2, p. 4.2-9 and Table 4.2-3, p. 4.2-10.
[150] Pless Comments, p. 2.
[151] *Id.*
[152] DEIS, p. 2-53.

maximum daily emissions based on the assumed operation of construction equipment for four to eight hours per day is substantially underestimated.[153] 11-62 cont.

The DEIS also substantially underestimates off-site vehicle miles traveled. The DEIS estimates emissions of off-site entrained fugitive road dust from trucks and construction worker commuter vehicles based on a daily round-trip distance of 20 miles.[154] To estimate combustion emissions from off-site vehicle traffic, the DEIS assumes daily round-trip distances of 50 miles per day for construction worker commuter vehicles and 25 miles per day for trucks.[155] These distances are much too short. As Pless explains, the Project site is located in a sparsely inhabited environment – 13 miles northwest of the City of Blythe (population less than 21,000 in 2010), 32 miles east of Desert Center (population 204 in 2010), and 6 miles north of Interstate 10. In reality, workers would likely commute from 100 miles away from more populated areas, such as Indio, Palm Springs, Palm Desert, Cathedral City, and Coachella (and therefore the proper roundtrip number is 200 miles, not 50 miles).[156] Similarly, delivery trucks would likely come from considerably farther away than 12.5 miles, and therefore the DEIS' daily roundtrip distance of 25 miles is significantly underestimated.[157] 11-63

As it stands, the DEIS underestimates emissions of air pollutants during project construction. The DEIS must be revised to include realistic assumptions of construction hours and commute distance for construction worker commuter vehicles and trucks. 11-64

2. <u>The DEIS Fails to Identify and Mitigate Significant Impacts to Air Quality from NOx and Particulate Matter Construction Emissions</u>

As a result of the unrealistic assumptions discussed above, the DEIS substantially underestimates off-site entrained road dust and combustion emissions from construction worker commuter vehicles and trucks.[158] Consequently, the DEIS fails to identify and mitigate significant impacts from emissions of nitrogen oxides ("NOx") and particulate matter. 11-65

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[153] Pless Comments, p. 3.
[154] DEIS, Appendix H, p. H-3.
[155] *See* AECOM Report, Attachment 1-C.
[156] Pless Comments, p. 3.
[157] *Id.* at p. 3.
[158] *Id.* at pp. 3-4.
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Specifically, the DEIS estimates maximum daily construction emissions of NOx to be 135 lbs/day (2 lbs/day shy of the 137 lbs/day threshold of significance for NOx emissions from construction activities established by the Mojave Desert Air Quality Management District ("MDAQMD")).[159] During the month of maximum emissions (month 6,) off-site vehicles account for 34.9 lbs/day of NOx emissions. According to Dr. Pless, even a modest increase in the roundtrip mileage would increase estimates of NOx emissions over MDAQMD's significance threshold.[160] Dr. Pless provides the following example: an increase in roundtrip distances by just 10 percent would increase NOx emissions by roughly 3.5 lb/day, which puts construction emissions over the threshold.[161] As Pless notes, it is likely that roundtrip distances would be more than four times (or 400 percent) those assumed by the DEIS.[162] Accordingly, impacts on air quality from NOx emissions would be substantially greater.[163] 11-65 cont.

There is a similar story for particulate matter emissions. The DEIS estimates that Project construction would result in a maximum of 136 lbs/day of emissions of PM10 (particulate matter smaller than or equal to 10 micrometers), including 110 lbs/day of fugitive dust from on-site sources, 19 lbs/day of entrained road dust from vehicle travel on off-site paved roads and 7 lbs/day from off-road construction equipment and construction worker commuter vehicles and trucks' exhaust emissions. This estimate, which assumes implementation of fourteen Applicant-proposed measures for control of on-site fugitive dust with an estimated 68% control efficiency, exceeds the significance threshold for PM10 established by the MDAQMD of 82 lbs/day by 54 lbs/day or 66%.[164] Accordingly, the DEIS concludes that mitigated PM10 emissions during construction would result in substantial residual Project-specific and cumulative impacts on air quality and could result in an exceedance of the California 24-hour ambient air quality standard for PM10.[165] However, Pless points out that, similar to NOx emissions, these estimates are too low and, consequently, PM10 emissions would exceed MDAQMD's daily emissions threshold by a far greater amount than identified in the DEIS.[166] 11-66

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[159] DEIS, Table 4.2-3, p. 4.2-10.
[160] Pless Comments, p. 4.
[161] *Id.* at p. 4.
[162] *Id.*
[163] *Id.*
[164] *Id.*
[165] DEIS, pp. 4.2-11 and -20.
[166] Pless Comments, p. 4.

3. The DEIS' Proposed Mitigation for Project Construction Emissions Is Inadequate and Additional, Feasible Mitigation Should Be Included in a Revised DEIS

The DEIS proposes mitigation that requires the Applicant to develop and implement a plan that demonstrates that off-road construction equipment (more than 50 horsepower) will achieve a Project-wide fleet-average 45 percent PM10 reduction and 20 percent NOx reduction compared to the most recent fleet average as determined by the California Air Resources Board. According to Dr. Pless, "this proposed mitigation is inadequate because emissions would continue to exceed MDAQMD thresholds of significance indicating that California's AAQS may be exceeded."[167] Pless recommends that additional and/or more stringent, feasible mitigation measures for control of fugitive dust and combustion exhaust emissions during construction be included in a revised DEIS.[168]

For starters, Pless recommends the presence of an air quality construction mitigation manager.[169] This would ensure the efficacy of the proposed measures.[170] The duties of an air quality construction mitigation manager could include 11-67

> developing transportation plans for truck routes and queuing; continuously monitoring the situation at the site (*e.g.*, vehicle speeds, *e.g.*, by installing radar enforcement; inspection of wind sheltering; real-time portable monitoring of particulate matter; observation of dust plume opacity); requiring additional or more stringent mitigation when necessary (*e.g.*, suspending all grading, earthmoving, or excavation activities when winds exceed 20 miles per hour; requiring pre-watering and phasing of work; pre-application of water to proposed cuts, etc.); creating construction surveys and monitoring plans to control dust, vibrations, work hours and noise; and implementing a comprehensive communications strategy including establishment of a construction mitigation hotline and address complaints in a timely manner.[171]

Dr. Pless also suggests that additional and/or more stringent mitigation measures for construction activities could be modeled, for example, after those required for 11-68

[167] *Id.* at p. 5.
[168] *Id.*
[169] *Id.*
[170] *Id.*
[171] *Id.*
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the Genesis Solar Energy Project.[172] A copy of the measures is attached to Dr. Pless' comments. 11-68 cont.

B. The DEIS Fails to Disclose, Analyze, and Mitigate Impacts to Biological Resources

The DEIS fails to adequately analyze and mitigate the Project's impacts to numerous species. The DEIS must be revised accordingly.

1. Impacts from Meteorological Towers

One or more permanent meteorological stations would be installed at the Project site to track weather patterns.[173] According to the DEIS, "Figure 2-9 depicts a typical meteorological station."[174] Figure 2-9 shows a tower with several supporting guy wires. Collisions with towers, support wires and lighted buildings are a frequent source of mortality for birds and bats.[175] The DEIS fails to disclose, analyze, or provide mitigation for the collision hazard that meteorological towers and guy wires pose to birds and bats. 11-69

2. Impacts from Night Lighting

The DEIS indicates that exterior security lighting would be installed to provide for safe access to Project facilities as well as visual surveillance.[176] This lighting appears to be in addition to the lighting that would be provided at the O&M building, Unit 1 and Unit 2 substations, site entrance, and switchyard.[177]

Light pollution is considered a serious threat to ecological communities because it has the potential to alter physiology, behavior, and population ecology of wildlife.[178] For example, light pollution may have an adverse effect on an organism's ability to acquire prey or avoid predators.[179] In addition, night lighting has the potential to disrupt the breeding and nesting behavior of sensitive bird 11-70

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[172] *Id.* at p. 6.
[173] DEIS, p. 2-14.
[174] *Id.*
[175] Cashen Comments, pp. 3-4.
[176] DEIS, p. 2-17.
[177] *Id.*
[178] Cashen Comments, p. 4.
[179] *Id.*
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species (e.g., burrowing owl) if placed in close proximity to nest sites.[180] Night lighting also is a substantial threat to migrating birds. In 2011, at least 484 birds comprised of 29 different species died due to night lighting at the Laurel Mountain Substation in West Virginia.[181]

The DEIS acknowledges the adverse effects that night lighting can have on wildlife.[182] It also discusses mitigation measures that will be implemented to reduce those effects.[183] In Cashen's opinion, even with the proposed mitigation measures, night lighting will still have adverse effects on wildlife.[184] The extent of the adverse effects cannot be evaluated because the DEIS does not provide information on the abundance of lights at the Project site, the luminous emittance (i.e., intensity) of the bulbs, the height of light fixtures or the location of lights in relation to sensitive biological resources (e.g., habitat known to be occupied by the Mojave fringe-toed lizard and burrowing owl).[185] The DEIS must be revised to include this missing information and must contain an adequate analysis of the Project's impacts on wildlife from night lighting. 11-70 cont.

3. Impacts from Dust Suppressants

The DEIS states that concentrate from the reverse osmosis water treatment facility could be used as a dust suppressant on the Project site.[186] Salt, and other bi-products of water treatment (e.g., chemical and biological agents), can be toxic to plants and animals.[187] If used as a dust suppressant, concentrate from the reverse osmosis water treatment facility also may contaminate ground and surface water supplies.[188] The DEIS completely fails to disclose, analyze, or provide mitigation for these adverse environmental impacts. 11-71

[180] *Id.*
[181] *Id.*
[182] DEIS, p. 4.4-16.
[183] *Id.*
[184] Cashen Comments, p. 4.
[185] *Id.*
[186] DEIS, p. 2-21.
[187] Cashen Comments, p. 5.
[188] *Id.*
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4. Impacts from Fencing

The Project site would be completely surrounded by fencing, topped with three-stranded barbed wire.[189] Barbed wire fencing poses a mortality to sensitive species that occur in the Project area, including the burrowing owl, prairie falcon and bighorn sheep.[190] The USFWS has confirmed fence strikes of prairie falcons at solar facilities.[191] In addition, the fencing "create[s] a potential entrapment hazard to wildlife."[192] The DEIS completely fails to disclose, analyze, or mitigate impacts to wildlife from Project fencing. To mitigate impacts from fencing, Cashen recommends that, at a minimum, the top-most wire should be smooth. In addition, Cashen recommends that the Applicant work with BLM and wildlife agencies to develop a "wildlife-friendly" fence design.[193] 11-72

5. Impacts to Golden Eagles

Golden eagles are protected by the Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Act, and Fish and Game Code section 3511. California law prohibits take of golden eagles. The USFWS requires a take permit to be issued for "take" of bald or golden eagles where the taking is associated with, but not the purpose of, the activity, and cannot be practicably avoided.[194] Take includes causing a decrease in golden eagle productivity by substantially interfering with normal breeding, feeding, or sheltering behavior.[195]

During breeding season, golden eagles have home ranges as small as 480 acres, with 95 percent of the activity concentrated in core areas as small as 74 acres.[196] The Project would permanently impact 4,903 acres of suitable foraging habitat for the golden eagle.[197] According to a USFWS biologist, the Applicant did 11-73

[189] DEIS, p. 2-16.
[190] Cashen Comments, p. 24.
[191] Attachment I, Email correspondence between Pagel and Baird, February 2, 2012 and Email correspondence between Rodriguez and Keeler, February 28, 2012.
[192] *Id.*
[193] Cashen Comments, p. 24.
[194] U.S. Fish and Wildlife Service, Division of Migratory Bird Management. 2009. Final Environmental Assessment, Proposal to Permit Take. Provided Under the Bald and Golden Eagle Protection Act. Washington: Dept. of Interior.
[195] *Id.*
[196] Cashen Comments, p. 27.
[197] DEIS, p. 4.4-3.

not collect adequate data regarding golden eagle use of the Project site.[198] In his comments, Cashen explains that "[i]n the absence of empirical data on the locations of core foraging areas, one must conclude that the Project could eliminate a substantial amount of core habitat (perhaps all) used by at least one pair of breeding eagles."[199] Cashen concludes that "[t]he loss of core foraging habitat is likely to lead to take, as defined in the Eagle Act."[200] The DEIS completely fails to analyze or provide mitigation for the take of golden eagles (in violation of California law), and the DEIS fails to acknowledge that the Project requires a permit from the USFWS pursuant to the Bald and Golden Eagle Protection Act. 11-73 cont.

The DEIS also fails to adequately analyze impacts to golden eagles from collision and electrocution. The DEIS states, "[a]lthough there is a potential for mortality due to collision with the gen-tie or distribution lines, the potential is low due to the distance from known nests and nesting habitat and the lack of known prey concentrations on the Project site (Tetra Tech EC, Inc., 2011)."[201] Cashen explains that the DEIS' conclusions are unsupported.

First, the Project poses a threat to eagles that are not linked to a nest site ("floaters") and to eagles that migrate through the Project area.[202] Second, there is no evidence that that there is a "lack of prey concentrations" on the Project site. In fact, the Applicant's consultant did not conduct surveys to document the abundance of golden eagle prey on the Project site.[203] Finally, the DEIS' proposed mitigation for the Project's impacts to golden eagles is wholly inadequate. The DEIS requires the Applicant to implement a Golden Eagle Monitoring and Management Plan if an occupied nest is detected within one mile of the Project boundaries. It then establishes triggers for adaptive management. These triggers include, "any evidence of Project-related disturbance to nesting golden eagles, including but not limited to: agitation behavior (displacement, avoidance, and defense), increased vigilance behavior at nest sites, changes in foraging and feeding behavior, or *nest site abandonment*."[204] In his comments, Cashen explains that most of these types of disturbance would constitute "take," which is not allowed under California law or 11-74

[198] Cashen Comments, p. 27.
[199] *Id.*
[200] *Id.*
[201] DEIS, p. 4.4-16.
[202] Cashen Comments, p. 27.
[203] *Id.*
[204] DEIS, p. 4.4-41 (emphasis added).
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without a permit from the USFWS.[205] Moreover, "there is no utility in adaptive management if an eagle abandons its nest."[206] Consequently, the mitigation proposed in the DEIS is inadequate. 11-74 cont.

To comply with NEPA, the DEIS must be revised to adequately analyze, disclose and mitigate significant adverse effects to golden eagles.

6. Impacts to Special-Status Plants

The DEIS fails to adequately disclose and analyze impacts to special-status plants. The DEIS states, without any support, "[t]he Project is not anticipated to substantially affect any populations of special-status plant species or cacti, although a number of individuals would be affected by each Alternative (as described above and summarized in Table 4.3-3)."[207] To the contrary, as the DEIS acknowledges, that many of the plant taxa in the Project region are at the edge of their range and it is well documented that peripheral populations have evolutionary significance and conservation value, and that they are at higher risk of extirpation.[208] Based on this information, Cashen concludes that the Project *would* substantially affect several special-status plant species.[209] Further, the CNDDB and the California Consortium of Herbaria database indicate that the Project would have a substantial adverse effect on the statewide population of several special-status plant species.[210] The DEIS fails to disclose this significant impact. 11-75 11-76

The DEIS also fails to adequately mitigate significant impacts to special-status plants. The DEIS requires the Applicant to provide compensatory mitigation for the Project's impacts to special-status plant species. According to the DEIS, 11-77

> Compensatory mitigation shall consist of acquisition of habitat supporting the target species, or restoration/enhancement of populations of the target species, and shall meet the performance standards for mitigation described below. In the event that no opportunities for acquisition or restoration/enhancement exist, the

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[205] Cashen Comments, p. 37.
[206] *Id.*
[207] DEIS, p. 4.3-16.
[208] *Id.* at p. 3.3-2.
[209] Cashen Comments, p. 22.
[210] *Id.*
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> Applicant can fund a species distribution study designed to promote the future preservation, protection or recovery of the species.[211]

In Cashen's opinion, this measure is inadequate. A distribution study cannot take the place of habitat acquisition.[212] If a species is so rare that there are "no opportunities for acquisition or restoration/enhancement," evidence shows that any impacts to that species would likely have severe consequences on the viability of the statewide population.[213] For example, if the Project site contained the last known population of a species and Project construction destroyed that population, a distribution study would provide no value. 11-77 cont.

The DEIS also requires the Applicant to establish Environmentally Sensitive Areas ("ESAs") that consist of 10- to 20-foot buffers around special-status plant species.[214] In Cashen's opinion, the proposed buffers are too small to reliably protect the target species, and therefore the measure is inadequate. Based on an analysis by the Conservation Biology Institute, California Energy Commission Staff concluded that plant occurrences that were not protected from project activities by a 250-foot buffer should not be considered "protected."[215] 11-78

Finally, the DEIS allows the Applicant to acquire "unoccupied but adjacent" habitat as rare plant mitigation.[216] According to Cashen, the proposed strategy has questionable conservation value, and therefore the measure is inadequate.[217] As Cashen explains, most rare plants have specific microhabitat requirements, which are poorly understood. Presumably, a site that is unoccupied does not provide the specific microhabitat requirements needed by the target species. The only way to justify the proposed measure is to show that the species historically occurred, but no longer occurs due to some management practice (e.g., grazing), that once eliminated, would reasonably be expected to promote return of the species. Cashen suggests that the BLM require the Applicant to demonstrate the value of any "unoccupied but adjacent" habitat that is proposed for mitigation. This would be the only way by which the BLM could begin to support this questionable mitigation. In addition, the compensation ratio should reflect the inherent, uncertain value in 11-79

[211] DEIS, p. 4.3-33.
[212] Cashen Comments, p. 30.
[213] *Id.* at p. 31.
[214] DEIS, p. 4.3-28.
[215] Cashen Comments, p. 31.
[216] DEIS, p. 4.3-34.
[217] Cashen Comments, p. 31.

replacing occupied habitat with unoccupied habitat (i.e., the compensation ratio should be higher).[218] 11-79 cont.

7. Impacts to Cryptobiotic Soil Crusts

Cryptobiotic soil crusts are communities of cyanobacteria, lichens, and mosses. These crusts bind fine soil particles by linked cyanobacterial fibers. Several studies have suggested that the presence of cryptobiotic crusts dramatically decreases wind and water erosion. When disturbed, cryptobiotic crusts lose most of their protective qualities allowing mobilization of the underlying mineral soils.[219]

Cashen explains in his comments that once desert crust or pavement is removed (or damaged), sand may be blown several kilometers downwind, resulting in an area of indirect disturbance that can exceed the directly disturbed area by several-fold. Blowing sand abrades plants, resulting in leaf stripping and damage to the cambium and therefore to the plant's ability to distribute and use water. Young plants are especially vulnerable to the effect of blowing sand because they lack woody tissue. This results in the suppression of revegetation in bare areas and the loss of vegetation on adjacent lands. Nitrogen-fixing microbial communities and cryptobiotic crusts also become buried by sand, reducing inputs of nitrogen to the soil.[220]

The Project would involve ground disturbance activities that will destroy vegetation. Studies show that destruction of vegetation results in soil degradation which, in turn, further decreases shrub cover and increases the susceptibility of land to wind and water erosion.[221] The fine particles and soil organic matter that are removed by erosion are key to the healthy functioning of soils because they increase soil nutrient content, soil porosity, water-holding capacity, and cation-exchange capacity. Because new vegetation growth is inhibited by blowing sand, the ability of vegetation to stem erosion is limited. This results in a negative feedback loop that ultimately results in *severe land degradation*.[222]

The DEIS fails to disclose the abundance and distribution of cryptobiotic soil crusts in the Project area (even though cryptobiotic soil crusts are known to occur 11-80

[218] *Id.*
[219] *Id.*
[220] *Id.* at pp. 22-23.
[221] *Id.* at p. 23.
[222] *Id.*
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there).[223] The DEIS also fails to fully disclose or assess the landscape-level impacts that are likely to occur once vegetation and cryptobiotic soil crusts are removed from the Project site. 11-80 cont.

The DEIS acknowledges the adverse effects that can result from fugitive dust, and that fugitive dust has the potential to cause significant impacts to sensitive resources. However, it relies on the assumption that after construction is complete, disturbed areas can be stabilized through revegetation, or with a nontoxic soil stabilizer or soil-weighting agent.[224] Cashen provides evidence that the DEIS' assumptions are wrong.

First, natural resource restoration is challenging under any circumstances and it can be extremely difficult in arid environments. As the DEIS acknowledges, it takes many years for plant communities to recover in desert ecosystems, and all ground disturbance activities associated with the Project should be considered permanent. Consequently, one cannot assume that impacts to cryptobiotic soil crusts can be mitigated through revegetation.[225] 11-81

Second, the length of time that a soil stabilizer is effective varies according to the type of product, soils, weather, application rate, and traffic conditions.[226] The DEIS fails to account for the fact that soil stabilizers are not effective indefinitely.

Finally, the DEIS lacks any performance standards for the proposed dust control mitigation measures, and it fails to require mitigation monitoring to ensure dust control efforts are successful in minimizing indirect impacts to sensitive biological resources.

The DEIS fails to adequately disclose, analyze or mitigate the Project's adverse effects on cryptobiotic soil crusts. The DEIS must be revised and recirculated accordingly. 11-82

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[223] *Id.*
[224] DEIS, pp. 4.3-5, 4.2-7 - 8.
[225] Cashen Comments, p. 23.
[226] *Id.* at p. 24.
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8. Impacts to Burrowing Owls

The DEIS references CDFG's 1995 Staff Report on Burrowing Owl Mitigation to define impacts to burrowing owls.[227] CDFG's 1995 Staff Report has been superseded by its 2012 Staff Report on Burrowing Owl Mitigation, which incorporates a considerable amount of new information pertaining to burrowing owl impacts.[228] For example, CDFG's definition of impacts to burrowing owls is no longer limited to disturbance within 50 meters of an occupied burrow.[229] Because the DEIS fails to consider the information provided in CDFG's 2012 Staff Report, it fails to identify significant adverse effects to burrowing owls.[230] For example, due to the stress caused to burrowing owls from passive relocation, the 2012 Staff Report concludes that passive relocation of burrowing owls results in significant impacts to the species. The DEIS fails to identify or analyze this significant adverse effect, as required by NEPA. 11-83

The DEIS also fails to adequately mitigate the Project's impacts to burrowing owls. The DEIS requires the Applicant to acquire 19.5 acres of compensation habitat for Project impacts to burrowing owls.[231] This acreage value is based on the BLM's assessment that the Project would affect three pairs of owls, and that each pair requires 6.5 acres of compensation habitat. Evidence shows that the proposed measure will not mitigate the effects of the Project on burrowing owls. 11-84

First, the proposed mitigation is not commensurate with the adverse effects of the Project. The burrowing owl mitigation guidelines referenced in the DEIS establish that compensatory mitigation should be based on the number of active burrows that may be affected by an action, not on the number of owls that were observed at a site.[232] The DEIS states that 11 active burrows were detected on the Project site.[233] The BRTR, on the other hand, suggests at least 18 active burrows were detected on the Project site.[234] Nevertheless, meeting the mitigation

[227] DEIS, p. 4.4-14.
[228] Cashen Comments, p. 25.
[229] *Id.*
[230] *Id.*
[231] DEIS, p. 4.4-38.
[232] Cashen Comments, p. 33.
[233] DEIS, p. 3.4-12.
[234] BRTR, Figures 11 and "Appendix J." *See also* 2011 Fall Plants and Supplemental Wildlife Survey Report, Figure 6A and B.

requirements referenced in the DEIS would dictate the need for at least 71.5-acres of compensatory mitigation – not 19.5.[235] Even then, given the Project would disturb more than 4,900 acres of burrowing owl habitat, acquisition of 19.5 (or 71.5) does little to offset the loss of 4,900 acres of habitat. According to the CDFG, offsite mitigation may not adequately offset the biological and habitat values impacted on a one to one basis. Consequently, the Applicant should be required to acquire more than 4,900 acres of compensatory mitigation lands.[236] 11-84 cont.

Second, the CDFG no longer accepts the mitigation standards recommended in the CBOC guidelines or its 1995 Staff Report on Burrowing Owl Mitigation because those standards have proven ineffective in the conservation of burrowing owl populations.[237] The DEIS must base its mitigation on CDFG's 2012 Staff Report on Burrowing Owl Mitigation.[238] 11-85

Third, the timing of preconstruction burrowing owl surveys is not consistent with CDFG recommendations. In accordance with CDFG's 2012 Staff Report on Burrowing Owl Mitigation, the BLM should require the Applicant to conduct an initial preconstruction survey within the 14 days prior to ground disturbance, followed by a subsequent survey within 24 hours prior to ground disturbance. The results of these surveys and the subsequent mitigation strategy should be approved by CDFG prior to any ground disturbance activities.[239] 11-86

Fourth, the DEIS allows the Applicant to evict burrowing owls from their burrows, as long as it first creates or enhances replacement burrows. The DEIS allows these replacement burrows to be placed up to one mile from the Project disturbance area.[240] Evidence shows that locating artificial or natural burrows more than 100 meters from the eviction burrow may greatly reduce the chances that new burrows will be used. Cashen suggests that the mitigation measure be revised to require replacement burrows as close as possible to any burrows that are destroyed by the Project. Further, any owls that cannot be "relocated" to replacement burrows within 100 meters of the eviction site should be considered 11-87

[235] Cashen Comments, p. 33.
[236] *Id.* at p. 34.
[237] *Id.* at pp. 33-34.
[238] *Id.*
[239] Cashen Comments, p. 35.
[240] DEIS, p. 4.4-37.

permanently impacted and additional mitigation (i.e., habitat compensation) should be required.[241] 11-87 cont.

Fifth, CDFG recommends that burrowing owl relocation sites be protected in perpetuity (e.g., through a conservation easement).[242] The DEIS must be revised to reflect this. 11-88

Sixth, the DEIS' proposed buffers for active owl burrows are not consistent with CDFG's 2012 Staff Report. In addition, the mitigation monitoring imposed by the BLM is not consistent with CDFG's 2012 Staff Report.[243] 11-89

Finally, the DEIS allows the Applicant to provide burrowing owl compensation lands that are up to five miles from an active burrowing owl nesting territory.[244] Cashen explains that acquisition lands that are up to five miles from occupied habitat have little conservation value to the species unless those lands can be made suitable for occupancy. The compensation ratio applied to the mitigation measure must reflect the unpredictable value of replacing occupied habitat with unoccupied habitat (i.e., the ratio must be higher).[245] 11-90

9. Impacts to Wildlife Corridors and Connectivity

The DEIS concludes the Project would "have a minor impact on a regional connectivity corridor for the bighorn sheep because the corridor is maintained to the west, north, and east of the solar plant site."[246] The DEIS' conclusion is unsupported. Further, evidence shows that the Project would have a significant adverse effect on wildlife corridors and connectivity. 11-91

The Project would be bounded on either side (north and south) by other solar power plants – BSPP and enXco McCoy.[247] Together, these projects take up more than 27,000 acres.[248] Permanent fencing for the Project and the adjacent BSPP project would create a 5-mile-long wildlife movement barrier. With the addition of 11-92

[241] Cashen Comments, p. 35.
[242] *Id.*
[243] *Id.*
[244] DEIS, p. 4.4-38.
[245] Cashen Comments, p. 35.
[246] DEIS, p. 4.4-15.
[247] *See* DEIS, Figure 4.4-1.
[248] DEIS, Table 4.1-4.

enXco fencing, the barrier would be even greater. This will impede wildlife movement, even for highly motile species.[249] 11-92 (cont.)

10. Impacts to Burro Deer

The DEIS states, "[d]irect and indirect construction impacts to burro deer would be similar to those described for the Nelson's bighorn sheep."[250] Cashen explains that the DEIS' analysis is inadequate for two reasons.

First, deer and sheep do not use washes in the same way. Sheep forage in washes following rainfall events that result in good forage production, particularly with respect to annual plant species. Deer live in those washes year round and, although they also benefit from good annual plant production following periods of rainfall, they are dependent upon the vegetation in those washes year-round for forage. Cashen concludes that making areas inaccessible to deer through fence construction will undoubtedly result in a decline in the deer population.[251] 11-93

Second, deer move across wide expanses of the desert to access high-quality forage that becomes available with rainfall. Fencing the Project site will not only preclude deer from accessing a vast amount of habitat, but it will also impact their ability to move through the Project area to other areas of better habitat that become temporarily available following rainfall.[252]

Evidence shows that the Project would significantly affect burro deer. The DEIS fails to disclose, analyze and mitigate this impact.

11. Impacts to Couch's Spadefoot Toad

The Couch's spadefoot is listed as a BLM Sensitive Species and a California Species of Special Concern. Ten potential Couch's spadefoot breeding pools were detected on the Project site. Because the Applicant did not conduct focused surveys for Couch's spadefoot, the DEIS (correctly) assumes that all 10 pools are used by the species. However, the DEIS fails to disclose the ecological implications of this 11-94

[249] Cashen Comments, p. 26.
[250] DEIS, p. 4.4-15.
[251] Cashen Comments, p. 26.
[252] *Id.*
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impact, and thus fails to analyze the extent of the Project's impacts on Couch's spadefoot toads.

Cashen explains that Couch's spadefoot is an extremely rare species in California and its range is limited to a very small region in the southeastern portion of the state. The CNDDB has only five documented records of the species in the State. Couch's spadefoot is susceptible to disturbance from off-road vehicles that create noise similar to rainfall, inducing emergence under highly unfavorable (hot, dry) conditions that would be almost certainly fatal to adults. Breeding sites used by the Couch's spadefoot are potentially vulnerable to disturbance that alters the percolation characteristics of the substrate in a manner that makes pools too short-lived for larvae to attain metamorphosis.[253] Based on these facts, Cashen concludes that Project impacts to 10 breeding pools used by the species would have severe ecological implications that must be disclosed in the DEIS.[254] 11-94

The DEIS' proposed mitigation for the Project's impacts to Couch's spadefoot toad is also inadequate and must be revised. The DEIS establishes that if complete avoidance of the ponds or other breeding sites identified during forthcoming surveys is not possible, the Applicant will be required to create "additional breeding habitats (ephemeral pond) at least equal in area to the acreage of ponds being impacted".[255] As Cashen explains in his comments, this measure is inadequate for two reasons.

First, it fails to establish a mechanism that ensures the Applicant will make a good faith effort to avoid and minimize impacts to breeding ponds. Indeed, the fact that the BLM has assumed the Project would impact all 10 breeding sites, nine of which coincide with proposed linear facilities, strongly suggests the BLM has not worked with the Applicant to avoid and minimize impacts to the Couch's spadefoot. Given the status of the species, the BLM and Applicant must explore all feasible opportunities to avoid and minimize impacts to breeding ponds that may be used by the Couch's spadefoot.[256] 11-95

Second, the proposed measure that requires the creation of new ponds (i.e., WIL-14) does not ensure adequate mitigation. Couch's spadefoot toads have three principal habitat requirements: temporary desert rainpools with water

[253] Cashen Comments, p. 29.
[254] *Id.*
[255] DEIS, p. 4.4-43.
[256] Cashen Comments, p. 39.
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temperatures greater than 15 °C that last for at least nine days during the breeding season, subterranean refuge sites (with a loose enough substrate to permit burial) within in the vicinity of the breeding pool and an insect food base.[257] The mitigation proposed in WIL-14 addresses only *one* of these habitat requirements – that pools hold water for at least nine days during the breeding season -- and provides *no assurance* that this single habitat requirement will be met. Furthermore, the "breeding season" has been only loosely defined. [258] Thus, there is no assurance that ponds will be suitable breeding habitat and the mitigation fails.

Moreover, the proposed mitigation lacks any discussion of where created ponds would be located, how they would be conserved in perpetuity, a funding mechanism for their creation, preservation, and management, and the water supply that will be used to ensure the ponds hold water for at least nine days during the breeding season. The measure also fails to meet any minimum standards for water quality, vehicle noise and other anthropogenic disturbances may negatively affect Couch's spadefoot toads.[259] In addition, WIL-14 does not establish performance criteria for any of the issues (or considerations) central to reserve design. These include site selection, corridors, buffers, isolation, and fragmentation.[260] The measure also fails to address patch size as an important consideration in habitat suitability for Couch's spadefoot toads. In particular, once a certain patch size is reached, area alone does not increase habitat suitability.[261] This is especially important because the BLM's proposed mitigation does not require the Applicant to replicate the distribution and number of pools impacted by the Project; the condition only requires that mitigation be implemented for those acres that are impacted (e.g., the Applicant could create one "mega" pool to replace impacts to 10 well-distributed pools). Because distribution and abundance of pools may affect overall habitat suitability for Couch's spadefoot toads, minimum standards associated these variables must be incorporated into the BLM's mitigation.[262] Finally, WIL-14 fails to include monitoring that confirms spadefoot toads are breeding in any pond habitat created to mitigate impacts to the species.[263]

11-95 (cont.)

[257] *Id.*
[258] *Id.*
[259] *Id.*
[260] *Id.* at p. 40.
[261] *Id.*
[262] *Id.*
[263] *Id.* at p. 41.
2553-020cv

12. Impacts to Special-Status Bats

The DEIS indicates that the Project could result in the direct loss of a bat roosting site that was detected on the Project site.[264] Yet, the DEIS provides no mitigation for this significant adverse effect, in violation of NEPA. 11-96

13. Impacts to Desert Kit Fox

The first documented case of canine distemper in the desert kit fox was recently discovered at the Genesis Solar Energy Project site, approximately 17 miles west of the Project site.[265] Since then, the disease has spread, and there is concern that the desert kit fox could suffer an epidemic similar to one that nearly wiped out the island fox population on Santa Catalina Island in 1999.[266] Cashen explains that the Project has the potential to exacerbate the distemper issue by stressing resident kit foxes and displacing kit foxes from their home ranges (which may lead to intermingling of healthy and diseased kit foxes). The DEIS completely fails to disclose this significant adverse impact to desert kit fox. 11-97

In light of the distemper outbreak at the Genesis Solar Energy Project, and the reasonably foreseeable impacts to kit fox from the Project, Cashen recommends that the Applicant and BLM develop a kit fox mitigation monitoring program to be approved by CDFG.[267]

14. Impacts to Nesting Birds

The DEIS requires the Applicant to have a biologist monitor active nests within the range of construction-related noise exceeding 65 dBA.[268] The DEIS establishes triggers for adaptive management as "evidence of Project-related disturbance to nesting birds such as...*nest site abandonment*."[269] Cashen explains there are two significant problems with the DEIS' approach to mitigation for the Project's impacts to nesting birds. 11-98

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[264] DEIS, p. 4.4-15.
[265] Cashen Comments, p. 30; *see also* Attachment J, Compliance reports for the Genesis Solar Energy Project, documenting kit fox deaths.
[266] *Id.*
[267] *Id.* at p. 33.
[268] DEIS, p. 4.3-23.
[269] *Id.*
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First, Project activities that cause a nesting bird to abandon its nest would likely constitute a take,[270] which is prohibited by the Migratory Bird Treaty Act.

Second, scientific literature clearly demonstrates the adverse effects of noise and other forms of human disturbance on nesting birds, including for example, sound levels above 50 dBA within 1,000 meters of the source. But there is no evidence to support the notion that impacts to nesting birds from exposure to loud noise levels can be reliably avoided through monitoring and "adaptive management."[271] Consequently, the mitigation measure is inadequate and must be revised to prohibit loud construction noise within a scientifically-defensible buffer zone around nesting birds. 11-98 (cont.)

Thus, impacts to nesting birds remain significant.

15. Impacts to Mojave Fringe-Toed Lizard

The DEIS indicates there are approximately 1,098 acres of occupied Mojave fringe-toed lizard habitat within the Chuckwalla Valley and Palo Verde Valley, of which approximately 655 acres (59.7 percent) occurs in areas where future development projects are proposed.[272] The DEIS concludes the mitigation measures proposed in the DEIS would provide suitable compensatory mitigation for habitat losses.[273] Cashen provides evidence that the DEIS' proposed mitigation is inadequate.

First, future development projects would eliminate 655 of the 1,098 acres of occupied Mojave fringe-toed lizard habitat in the Chuckwalla Valley and Palo Verde Valley, leaving 443 acres. The DEIS proposes habitat compensation at a 3:1 ratio. Assuming the other projects that impact Mojave fringe-toed lizard habitat will also provide compensation at a 3:1 ratio, the projects would cumulatively have to provide 1,965 acres of compensation habitat. This is impossible because only 443 acres of occupied Mojave fringe-toed lizard habitat will remain after development of the projects. Cumulatively, the projects would not even be able to accomplish compensation at a 1:1 ratio (which would require 655 acres).[274] 11-99

[270] Cashen Comments, p. 37.
[271] *Id.*
[272] DEIS, p. 4.4-24.
[273] *Id.*
[274] Cashen Comments, p. 28.
2553-020cv

Second, the Mojave fringe-toed lizard exhibits a metapopulation structure, meaning a population that has a spatially discrete distribution, and for which at least one or more local populations has a non-trivial probability of extinction.[275] The fate of plant and animal metapopulations depends on the dispersal of individuals, both within and among patches of habitat.[276] Simulation models demonstrate clearly that populations in interconnected patches have a greater survival probability (i.e., persistence) than those in isolated patches and, moreover, that survival probability in connected patches increases with the degree of clustering among patches and with corridor quality.[277] Based on these facts, and knowledge of other factors (e.g., deterministic and stochastic factors) that affect the persistence of small populations, Cashen concludes that the Mojave fringe-toed lizard population in the Chuckwalla Valley and Palo Verde Valleys will not persist if there is a 59.7 percent loss of habitat.[278] The DEIS fails to address the importance of metapopulation dynamics in maintaining a viable Mojave fringe-toed lizard population and fails to adequately disclose, analyze, and mitigate the Project's significant impacts to the Mojave fringe-toed lizard. 11-100

C. The DEIS Must Disclose, Analyze and Propose Mitigation for Impacts to Cultural Resources

Section 101 of NEPA declares it is a matter of national policy to preserve important historic, cultural, and natural aspects of our national heritage. Policy direction in BLM Manual 8100, section 8110.05D, further provides that BLM should "[i]ncorporate cultural resource considerations into all aspects of planning and decision making." Also, under Section 106 of the NHPA, the BLM has responsibility to consult with tribes and other parties to ensure that these impacts are identified as early as possible. Consultation must provide Indian tribes a reasonable opportunity to identify concerns about historic properties, advise on the identification of historic properties, including those of traditional religious and cultural importance, articulate its views on the undertaking's effects on such properties, and participate in the resolution of such effects.[279] The DEIS fails to satisfy the requirements of NEPA and the NHPA. 11-101

[275] Cashen Comments, p. 28.
[276] *Id.*
[277] *Id.*
[278] *Id.*
[279] 36 C.F.R. § 800.2.

1. The DEIS Violates NEPA because BLM's Impact Analysis Focuses on a Small Subset of Cultural Resources and Ignores Others

As explained above, the DEIS' definition of "cultural resource" is extremely narrow, emphasizing only specific, small sites and isolates on or in the ground that are recognized, identified and valued by archaeologists through archaeological surveys, while excluding "larger, more inclusive phenomena like landscapes, viewsheds...and 'districts.'"[280] As a result, the DEIS only analyzes the Project's impacts on only those cultural resources it classifies as sites, buildings, structures, objects or districts made of up discrete landscape features. 11-102

The DEIS' narrow definition of cultural resources carries through to its definition of the Area of Potential Effect ("APE"). The DEIS defines the APE for direct effects to be where construction activities will certainly churn up the soil that may contain artifacts, and for indirect effects, a half mile buffer zone around the APE for direct effects.[281] According to King, the APE for both direct and indirect effects is arbitrary and narrow and reflects an assumption that only physical impacts to physical remains matter.[282] As a result, the DEIS completely ignores, for example, the Project's impacts to viewsheds of cultural or spiritual value that may extend beyond a half mile.[283] "The same applies to auditory, olfactory, and other impacts not directly related to the disturbance of archaeological sites."[284] 11-103

In short, the DEIS ignores the Project's impacts on cultural resources that are not historic properties recognized by the Applicant's consultants while walking on the ground surface. "By first defining out of existence all 'cultural resources' that are not archaeological sites, and then excluding all effects other than potential physical effects on such sites, the DEIS ignores most of the project's likely impacts on cultural resources."[285] In King's opinion, "BLM's conclusions are likely grossly underestimated."[286] BLM's approach violates NEPA and the DEIS must be revised to analyze the Project's impacts on all cultural resources. 11-104

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[280] King Comments, p. 3.
[281] DEIS, p. 4.5.1.
[282] King Comments, p. 13.
[283] *Id.*
[284] *Id.* at p. 14.
[285] *Id.*
[286] King 106 Comments, p. 5.

2. The DEIS Fails to Analyze the Project's Impacts on Buried Cultural Resources

The DEIS states,

> [t]he distribution of artifacts across the Project site shows that few cultural resources were identified in the southwestern and eastern portions of the Project site. This may be a result of flooding events that have taken place over time. The area in question has deep washes, suggesting that a high volume of water has the potential to move through the area. There is also evidence of flooding from the McCoy Wash near the eastern edge of the Project site and beyond the surveyed area. Historic deposits in the area have likely been displaced by these flooding events.[287]

King explains in his comments that these flood events can "bury artifacts, features, burials, and whole sites. This enhances the likelihood of unanticipated discoveries during construction, which has happened on the Genesis Solar Energy Project."[288]

In addition, the DEIS states that "Holocene-age deposits are known to contain surface and ***buried*** archaeological deposits near the Project area" and "the proposed Project area is underlain by late Pleistocene and Holocene-age alluvial fan, valley fill, fluvial wash, and Aeolian deposits."[289] As King explains,

> [i]n other words, whatever the applicant's contractors noticed in their walks over the surface of the project area, there is every reason to think that there are buried cultural deposits of Holocene, if not Pleistocene, age. Here again we are being warned of the potential for a Genesis Solar situation, but the DEIS ignores the warning.[290]

11-105

Despite the likelihood of buried resources on the Project site, and the catastrophe that occurred at the Genesis Solar Energy Project, the DEIS completely fails to analyze the Project's impacts on buried cultural resources.

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[287] DEIS, p. 3.5-29.
[288] King Comments, p. 10. *See also* Attachments E and F.
[289] DEIS, pp. 3.5-30 - 31 (emphasis added).
[290] King Comments, p. 11 (emphasis in original).
2553-020cv

3. The DEIS Fails to Adequately Evaluate the Project's Impacts on Cultural Landscapes

Without any basis, the DEIS states that NRHP "eligibility criteria are still being developed" for the two cultural landscapes identified on the Project site – the Desert Training Central Cultural Landscape and the Prehistoric Trails Network Cultural Landscape.[291] The DEIS is simply wrong. The NRHP's eligibility criteria have been in place since the 1960's and apply to landscapes (and any other type of property).[292] Also, the National Park Service issued guidelines for evaluating landscapes.[293] The DEIS must be revised to include analyses of the Project's impacts on cultural landscapes. 11-106

4. The DEIS Fails to Provide Adequate Mitigation for Impacts to Cultural Resources

The DEIS includes one mitigation measure for the Project's impacts to cultural resources. "CUL-1" states, "BLM's execution of an MOA" under Section 106 of the NHPA will "resolve adverse effects associated with" the Project.[294] According to the DEIS,

> [t]he MOA will contain measures to avoid, minimize, and mitigate adverse effects to historic properties and detail the process for activities to proceed in areas where historic properties are not now known to exist; procedures for treatment of inadvertent discoveries; recognition that BLM will comply with NAGPRA; compliance monitoring; dispute resolution; and tribal participation.[295]

CUL-1 also states that a HPTP will be prepared that contains procedures to mitigate impacts to historic properties. The DEIS then lists measures that the HPTP *could* include.[296]

CUL-1 fails to include "a reasonably complete discussion of possible mitigation measures"[297] for impacts to cultural resources. Instead, it merely 11-107

[291] DEIS, p. 3.5-30.
[292] *See* 36 C.F.R. § 60.4.
[293] *See* C.f. National Register Bulletins 18, 30 and 38, available at http://www.nps.gov/nr/publications/bulletins.
[294] DEIS, p. 4.5-9.
[295] *Id.* at p. 4.5-10.
[296] *Id.*
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provides a "perfunctory description" or a "mere listing" of possible, hypothetical mitigation measures, in violation of NEPA.[298] Further, CUL-1 does not provide any mitigation for the Project's impacts to any cultural resources other than archaeological sites found on the surface of the ground and identified as eligible for the NRHP. The DEIS completely fails to satisfy the requirements of NEPA. 11-107 (cont.)

5. The DEIS does Not Satisfy the NHPA because there is No Evidence that BLM Consulted with Tribes

The NHPA requires BLM to consult with any Indian tribe that attaches cultural significance to historic properties that may be affected by the Project. The DEIS states that the Applicant's consultant (AECOM) made some attempt to inform Indian tribes about the Project.[299] According to the DEIS, AECOM sent letters to tribes and made follow-up phone calls.[300] As explained by King, contact by a project applicant's consultant does not constitute government-to-government consultation required by the NHPA.[301] This is made clear by the Advisory Council on Historic Preservation's ("ACHP") "Section 106 Archaeology Guidance" which states,

> [a] federal agency may not delegate to an applicant or any other non-federal party its responsibility to consult with federally recognized Indian tribes on a government-to-government basis. The federal government's responsibility...is established through Executive Orders, Presidential memoranda, and other authorities, and is explicitly recognized by the ACHP's regulation [36 CFR § 800.2(c)(2)(ii)(B) and (C)...[302]

11-108

Moreover, there is no evidence that any *meaningful* consultation occurred. The DEIS merely provides capsule summaries, without any context or analysis, of six tribes' responses to AECOM's contacts. Specifically, the DEIS reports:

- The Quechan Trial Historic Preservation Officer ("THPO") expressed "concerns about the cultural landscape" and would like a copy of the Class III report;

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[297] *Robertson v. Methow Valley Citizens Council*, 490 U.S. at 352.
[298] *Neighbors of Cuddy Mountain*, 137 F.3d at 1380; *Idaho Sporting Cong. v. Thomas*, 137 F.3d at 1151.
[299] DEIS, pp. 3.5-27 – 28.
[300] *Id.*
[301] King Comments, p. 7.
[302] Available at http://www.achp.gov/docs/ACHP%20ARCHAEOLOGY%20GUIDANCE.pdf, p. 10.

- The Agua Caliente THPO requested maps and site descriptions/evaluations;
- The Cocopah tribal archaeologist offered no response;
- A member of the Serrano wanted to be notified of updates and wanted a copy of the class III report;
- Quechan elder, Preston Arrow-weed, did not wish to participate;[303] and
- The Chemehuevi Chairperson had "general concerns about development in the desert."[304]

In his comments, King explains that,

> [w]ithout knowing what kinds of letters were sent by AECOM to the tribes, or what the content of any telephone calls were, it is impossible to determine whether the DEIS' brief capsule summaries actually capture tribal views. The DEIS completely fails to evaluate the meaning of tribal concerns, or explain what might be done with them. In other words, the DEIS contains no analysis of the project's effects on tribes.[305]

11-108 (cont.)

Notably, "a lack of response" from a tribe

> should not be interpreted as a lack of interest in consultation or in providing information. Rather, the tribe may choose not to respond to a query from an applicant (or its consultant or contractor) because this contact does not meet the requirement of government-to-government consultation. In those cases where a tribe has not responded to an applicant or its representative, the federal agency must contact the tribe to initiate consultation and ascertain its interest.[306]

Here, despite a lack of response from the Cocopah tribe and a Quechan elder's wish to not participate (perhaps because the contact did not meet the requirement of

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[303] The DEIS provides no reason why Mr. Arrow-weed "did not wish to participate" – perhaps it is because he did not want to talk to the Applicant's consultant.
[304] DEIS, Appendix D, Table 3.
[305] King Comments, p. 8
[306] ACHP "Section 106 Archaeology Guidance," p. 11 (available at http://www.achp.gov/docs/ACHP%20ARCHAEOLOGY%20GUIDANCE.pdf).

government-to-government consultation), there is no evidence that BLM itself contacted the Cocopah or Quechan tribes. This is a blatant violation of the NHPA. 11-108 (cont.)

6. The DEIS does Not Satisfy the NHPA because there is No Evidence that BLM Consulted with Other Parties

The NHPA requires BLM to consult with tribes *and other parties*.[307] There is no evidence that BLM consulted with parties other than tribes who might have cultural interests in the area of the Project.

The DEIS states that the majority of the "sites" thought to be eligible for the NRHP are associated with military activities associated with the World War II General Patton training center.[308] Yet, there is no indication that BLM contacted military history groups about their interests in the treatment of such sites and the landscape(s) of which they are parts. Consultation is key to identifying the Project's impacts on the "Desert Training Center Cultural Landscape." In his comments, King explains, "the significance of a landscape (or site, or anything else) is not an abstract quality that an uninvolved observer can measure; it is inevitably embedded in the minds of those who know about and perhaps value the place."[309] Without proper consultation, it is impossible to determine the extent of the Project's impacts on the cultural landscape. 11-109

7. The DEIS does Not Satisfy the American Indian Religious Freedom Act

The American Indian Religious Freedom Act[310] ("AIRFA") was enacted to protect and preserve the traditional religious rights and cultural practices of Native Americans. These rights include access to sacred sites, freedom to worship through ceremonial and traditional rights and use and possession of objects considered sacred, among other rights. AIRFA requires federal agencies to respect the customs, ceremonies and traditions of Native American religions. 11-110

The DEIS states that "t[h]e BLM complies with AIRFA by obtaining and considering the views of traditional religious practitioners as part of the NEPA

[307] NHPA, § 106; 36 C.F.R. Part 800.
[308] DEIS, p. 3.5-28.
[309] King Comments, p. 10.
[310] 42 U.S.C. § 1996.
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compliance process."[311] The DEIS contains no evidence that the BLM has taken any action to obtain and consider "the views of traditional religious practitioners." 11-110 (cont.)

8. The DEIS does Not Satisfy the Native American Graves Protection Act

The Native American Graves Protection Act[312] ("NAGPRA") requires federal agencies to return Native American cultural items to their respective peoples. Cultural items include human remains, associated funerary objects, unassociated funerary objects, sacred objects and objects of cultural patrimony.[313] Under NAGPRA's implementing regulations,[314] if the discovery of Native American ancestral remains or cultural items can be *expected* on federal or tribal land, the federal agency must consult with culturally affiliated tribes and prepare and implement a Plan of Action.[315]

The DEIS completely fails to comply with the requirements of NAGPRA and its implementing regulations. Instead, the DEIS states, "*[i]f* human remains or associated funerary objects *are* discovered on public lands within the Project area, the BLM will comply with the law and regulations..."[316] The DEIS ignores the NAGPRA regulations that require consultation with culturally affiliated tribes and preparation and implementation of a Plan of Action if cultural items are *expected* to be found. King explains in his comments that, "[g]iven the geomorphological evidence that buried Holocene (if not Pleistocene) archaeological sites are present in the project area, a POA must be developed now, prior to project approval."[317] Moreover, the DEIS states, "BLM will comply with the law and regulations" if "human remains or associated funerary objects are discovered."[318] The DEIS completely ignores NAGPRA's requirements with respect to unassociated funerary objects, sacred objects and objects of cultural patrimony. 11-111

[311] DEIS, p. 3.5-32.
[312] 25 U.S.C. § 3001 et seq.
[313] 25 U.S.C. § 3001.
[314] 43 C.F.R. § 10 et seq.
[315] 43 C.F.R. § 10.3(c).
[316] DEIS, p. 3.5-33.
[317] King Comments, p. 12.
[318] DEIS, p. 3.5-33.

D. The DEIS Must Disclose, Analyze and Propose Mitigation for Impacts Associated with Hazardous Materials

1. The DEIS Fails to Adequately Analyze, Disclose, and Mitigate Impacts Associated with the Release of Hazardous Materials from Flooding

The DEIS states that following Project construction, "erosion would occur in a manner consistent with existing conditions relating to wind and flash flooding"[319] and "on-site inundation of the solar arrays during flood periods is anticipated as a matter of Project design."[320] However, as explained by hazardous materials expert Matt Hagemann in his attached comments, the DEIS fails to disclose that "erosion from flooding destabilize, topple PV panel arrays and may cause evaporation ponds to overtop and release wastewater."[321] This may result in the release of toxic compounds and impacts to ecological receptors.[322]

The Project is located on a broad alluvial fan in a piedmont.[323] The Project places infrastructure (including PV panels and evaporation ponds) in the path of distributary ephemeral stream channels which characteristically fill and overtop to accommodate infrequent rainfall events.[324] As Hagemann explains, "[d]esert piedmonts are characterized by ephemeral flow networks that convey high-velocity flows through a complex array of unstable channels which shift positions during flooding. Predicting floods in these settings is difficult because of limited amounts of measured data on flow frequency and hydraulics."[325] Research shows that "'conventional concepts of floodplain management (i.e., as related to perennial streams) do not transfer' to alluvial fan settings and 'flood-hazard management [...] is a particularly challenging task.'"[326] 11-112

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[319] DEIS, p. 4.7-8.
[320] *Id.* at p. 4.20-9.
[321] Hagemann Comments, pp. 1-2.
[322] *Id.* at p. 2.
[323] *Id.* at p. 3.
[324] *Id.*
[325] *Id.*
[326] *Id.* (quoting Geologic Assessment of Piedmont and Playa Flood Hazards in the Ivanpah Valley Area, Clark County, Nevada, 2010, available at http://www.nbmg.unr.edu/pubs/r/r53/index.html).

PV panels containing cadmium telluride ("CdTe") may be used for the Project.[327] CdTe is a hazardous substance and if panels break, CdTe could be released.[328] The DEIS states, without any evidence, that "if the modules were damaged, CdTe would not mobilize from the glass into the environment in any plausible Project conditions."[329] Evidence shows otherwise. A recent study found that cadmium from broken PV panels can leach into groundwater at concentrations that exceed Environmental Screening Levels which have been established for "protection against leaching and subsequent impacts to groundwater."[330] Panels that break during flooding could release CdTe (at concentrations that exceed Environmental Screening Levels) that may be carried to the McCoy Wash and the Colorado River.[331] 11-113

Flooding could also inundate evaporation ponds, leading to erosion, failure of the ponds' embankments and a release of wastewater.[332] The evaporation ponds would contain discharge from the water treatment system and would require a Waste Discharge Requirement permit from the Colorado River Regional Water Quality Control Board.[333] According to the DEIS, the solids produced from precipitation of minerals in wastewater would likely be classified as Class II non-hazardous industrial waste.[334] The DEIS contains no analysis of impacts associated with the release of industrial waste as a result of flooding. 11-114

This is particularly concerning considering the recent flood event at the Genesis Solar Energy Project that damaged approximately 200 mirrors.[335] The developer of the project characterized the storm as a 100-year flood.[336] Based on data from the Precipitation Frequency Data Server from the National Oceanic and Atmospheric Administration, Hagemann determined that the storm was actually a 500-year flood event.[337] The DEIS provides no analysis of the Project's impacts 11-115

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[327] *See* DEIS, p. 4.9-6 (the Applicant has not determined which type of PV panel will be used for the Project. PV panels containing CdTe is one of the options being considered).
[328] *Id.* at p. 2.
[329] DEIS, p. 4.9-6.
[330] Hagemann Comments, p. 2 (quoting Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater).
[331] Hagemann Comments, p. 2.
[332] *Id.* at pp. 3-5.
[333] *Id.* at p. 4.
[334] DEIS, p. 2-22.
[335] Hagemann Comments, p. 2.
[336] *Id.*
[337] *Id.*
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associated with a 500-year flood. Further, the DEIS only provides mitigation for 25-year and 100-year storms.[338] It does not provide any mitigation for a 500-year storm event. If PV panels containing CdTe are used for the Project and flooding occurs, CdTe could be released to McCoy wash and the Colorado River. 11-115 (cont.) 11-116

Evidence shows that flood-hazard management in alluvial fan settings is particularly challenging. Tellingly, the recent flood at the Genesis project caused significant damage. According to Hagemann, the DEIS' mitigation measures for impacts associated with 25-year and 100-year storms

> would clearly not be adequate in the event of a storm of the magnitude which occurred on the Genesis Solar Energy Project site on July 30-31, 2012. The rainfall event at the Genesis Solar Energy Project shows that flooding that is not anticipated can occur in the desert where estimating the likelihood of flood events is notoriously difficult...Flooding of the magnitude observed on July 30-31, 2012 at the Genesis Solar Energy Project site would have the potential to cause widespread damage to PV panel arrays and to the evaporation ponds, impacts not analyzed in the DEIS.[339]

11-117

In light of this evidence, the DEIS must be revised to include an analysis of impacts and mitigation associated with the release of CdTe from PV panels and industrial waste from evaporation ponds. 11-118

2. <u>The DEIS Fails to Adequately Disclose, Analyze, and Mitigate the Project's Potential to Violate Water Quality Standards and Waste Discharge Requirements</u>

The Project includes up to eight evaporation ponds for discharge from the water treatment system. The Project will also impact 185 acres of waters of the State, including ephemeral drainages.[340] Hagemann explains in his comments that discharge of wastewater to the evaporation ponds would require a Waste Discharge Requirement permit from the Colorado River Regional Water Quality Control Board.[341] He also notes that any fill placement (e.g. during road construction) or placement of PV panel supports across ephemeral drainages would require a 11-119

[338] DEIS, pp. 4.20-18 – 19.
[339] Hagemann Comments, p. 4.
[340] DEIS, p. 4.3-6.
[341] Hagemann Comments, p. 4.
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permit.[342] The DEIS fails to evaluate these permit requirements. An analysis is necessary to show that the Project will not cause or contribute to an exceedance of water quality standards established for surface water and groundwater under the Basin Plan, to ensure full compliance with the requirements of the Porter-Cologne Water Quality Control Act and the California Water Code, and to show that wastewater discharge and fill placement will not cause adverse effects to wildlife and waters of the State.

Further, the California Water Code requires the Applicant to prepare a Report of Waste Discharge for approval from the Colorado River RWQCB[343] prior to Project approval. Hagemann notes that other solar projects with evaporation ponds and fill placement were required to prepare ROWDs prior to Project approval.[344] The ROWD should be included in a revised DEIS so that the public can review the Project's potential impacts on water resources and biological resources. Hagemann explains that, 11-119 (cont.)

> [t]he ROWD should include documentation about wastewater pond construction (including design specifications, sizing (including flood event considerations) and evaluation of the need for leak detection), provisions for monitoring and reporting water quality and biological impacts (including bird mortality), and an evaluation of the need for groundwater monitoring.[345]

None of this information has been disclosed.

3. The DEIS Fails to Adequately Analyze, Disclose, and Mitigate Hazards Associated with Former Military Use of the Site

The DEIS identifies unexploded ordinance ("UXO") in the Project area, and generally describes the history of General Patton's World War II Desert Training Center.[346] The DEIS also generally describes the Muroc Army Air Field located south of the Project site, which was used as a heavy bombardment crew training base during World War II.[347] The DEIS states that

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[342] *Id.* at pp. 4-5.
[343] Cal. Water Code, § 13260.
[344] Hagemann Comments, pp. 5-6.
[345] *Id.* at p. 5.
[346] DEIS, p. 3.22-4.
[347] *Id.*
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> bombs and explosive materials, and possible incendiary and pyrotechnic materials, were stored on airfield grounds in up to five magazines or bunkers. A gunnery range, skeet range, and jeep type target range, all with ammunition storage, were constructed and used by Army personnel.[348]

The DEIS acknowledges that "UXO presents an immediate risk of acute physical injury from fire or explosion resulting from accidental or unintentional detonation" and "unidentified UXO could be present on the solar plant site or along the proposed linear facilities."[349] Specifically,

> surface and shallow sub-surface UXO could be disturbed by vehicles, workers walking, and/or excavation using shovels or similar hand tools, and deeper sub-surface UXO could be disturbed by earth movement and excavation processes that would be required for development of the Proposed Action.[350]

Mr. Hagemann reviewed the DEIS with respect to hazards associated on the site from remnants of the military's use of the site. Hagemann also conducted his own research regarding the military's use of the Project site. Hagemann concluded that the DEIS' analysis and mitigation for the Project's impacts associated with former military use of the Project site is inadequate.

Hagemann discovered that the "[p]ractice bombing range underlies a majority of the Project area" and a Jeep Range underlies "the eastern generator tie line alignment and an access road."[351] Mr. Hagemann's research also revealed that "high explosive bombs" were used at the firing and bombing area.[352] According to Hagemann, "[t]he former Firing and Bombing Area, which underlies much of the Project footprint, represents an area where UXO may be present in the form of practice bombs and incendiary devices."[353] Notably, during limited surveys of the neighboring Blythe Solar Power Project, seven UXO findings were reported.[354] It is likely that more UXO would be found if the entire Blythe project site were surveyed.[355] Hagemann concludes that "almost assuredly, hazardous materials and

11-120

[348] *Id.*
[349] *Id.* at p. 4.22-5.
[350] *Id.*
[351] Hagemann Comments, pp. 6-7.
[352] *Id.* at p. 7.
[353] *Id.* at p. 8.
[354] *Id.* at p. 9.
[355] *Id.*

unexploded ordnance will be found in areas where earthwork will take place, putting workers at risk..."[356] 11-120 (cont.)

Hagemann's conclusion is particularly concerning because, "in addition to the explosion hazard represented by the UXO, toxic chemicals may be found in the soil associated with the practice bombs and incendiary devices.[357] Specifically, "[t]he bullets and impacted soil may contain lead and other metals, including copper, zinc, tungsten, arsenic, antimony and nickel at concentrations that would pose a risk to workers excavating soil."[358] The DEIS completely fails to identify the potential for contamination associated with bullets that, according to Hagemann, are likely to be found on the Project site.[359]

The DEIS also completely fails to disclose and analyze the presence of contamination on the Project site from the presence of pyrotechnic, incendiary or tracer ammunition. In his comments, Hagemann explains that compounds of concern used in pyrotechnic munitions include perchlorates.[360] Percholates can be inhaled via soil dust.[361] Perchlorates inhibit thyroid function and are a risk to human health.[362] To prevent significant risk to worker safety and public health, Hagemann recommends that soil sampling be conducted on the Project site prior to Project approval.[363] 11-121

Given the intensity of the military maneuvers on the Project site and in the Project vicinity, the DEIS' analysis of associated impacts is extremely deficient. The DEIS must be revised to include full disclosure of military uses of the Project area, including any soil contamination hazards posed by the military use. Impacts from soil contamination must be evaluated prior to Project approval and mitigation for those impacts must be provided. 11-122

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[356] *Id.*
[357] *Id.* at p. 8.
[358] *Id.* at p. 7.
[359] *Id.* at p. 8.
[360] *Id.*
[361] *Id.*
[362] *Id.*
[363] *Id.*
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E. The DEIS Must Disclose, Analyze, and Propose Mitigation for Impacts to Water Resources

1. The DEIS Fails to Adequately Analyze Impacts Associated with Flooding

The DEIS states that "unless suitably protected from flooding, the proposed on-site buildings could become inundated during a heavy storm event."[364] Mitigation measure WATER-4 requires "all on-site buildings, maintenance areas, designated parking lots, and associated facilities be constructed at an elevation of at least 2 feet above the highest anticipated flood flows during a 100-year event."[365] The DEIS also states, "[t]he potential for the MSEP to result in increased stormwater flows, such that existing or planned stormwater drainage facilities could be insufficient to convey flows, is considered minor."[366]

Recently, a massive flood occurred at the Genesis Solar Energy Project. In its environmental review of the Genesis project, the BLM concluded that "mitigation measures ensure that potential GSEP drainage and flooding related impacts would be minimized."[367] Measures included constructing engineered channels to redirect water flow around the project site.[368] However, the recent flood resulted in significant damage, including (among other things):

- One-half mile to one mile of tortoise fencing was washed out;
- Debris from the project site was moved up to one mile off-site by floodwaters;
- 195 mirrors were broken;
- Caissons were damaged by three to six feet of soil erosion;
- A temporary V-ditch was destroyed;
- A channel on the east side of project site was scoured from flood waters;
- The main access road was impassable (and a temporary road had to be graded to evacuate the site);

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[364] DEIS, p. 4.20-9.
[365] *Id.*
[366] *Id.* at p. 4.20-8.
[367] Final Environmental Impact Statement for Genesis Solar Energy Project, August 2010, p. 4.19-25.
[368] *Id.*

- Approximately six inches of sediment deposits accumulated in the mirror field;
- Approximately 31,300 cubic yard of soil was displaced;
- Construction trailers were flooded; and
- The tortoise crossing was washed out.[369]

To repair the damage, NextEra had to grade a temporary road outside of the project's right-of-way, replace the tortoise fencing and use off-highway vehicles and other equipment to retrieve debris that was carried off-site, among other things.

According to NextEra, the flooding damage was so significant because,

> [w]ith construction unfinished, the full design of handling storm-water was not realized. Open underground power and piping trenches channeled water to non-designated areas. As water follows the path of least resistance, open trenches, material storage, unfinished grading, along with other minor items allowed additional erosion and sedimentation build-up.[370]

This significant damage results in unanalyzed significant adverse effects. For example, the Project site will need more grading which will result in additional significant adverse effects to air quality and biological resources, among other impacts.

Clearly, BLM was incorrect when it concluded that mitigation measures would minimize impacts from flooding at the Genesis project site. It appears that construction phases were not properly timed. For example, mirrors were erected before stormwater prevention measures were completed. Instead, to prevent significant damage, it makes sense that all features necessary to handle stormwater be in place *prior to the commencement of other construction.*

Evidence shows that it is reasonably foreseeable that a flood at the Project site could cause significant damage. The DEIS must disclose all reasonably foreseeable impacts associated with a major flood and propose all feasible mitigation. In addition, BLM should require the Applicant to construct all Project features necessary to handle stormwater prior to all other construction. 11-123

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[369] *See* Attachment K, Genesis Solar Energy Project Major Rain Event on 7/31/2012 [Conversations with NextEra Compliance on 8/1], Genesis Flood Damage Assessment, and Flood Event Photos, available at: http://www.energy.ca.gov/sitingcases/genesis_solar/compliance/submittals/July-31-2012_Flood_Event/.

[370] *Id.*

2. The DEIS Fails to Adequately Analyze and Mitigate Impacts to the Colorado River

The Project site overlies the Palo Verde Mesa Groundwater Basin.[371] The DEIS states that water for the Project will come from,

> two or three primary wells and a sufficient number of back-up wells...All wells would be constructed and operated within the solar plant site at the eastern end of Unit 1; the ***precise location of the well field would be defined during the detailed design***. ***If possible***, one of the wells would be located near the proposed water treatment system area. ***As currently planned***, the wells would pump groundwater from the PVMGB, where the water table has been measured ***at or near*** 254 feet amsl.[372]

The DEIS acknowledges that "[s]ubsurface inflow into the PVMGB occurs from the Colorado River via the PVVGB..."[373] According to the DEIS, the PVMGB "is hydrologically continuous with the PVVGB. Therefore, both basins are considered together in support of the water supply assessment" and "the two basins are collectively referred to as the Palo Verde Groundwater Basin."[374] Further, "[g]roundwater migrating from the Colorado River through the PVMGB represents most of the subsurface inflow to the basin..."[375] The DEIS also states that the "PVMGB is tributary to the lower Colorado River, and is part of the Colorado River aquifer."[376] Finally, the PVMGB "is likely subject to the Colorado River Compact, 1922, the Boulder Canyon Project Act, and the Consolidated Decree 547 U.S. 150 (2006),"[377] which, together with other laws, regulations and contracts, make up the "Law of the River." Yet, the DEIS concludes, without any evidence, that "groundwater connection between the Colorado River and the PVMGB is not anticipated."[378] The DEIS provides no analysis of the Project's impact on the Colorado River. 11-124

[371] DEIS, p. 3.20-4.
[372] *Id.* at p. 2-18.
[373] *Id.* at p. 3.20-7 (emphasis added).
[374] *Id.* at p. 4.18-2.
[375] *Id.* at p. 3.20-7.
[376] *Id.* at p. 3.20-4.
[377] *Id.*
[378] *Id.* at p. 3.20-7.

Pursuant to the Law of the River, any diversion or consumptive use of lower Colorado River mainstream water without an entitlement is illegal.[379] Consumptive use of the mainstream includes "water drawn from the mainstream by underground pumping."[380] The accounting surface methodology was developed in the 1990s by the U.S. Geological Survey, in cooperation with the Bureau of Reclamation, to identify wells outside the Colorado River floodplain that yield water that will be replaced by water from the River and require an entitlement.[381] Under the accounting surface methodology, any well that pumps water from below the accounting surface is presumed to be pumping Colorado River water and therefore requires an entitlement.[382]

11-124 (cont.)

According to USGS' Update of the Accounting Surface Along the Lower Colorado River report, the accounting surface at the Project site appears to be in the range of 252 to 256 feet.[383] Because the Project would pump water from "two or three primary wells and a sufficient number of back-up wells" in undetermined locations "at the eastern end of Unit 1... where the water table has been measured ***at or near*** 254 feet amsl,"[384] there is potential for the Project to pump water from below the accounting surface. Without any evidence to the contrary, it must be assumed that the Project would pump Colorado River water and the Applicant must obtain an entitlement. The DEIS completely fails to analyze or mitigate this significant adverse effect.

VII. THE DEIS FAILS TO CONSIDER A REASONABLE RANGE OF ALTERNATIVES

A. The Purpose and Need Statement is Arbitrarily Narrow and Promotes Private Interests

An EIS must briefly describe the underlying purpose and need to which the agency is responding in proposing the alternatives, including the Proposed Action.[385] The BLM's *NEPA Handbook* mandates that the purpose and need statement for an externally generated action must describe the BLM's purpose and

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[379] *Arizona v. California*, 547 U.S. 150, 156 (2006).
[380] *Id.* at 153.
[381] *See* Attachment L, Update of the Accounting Surface Along the Lower Colorado River, Scientific Investigations Report 2008-5113.
[382] *Id.* at p. 3.
[383] *Id.* at, p. 14, Figure 6.
[384] DEIS, p. 2-18 (emphasis added).
[385] 40 C.F.R. § 1502.13.

need, not an applicant's or external proponent's purpose and need.[386] The "need" for the action is the underlying problem or opportunity to which the BLM is responding with the action.[387] The "purpose" is the goal or objective that the BLM is trying to reach.[388] Clearly distinguishing the purpose and the need clarifies for the public and decision makers why the agency is proposing to spend large amounts of taxpayers' money, while at the same time causing significant environmental impacts.[389] As recently repeated by the Ninth Circuit, "an agency cannot define its objectives in unreasonably narrow terms."[390]

The DEIS contains an arbitrarily narrow purpose and need statement that impermissibly promotes private objectives. The purpose and need statement states that the BLM's purpose and need for the Project is to respond to the application for the ROW.[391] This narrowly defined statement implies that BLM stands to gain nothing more than a rubber-stamped document at the end of this process. It is nonsensical to think that the BLM would spend taxpayer money and impact the environment for such an inconsequential result. While the introduction to the purpose and need statement recites statutes, regulations and orders that encourage the development of renewable energy on public lands, these sources of authority do not encourage the development of some parcels over others.[392] 11-125

B. Reasonable Alternatives Omitted from Analysis

Under NEPA, federal agencies must consider alternatives to their proposed actions as well as their environmental impacts.[393] The alternatives analysis has been called the "linchpin" of the Environmental Impact Statement.[394]

An EIS must "[r]igorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly

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386 NEPA Handbook p. 35 (citing 40 C.F.R. § 1502.13).
387 *Id.*
388 *Id.*
389 Ronald E. Bass et al., The NEPA Book 89 (2d. ed. 2001).
390 *National Parks & Conservation Ass'n v. Bureau of Land Management* (2010) 2010 WL 1980717, 8 (9th Cir. 2010), quoting *City of Carmel-By-The-Sea v. United States Dep't. of Transp.*, 123 F.3d 1142, 1155 (9th Cir. 1997).
391 DEIS p. 1-2.
392 *Id.*
393 40 CFR § 1502.14.
394 *Monroe County Conservation Council, Inc. v. Volpe* (2d Cir. 1972) 472 F.2d 693.

discuss the reasons for their having been eliminated."[395] It is "absolutely essential to the NEPA process that the decisionmaker be provided with a detailed and careful analysis of the relative environmental merits and demerits of the proposed action and possible alternatives, a requirement that courts have characterized as 'the linchpin of the entire impact statement.'"[396] This is particularly true in cases where there may be "unresolved conflicts concerning alternative uses of available resources."[397]

The alternative discussion must include not only primary alternatives, *i.e.*, substitutes for the agency's proposed action that accomplish the action in another manner, but also secondary alternatives, which are means of carrying out the action in a different manner.[398] The range of alternatives to be discussed is governed by a "rule of reason." Agencies have a duty "to study all alternatives that appear reasonable and appropriate for study . . ., as well as significant alternatives suggested by other agencies or the public during the comment period."[399] Reasonable alternatives are those that may be feasibly carried out based on technical, economic, environmental, and other factors. It is well established that an alternative is not infeasible merely because the project proponent does not like it or is not capable of implementing it.[400] "The 'existence of a viable but unexamined alternative renders an environmental impact statement inadequate.'"[401]

If an EIS is prepared in connection with an application for a permit or other federal approval, the EIS must rigorously analyze and discuss alternatives that are

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395 40 C.F.R. § 1502.14(a).

396 *NRDC v. Callaway*, 524 F.2d 79, 92 (2d Cir. 1975) (citation omitted); *see Silva v. Lynn*, 482 F.2d at 1285; *All Indian Pueblo Council v. United States*, 975 F.2d 1437, 1444 (10th Cir. 1992) [a thorough discussion of the alternatives is "imperative"].

397 *See* 42 U.S.C. § 4332(2)(E); *California v. Block*, 690 F.2d 753, 766-767 (9th Cir. 1982).

398 *See Methow Valley Citizens Council v. Regional Forester*, 833 F.2d 810 (9th Cir. 1987), *rev'd on other grounds*, 490 U.S. 332 (1989); *see also* Mandelker, *NEPA Law and Litigation* (2d ed., rel. 8, 2000).

399 *Roosevelt Campobello Int'l Park Comm'n v. United States EPA*, 684 F.2d 1041, 1047 (1st Cir. 1982) (quotations omitted); *City of Carmel-By-The-Sea v. U.S. Dept. of Transp.*, 95 F.3d 892, 903 (9th Cir. 1996).

400 *See* CEQ, *Forty Most Asked Questions Concerning CEQ's NEPA Regulations* (1981), question No. 2(a), 46 Fed.Reg. 18026, 18027 (March 23, 1981).

401 *Resources Ltd. v. Robertson*, 35 F.3d 1300, 1307 (9th Cir. 1993), *quoting Idaho Conservation League v. Mumma*, 956 F.2d 1508, 1519 (9th Cir. 1992); *see Grazing Fields Farm v. Goldschmidt*, 626 F.2d 1068, 1072 (1st Cir. 1980) [Even the existence of supportive studies and memoranda contained in the administrative record but not incorporated in the EIS cannot "bring into compliance with NEPA an EIS that by itself is inadequate"].

"reasonable," *regardless of whether the proponent or applicant likes or is itself capable of carrying out a particular alternative.* "Reasonable alternatives include those that are practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant."[402] Courts have shown little reluctance in striking down EISs that fail to include a thorough discussion of reasonable, less environmentally damaging alternatives.[403] Finally, an EIS must include a discussion of "natural or depletable resource requirements *and conservation potential of various alternatives and mitigation measures.*"[404]

1. The DEIS Failed to Seriously Consider Alternative Sites

The BLM must consider reasonable alternatives, even if the Applicant does not like the alternative or is incapable of implementing the Project on an alternative site.[405] The DEIS states "[a]n all-private land alternative was not carried forward for detailed evaluation in the PA/EIS because no private parcels or combinations of parcels of sufficient size were available that met the minimum requirements."[406] These requirements, according to the DEIS, are a minimum of 1,500 contiguous (or nearly contiguous) acres listed for sale or lease located within 20 miles of the Colorado River Substation and in proximity to a reasonable gen-tie line option.[407] BLM's decision not to consider alternate sites on private land that do not meet these requirements is impermissible because it is based on an arbitrarily narrow purpose and need -- to respond to the Applicant's request for a ROW. The BLM may not adopt private interests to draft a narrow purpose and need statement that excludes alternatives that fail to meet specific private objectives.[408] 11-126

As drafted, the DEIS violates NEPA's basic requirement to consider alternatives to the proposed Project. Numerous environmental organizations have recommended criteria to consider when selecting land for siting renewable energy projects.[409] The proposed site for the Project does not satisfy any of these criteria. The proposed Project site is not ideal for long-term energy generation. This 11-127 11-128

[402] Forty Most Asked Questions Concerning CEQ's [NEPA] Regulations at Question 2a.
[403] *See, e.g., Marble Mountain Audubon Society v. Rice*, 914 F.2d 179 (9th Cir. 1990); *Dubois v. U.S. Dept. of Agriculture*, 102 F.3d 1273 (1st Cir. 1996).
[404] 40 C.F.R. § 1502.16(f), emphasis added.
[405] *See* CEQ, Forty Most Asked Questions Concerning CEQ's NEPA Regulations No. 2(a) (1981).
[406] DEIS, p. 2-59.
[407] *Id.*
[408] NEPA Handbook p. 50.
[409] *See* Attachment M, Renewable Siting Criteria for California Desert Conservation Area.

particular site lies within undisturbed desert habitat that contains untouched and intact environmental resources. As discussed at length in the preceding sections, the site is characterized by desert scrub vegetation, desert washes, and sand dunes. Special-status species were observed on the site. In addition, many cultural resources exist on-site.

The BLM should consider an alternate site on disturbed land. In the desert to the northwest of the Project site, for example, there is an extensive amount of abandoned farmland that would facilitate long-term energy generation while reducing the Project's impacts on environmental resources.[410] These areas have existing infrastructure and are near roads and existing power lines. The BLM must evaluate siting the Project on these alternate sites, or risk failing to evaluate a viable alternative. 11-128 (cont.)

2. The DEIS Improperly Eliminated Alternative Solar Energy Technologies From Consideration

The DEIS fails to adequately analyze alternative solar energy technologies. The DEIS, without any analysis or evidence, states that other types of energy projects would not reduce impacts. For example, the DEIS dismisses distributed solar as an alternative to the Project.[411] The DEIS provides no analysis or evidence to support elimination of this alternative technology. In reality, because distributed solar technologies could be installed in urban and other developed areas that have already been disturbed, they would have substantially fewer environmental impacts. 11-129

3. The DEIS Must Consider The Above Alternatives Regardless of The Applicant's "Preference"

Lest there be any lingering belief that the applicant's desires dictate the range of alternatives that NEPA requires be discussed in an EIS, we wish to state emphatically that this is **not** the case under applicable law. The fact that BLM is acting in a permitting role, rather than initiating the project itself, in no way limits the extent of its obligations under NEPA. CEQ and the courts have repeatedly declared that the duty to discuss alternatives in an EIS is no different when the

[410] *See* Attachment N, Map: Abandoned Farmland – Eastern Riverside County, Coachella Valley Assoc. of Governments.
[411] DEIS, p. 2-61.
2553-020cv

action is initiated by a Federal agency or by private parties.[412] BLM must therefore consider all alternatives that are reasonably related to the project and evaluate them in the EIS.

In this case, the Project's purpose and need could be fully satisfied by an off-site alternative or by a technological alternative that requires less acreage and resources. Each of these approaches is feasible, economic, and will minimize or avoid potentially significant impacts. Under NEPA, it is imperative that they be evaluated in detail irrespective of the applicant's preference. 11-130

C. Alternative 3 – Central Gen-tie Route – is the Environmentally Preferable Alternative

NEPA regulations state "that agencies shall...[i]dentify the agency's preferred alternative or alternatives, if one or more exists, in the draft statement and identify such alternative in the final statement unless another law prohibits the expression of such a preference."[413] The DEIS states that BLM's preferred alternative is the proposed Project.[414] Yet, the DEIS' summary of impacts by alternative reveals that Alternative 3—Central Gen-tie Route would have substantially less impacts to numerous resources. For example, Alternative 3 would affect 20 to 24 fewer known cultural resource sites.[415] The DEIS should be revised to identify Alternative 3—Central Gen-tie Route as the environmentally preferred alternative. 11-131

In addition, because the Applicant now owns the adjacent BSPP[416] (the site through which the central gen-tie route runs), the Applicant must construct both projects in a way that affords the most environmental protection. For example, because Alternative 3—Central Gen-tie Route could be used for both projects, and it would greatly decrease impacts associated with two separate transmission routes, the BLM should require the Applicant to develop this route. 11-132

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412 CEQ, *Guidance Regarding NEPA Regulations*, 58 Fed.Reg. 34263 (1983), available at: http://ceq.hss.doe.gov/nepa/regs/1983/1983guid.htm (as of July 1, 2010).
413 40 C.F.R. § 1502.14(e).
414 DEIS, p. ES-4.
415 DEIS, p. ES-8.
416 *See* http://online.wsj.com/article/BT-CO-20120627-714633.html.
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VIII. THE DEIS FAILS TO COMPLY WITH THE FEDERAL LAND POLICY AND MANAGEMENT ACT

The Federal Land Policy & Management Act ("FLPMA") establishes requirements for land use planning on public land.[417] FLPMA requires that BLM, under the Secretary of the Interior, "develop, maintain, and when appropriate, revise land use plans" to ensure that land management be conducted "on the basis of multiple use and sustained yield."[418] The process for developing, maintaining, and revising resource management plans is controlled by FLPMA regulations. [419] Under FLPMA, if BLM wishes to change a resource management plan, it can only do so by formally amending the plan:

> An amendment shall be initiated by the need to consider monitoring and evaluation findings, new data, new or revised policy, a change in circumstances or a proposed action that may result in a change in the scope of resource uses or a change in the terms, conditions and decisions of the approved plan. An amendment shall be made through an environmental assessment of the proposed change, or an environmental impact statement, if necessary, public involvement as prescribed in § 1610.2 of this title, interagency coordination and consistency determination as prescribed in § 1610.3 of this title and any other data or analysis that may be appropriate. . . [420]

The objective of resource management planning by the Bureau of Land Management is to maximize resource values for the public through a rational, consistently applied set of regulations and procedures which promote the concept of multiple use management and ensure participation by the public, state, and local governments, Indian tribes, and appropriate federal agencies. Resource management plans are designed to guide and control future management actions and the development of subsequent, more detailed and limited scope plans for

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[417] 43 U.S.C. §§ 1701-1785 (2006).
[418] 43 U.S.C. §§ 1701(a)(7), 1712(a); see also *Kern v. Bureau of Land Mgmt.*, 284 F.3d 1062, 1067 (9th Cir. 2002) (holding that FLPMA "requires the BLM to prepare [resource management plans] for the various districts under its control.").
[419] 43 CFR §§ 1601.0-1610.8 (2006).
[420] 43 CFR § 1610.5-5.

resources and uses.[421] "Consistent" means that the BLM plans will adhere to the terms, conditions, and decisions of officially approved and adopted resource related plans.[422]

A. The Project is Inconsistent with the CDCA Plan

The CDCA plan was developed in accordance with FLPMA to inventory CDCA resources and to prepare a comprehensive land use management plan for the area.[423] Under the CDCA plan, BLM inventoried the desert area with public input and identified areas appropriate for wilderness, limited, moderate and intensive uses.

The CDCA plan describes areas that were inventoried for biological resources, cultural resources, recreational uses, grazing, mineral development, and many other uses. The Project site is designated Class L. Under the CDCA plan, Multiple-Use Class L (Limited Use) protects sensitive, natural, scenic, ecological, and cultural resource values.[424] Public lands designated as Class L are managed to provide for generally lower-intensity, carefully controlled multiple use of resources, while ensuring that sensitive values are not significantly diminished.[425]

The BLM is considering amending the CDCA plan to allow for solar power development on the Project site. This is fundamentally incompatible with the BLM's Class L designation because the solar power plant will significantly impact the biological and cultural resource values on the site, as described above. The habitat that now exists on the site will be destroyed and the site will not likely recover for centuries or longer. The Project will not be designed to accommodate sensitive, natural, scenic, ecological, and cultural resource values on the project site, as is required by the CDCA Limited Use designation. The Project is incompatible with the CDCA plan designation adopted through a comprehensive planning effort. The BLM should not override the wisdom of this planning effort for the short-term benefits that may or may not occur from the siting of this experimental power plant. 11-133

[421] *Id.* at § 1601.0-2.
[422] *Id.* at § 1601.0-5.
[423] California Desert Conservation Plan of 1980 as amended, p. 5.
[424] *Id.* at p. 13.
[425] *Id.*

IX. CONCLUSION

The DEIS fails as an informational document and, thus, is inadequate under NEPA. The DEIS fails to establish the Project setting, does not fully and fairly describe the proposed action, provides incomplete analyses of some Project impacts and wholly omits discussion of other potentially significant adverse effects, and fails to adequately mitigate the Project's adverse impacts. The DEIS must be revised to cure these deficiencies and must be circulated for public review and comment. We respectfully urge the BLM to do so prior to taking any action on the Applicant's pending federal permit applications. 11-134

Sincerely,

Rachael E. Koss

Rachael E. Koss

REK:clv
Attachments

2553-020cv

CENTER *for* BIOLOGICAL DIVERSITY *Because life is good.*

protecting and restoring natural ecosystems and imperiled species through science, education, policy, and environmental law

via email and USPS

8/23/2012

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Re: Comments on Draft Plan Amendment (PA) to the California Desert Conservation Area Plan, 1980, as amended (CDCA Plan), and Draft Environmental Impact Statement (DEIS) for the McCoy Solar Energy Project (MSEP)

Dear Mr. Childers:

These comments are submitted on behalf of the Center for Biological Diversity's more than 378,000 staff, members and supporters in California and throughout the western states, regarding the Draft Plan Amendment (PA) to the California Desert Conservation Area Plan, 1980, as amended (CDCA Plan), and Draft Environmental Impact Statement (DEIS) for the McCoy Solar Energy Project (MSEP).

The development of renewable energy is a critical component of efforts to reduce greenhouse gas emissions, avoid the worst consequences of global warming, and to assist California in meeting its required emission reductions. The Center for Biological Diversity (the "Center") strongly supports the development of renewable energy production, and the generation of electricity from solar power, in particular. However, like any project, proposed solar power projects should be thoughtfully planned to minimize impacts to the environment. In particular, renewable energy projects should avoid impacts to sensitive species and habitats, and should be sited in proximity to the areas of electricity end-use in order to reduce the need for extensive new transmission corridors and lines and the efficiency loss associated with extended energy transmission. Only by maintaining the highest environmental standards with regard to local impacts, and effects on species and habitat, can renewable energy production be truly sustainable. 12-1

We support the comments submitted by Defenders of Wildlife, Natural Resources Defense Council, Sierra Club, the Wilderness Society and Audubon California and incorporate those comments herein. In addition to the issues identified in that letter, we have the additional following concerns: 12-2

Arizona • California • Nevada • New Mexico • Alaska • Oregon • Washington • Illinois • Minnesota • Vermont • Washington, DC

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Joint Review With Blythe Solar Project Amendment Is Needed

As the BLM is aware, the Blythe Solar Project adjacent to the proposed McCoy project was previously issued a right of way grant by BLM. Since that time, some site clearing was begun but no construction of the solar project was ever undertaken and Solar Millennium/Solar Trust of America entered bankruptcy. The Blythe project – whatever it may currently entail--was recently acquired by NextEra from the STA bankruptcy and NextEra has applied to amend its permit from the California Energy Commission[1], because of changes in technology from a solar-trough project to a photovoltaic project. The BLM will also be reviewing amendments including a change in the technology for the Blythe project from solar trough to PV. Therefore, because both the Blythe project and the McCoy project are connected – intending to share the same gen tie lines and roads—and because they are adjacent proposals from the same developer, the BLM should undertake joint NEPA review of the two projects. Such joint review will allow for greater flexibility in meeting the renewable energy goals and reduce impacts due to siting of the project components and infrastructure. BLM must seize this opportunity to further reduce environmental impacts of these projects by engaging in joint coordinated NEPA review. 12-3

While we anticipate that NextEra and the BLM may argue that each of these projects could go forward independently, the facts show that they are connected actions[2]—even if one is not necessary for the other to proceed. NEPA's implementing regulations explain that agencies *should* consider connected, cumulative, and similar actions in the same impacts statement. "Connected actions" *must* "be considered together in a single EIS." *Thomas v. Peterson*, 753 F.2d 754, 758 (9th Cir. 1985); 40 C.F.R. § 1508.25(a)(1), and where two actions are "inextricably intertwined" they are connected actions that *must* be considered together. *Thomas*, 753 F.2d at 759; *Save the Yaak Committee v. Block*, 840 F.2d 714, 720 (9th Cir. 1988). Here some project features will be shared, such as roads and gen-tie lines/corridors and therefore the two projects are intertwined and should be considered together.

Even actions that are considered cumulative to each other and are proceeding at the same time through the NEPA process should be considered in the same NEPA review. Cumulative actions "which when viewed with other proposed actions have cumulatively significant impacts [] should [] be discussed in the same impact statement." 40 C.F.R. § 1508.25(a)(2). Similarly, reasonably foreseeable actions also should be considered together in the same environmental review document when the actions "have similarities that provide a basis for evaluating their environmental consequences together, such as common timing or geography," and the "best way to assess adequately [their] combined impacts […] or reasonable alternatives" is to consider them together. 40 C.F.R. § 1508.25(a)(3). 12-4

1 http://www.energy.ca.gov/sitingcases/solar_millennium_blythe/compliance/documents/amendment/

2 Connected actions are those actions that:

i. Automatically trigger other actions which may require environmental impact statements.

ii. Cannot or will not proceed unless other actions are taken previously or simultaneously.

iii. Are interdependent parts of a larger action and depend on the larger action for their justification.

40 C.F.R. § 1508.25(a)(1).

The requirements that connected actions, cumulative, and/or similar actions be evaluated together prevents an agency from dividing a single project into segments that individually seem to have limited environmental impact, but as a whole have considerable impact. *See Thomas v. Peterson*, 753 F.2d at 758. It is important for federal agencies to consider connected actions together in a single NEPA process as opposed to segmenting review. *Daly v. Volpe*, 514 F.2d 1106, 1110 (9th Cir. 1975) (where actions are interconnected in terms of fulfilling a joint purpose it may be necessary to conduct a single NEPA review); *Sierra Club v. U.S. Dept. of Energy*, 255 F. 2d 1177, 1184 (D. Colo. 2002).

As noted above, considering the actions together will also provide significant benefit to the environment because it can minimize impacts and ensure any conservation measures – such as avoiding the washes – are consistent across the two projects and the landscape. 12-5

Dissected Fan Landscape/Project Alignment

We strongly suggest that the BLM consider an alternative in which both projects (MSEP and Blythe Solar Energy Project) are re-aligned to avoid the ecologically and hydrological important dissected fan area as identified in BLM's Northern and Eastern Colorado Plan (NECO). We submit Attachment 1, which shows the overlap of MSEP boundaries with the dissected fan landscape in the area. Clearly over half of McCoy Unit 2 is inappropriately sited and at odds with conservation of the dissected fan landscape. In addition to all of the biological benefits that the dissected fan landscape provides to desert tortoise and other desert wildlife, including rare and common migratory birds, its value to hydrological processes should be strongly considered. NextEra's Genesis solar project recently sustained significant, expensive impacts due to flooding[3], because it is also inappropriately sited on an area with dissected fan on an alluvial floodplain. The areas proposed for development of the McCoy project should be moved out of the dissected fan landscape to avoid impacts to desert species habitat, soils, surface hydrology, and project infrastructure. 12-6

Desert washes, especially in this part of the California Desert Conservation Area (CDCA), are important habitat for desert tortoise and other wildlife even if they do not support any trees or have only sparse trees common to the desert dry wash woodlands. In fact the DEIS documents that one of the dominant components of the vegetated ephemeral swales is galleta grass (at 3.3-2), a preferred food plant for desert tortoise. While we recognize that only one desert tortoise was identified on-site during the single year survey, we note that it and additional sign and burrows were documented in the dissected fan landscape indicating that these areas are part of the desert tortoise home ranges for local individuals and further reinforcing the need to abandon the western portion of the proposed project in order to avoid desert tortoise impacts. 12-7

Desert Kit Fox

The DEIS recognizes that the desert kit fox is a protected animal as a furbearing mammal under California Code of Regulations Title 14 Section 460 (DEIS at 3.4-3) and recognizes that desert kit fox occurs on site (at 3.4-16). In fact 57 kit fox natal dens were identified on the

3 http://www.energy.ca.gov/sitingcases/genesis_solar/compliance/submittals/July-31-2012_Flood_Event/

project site and gen-tie alignment during spring 2011 surveys. However, density estimates were not quantified for the number of desert kit fox that will be displaced and "taken" by the proposed project. 12-8 30260

As the BLM is well aware, the first documentation of a deadly outbreak of canine distemper was confirmed in late 2011 in desert kit fox, when dead kit foxes found on and adjacent to the Genesis industrial solar project during construction were necropsied by state veterinarians.

12-9 30213

The state wildlife veterinarian for the California Department of Fish and Game isn't certain the distemper outbreak is connected to the construction activities, but has concluded that habitat disturbance causes stress, and when animals succumb to stress they become more susceptible to disease.

Kit foxes have great fidelity to their natal burrows and as documented on the Genesis project site are not easily evicted from their burrows and home ranges through "passive relocation" or hazing. The DEIS incorrectly states that no "take" permits are given for desert kit fox, but as the BLM is aware, the California Department of Fish and Game did give take permits for desert kit foxes on Genesis to allow for trackable electronic collars for monitoring of some animals and inoculation of others against distemper. If any hazing activities are approved for desert kit fox as part of the project, we request that take permits be sought for the onsite kit foxes to monitor the ultimate outcome of the any hazing activities. 12-10 30260

Despite the efforts of state and federal biologists, who tried to prevent the disease from spreading the efforts have not been successful, and so far the kit fox distemper epidemic has spread over eleven miles south of the Genesis project site. Hope is dimming that the epidemic can now be contained. The BLM must ensure that this devastating impact to the desert kit fox population from fast-track industrial development is not repeated at the McCoy site or any other. Additional disruption of native populations of desert kit foxes from hazing them off the McCoy proposed project site, will result in additional displaced animals wandering the desert and potentially spreading the disease farther through the population. This is unacceptable. 12-11 30260

The DEIS fails to quantify how many kit fox territories overlap the proposed project site, or analyze the impacts to this species from the proposed project. The measures proposed at 4.4-36 for kit fox and badger are the same type of measures implemented for the Genesis project that failed to control the distemper outbreak and indeed may have caused it. 12-12 30260

Clearly a supplemental or revised DEIS needs to include a substantial section on the status of the on-site desert kit fox population, direct, indirect, and cumulative impacts to the species, and should require a Desert Kit Fox avoidance, minimization and relocation plan that sets out clear strategies to first avoid impacts to the species through re-design and then minimize and mitigate any remaining impacts to this species. 12-13 30260

Burrowing Owls

The DEIS notes that three burrowing owl pairs and at least 11 active burrows are located in the proposed project area (DEIS at 3.4-12). Preliminary results from the 2006-7 statewide

census identified that the Sonoran desert in California harbors few Western burrowing owls.[4] Even more worrisome is the documented crash of burrowing owls in their former stronghold in the Imperial Valley. The Imperial Valley has had a recently documented decline of 27% in the past years[5], resulting in an even more dire state for burrowing owls in California. Because burrowing owls are in decline throughout California, and now their "stronghold" is documented to be declining severely, the burrowing owls on this proposed project site (and on other renewable energy projects) become even more important to species conservation efforts. The recirculated or supplemental DEIS needs to evaluate the potential impact of the proposed project on this regional distribution of owls. 12-14

While habitat acquisition specifically for burrowing owls as identified in the DEIS, the proposed mitigation of only 6.5 acres per "active burrow" is too low (DEIS at 4.4-38), especially in the Colorado Desert, as it is outdated agency guidance. Mean burrowing owl foraging territories are 242 hectares in size, although foraging territories for owl in heavily cultivated areas is only 35 hectares[6]. Regardless, the acquisition of only 19.5 acres (8 hectares) fails to mitigate for one bird even if it was relying on a heavily cultivated area. Therefore, additional mitigation acreage needs to be required – calculated using the mean foraging territory size times the number of owls. Using the average foraging territory size for mitigation calculations may not accurately predict the carrying capacity and may *overestimate* the carrying capacity of the proposed project site, since the proposed project site at 1300 acres – it may be that in this area of the Colorado desert 1300+ acres is necessary to support one burrowing owl. While the DEIS fails to incorporate the guidance from CDFG from 2012[7]. the carrying capacity is tied to habitat quality, language should be included that mitigation lands that are acquired for burrowing owl be native habitats on undisturbed lands, not cultivated lands, which are subject to the whims of land use changes. The long-term persistence of burrowing owls lies in their ability to utilize natural landscapes, not human-created ones. 12-15

While "passive relocation" does minimize immediate direct take of burrowing owls, ultimately the burrowing owls' available habitat is reduced, and "relocated" birds are forced to compete for resources with other resident burrowing owls and may move into less suitable habitat, ultimately resulting in "take". While the DEIS proposes to require the development of a Burrowing Owl Mitigation Plan (4.4-37) and passively relocate burrowing owls, no draft plan is provided and it is unclear if any monitoring targeting "passively relocated" burrowing owl survivorship will occur. No requirements of the plan are provided. 12-16

Indeed, another reason for pulling the project development away from the western side is that during the fall surveys for plants, at least 8 burrowing owls remained on site and were located "in the western half of the Solar Plant Site Survey Area" (Appendix C – Fall Plant Surveys at pg. 14). And another reason to support avoiding the dissected fan landscape is that burrowing owls are also found in these areas, as the survey notes burrowing owls "were flushed from wash banks in incised washes" (Ibid). 12-17

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4 IBP 2008; Wilkerson and Seigel 2010
5 Manning 2009.
6 USFWS 2003
7 www.dfg.**ca**.gov/**wildlife**/non**game**/docs/BUOWStaffReport.pdf

Golden Eagle

While the DEIS identified seven golden eagle nests within a ten mile radius of the proposed project site and that they represented four eagle territories (at 3.4-13). It is unclear how many territories are affected by the proposed project. Furthermore, the DEIS fails to present exactly how to mitigate the loss of a substantial amount of foraging habitat for the golden eagle from this project and other permitted projects within the territories. The fact still remains that significant amounts of foraging habitat will decrease carrying capacity of the landscape and could result in a potential loss of habitat needed to support a nesting pair, which would impact reproductive capacity. 12-18

Scientific literature on this subject is clear - the presence of humans detected by a raptor in its nesting or hunting habitat can be a significant habitat-altering disturbance even if the human is far from an active nest[8]. Regardless of distance, a straight-line view of disturbance affects raptors, and an effective approach to mitigate impacts of disturbance for golden eagles involves calculation of viewsheds using a three-dimensional GIS tool and development of buffers based on the modeling[9]. Golden eagles have also been documented to avoid industrialized areas that are developed in their territory.[10] Additionally, the DEIS does not actually clearly analyze the impacts to and mitigations for the golden eagle under the Bald Eagle and Golden Eagle Protection Act, which prohibits, except under certain specified conditions, the take, possession, and commerce of such birds. Any anticipated "take" of golden eagles by the project must first be permitted under the Bald and Golden Eagle Protection Act—the BLM should not issue any approval until that permit is secured. 12-19

Cryptobiotic Soil Crusts and Desert Pavement

The proposed project is located in the Mojave Desert Air Quality Management District area, which is already in non-attainment for PM-10 particulate matter[11]. The construction of the proposed project further increases emissions of these types of particles because of the disruption and elimination of potentially thousands of acres of cryptobiotic soil crusts. Indeed, the proposed project site fits the description identified by USGS as most vulnerable to wind erosion[12].

Cryptobiotic soil crusts are an essential ecological component in arid lands. They are the "glue" that holds surface soil particles together precluding erosion, provide "safe sites" for seed germination, trap and slowly release soil moisture, and provide CO_2 uptake through photosynthesis[13].

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8 Richardson and Miller 1997
9 Camp et al. 1997; Richardson and Miller 1997
10 Walker et al. 2005
11 http://www.mdaqmd.ca.gov/index.aspx?page=214
12 http://ag.arizona.edu/OALS/ALN/aln51/chavez.html
13 Belnap 2003, Belnap et al 2003, Belnap 2006, Belnap et al. 2007

The DEIS does not describe the on-site cryptobiotic soil crusts. The proposed project will disturb an unidentified portion of these soil crusts and will likely cause them to lose their capacity to stabilize soils and trap soil moisture. The DEIS fails to provide a map of the soil crusts over the project site, and to present any avoidance or minimization measures. It is unclear how many acres of cryptobiotic soils will be affected by the project. The revised or supplemental DEIS must identify the extent of the cryptobiotic soils on site and analyze the potential impacts to these diminutive, but essential desert ecosystem components as a result of this project. 12-20

While desert pavements are mentioned as occurring on the proposed project site (DEIS at 3.7-10), quantitative acreage of pavement are not identified. The impact to air quality from disturbance of desert pavement is not analyzed. Clearly, avoidance of any impacts from construction to desert pavements will leave these ancient formations in place and protect the air quality of the region.

Conclusion

Thank you for your consideration of these comments. In light of the many omissions in the environmental review to date, we urge the BLM to revise and re-circulate the DEIS for both this project and the connected Blythe solar project redesign or prepare a supplemental DEIS addressing these issues and others before making any decision regarding the proposed plan 12-21 amendment and right-of-way application. In the event BLM chooses not to revise the DEIS and provide adequate analysis, the BLM should reject the right-of-way application and the plan amendment. Please feel free to contact me if you have any questions about these comments or the documents provided. 12-22

Sincerely,

Ileene Anderson
Biologist/Desert Program Director

cc: (via email)
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COLORADO RIVER INDIAN TRIBES

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August 23, 2012

Via E-mail and U.S. Mail

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Re: McCoy Solar Energy Project Draft Environmental Impact Statement

Dear Mr. Childers:

The Colorado River Indian Tribes ("CRIT" or "Tribes") submits these comments on the Draft Environmental Impact Statement ("DEIS") prepared by the Bureau of Land Management ("BLM") for the McCoy Solar Energy Project (the "Project"). BLM proposes to construct a utility-scale solar facility and a generation-intertie ("gen-tie") transmission line on 4,900 acres of undeveloped land in the Mohave desert near the Colorado River Indian Reservation and within the Tribes' ancestral and cultural homeland. Because of the Tribes' strong past and ongoing connection to the proposed site, CRIT is deeply concerned about the Project's impacts on cultural and other resources.

CRIT's people, particularly its Mohave and Chemehuevi members, have lived in the Project area since time immemorial, passing through and near the Project site on ancient trails, conducting religious ceremonies in the surrounding mountains, and using the rocks, native plants, and other resources in the area to produce tools, harvest food, and engage in ceremonial practices. Even today, CRIT's members continue to use the area as part of their traditional and religious practices. For example, Salt Song trails pass through the area; these trails and their associated songs—which include specific references to the surrounding mountains—are still used and sung by CRIT's Chemehuevi members with spiritual and cultural clan responsibility. According to Mohave elders, the CRIT's Mohave members also hold spiritual runs on the trails in the area. 13-1

Given this historic and ongoing use of the area, constructing a 5,000-acre solar field on the proposed Project site will have devastating cultural resource impacts. As both BLM and the Applicant know from recent experience at the Genesis Solar Energy Project ("Genesis"), it is very likely that the proposed grading, vegetation removal, and ground-disturbing activities will unearth and damage buried cultural artifacts (such as manos and metates, flakes, lithics, hammerstones, pottery, and other objects) left behind by CRIT's ancestors and held sacred by its present-day members. Disturbing these artifacts, which are strongly associated with the ancestors who used them, is taboo to CRIT's Mohave members, causing them significant emotional, spiritual, and cultural harm. Should any human remains be disturbed, 13-2

the harm felt by CRIT's members will likewise be significant. This spiritual harm cannot be mitigated by the remedial provisions of the Native American Graves Protection and 13-3

Repatriation Act. Finally, and without any doubt, the proposed Project will also significantly contribute to the wholesale transformation of the region from an untouched desert landscape to an industrial one. Not only will this transformation impact discrete archaeological resources (the narrow focus of the DEIS), it will also adversely impact the ongoing cultural and spiritual practices of CRIT's members. 13-4

In sum, the proposed Project is the most recent in a series of misguided attempts to solve the problems caused by the nation's excessive consumption of fossil fuels by destroying the natural and spiritual landscapes of the American Southwest. Rather than continue down this misguided path, CRIT urges BLM to revise the DEIS to include a Project alternative that joins energy conservation efforts and distributed generation of solar power. Such an alternative would have *no* impacts on cultural resources or any other natural resources threatened by the industrialization of the desert. It would also address the environmental injustice of placing the burden of solving climate change on CRIT and other native people, who have contributed little to the problem and have, throughout history, been forced to sacrifice what they hold sacred to satisfy the "needs" of the rest of the nation. 13-5

Moreover, the agency cannot approve the proposed Project on the record before it. As detailed below, the DEIS, as currently drafted, violates the National Environmental Policy Act, 42 United States Code § 4321 *et seq*. ("NEPA"). The information contained in the DEIS also indicates that BLM's actions are running afoul of the National Historic Preservation Act, 16 United States Code § 470 *et seq*. ("NHPA"). These federal laws require that, before an agency approves a project, it must identify cultural resources that may be impacted by a Project, determine how the Project will impact these resources, and analyze measures to mitigate or avoid these impacts. *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 350 (1989) (NEPA's procedures "require that agencies take a 'hard look at environmental consequences' and . . . provide for broad dissemination of relevant environmental information.") (citations omitted); *Muckleshoot Indian Tribe v. U.S. Forest Serv.*, 177 F.3d 800, 805 (9th Cir. 1999) ("Section 106 of NHPA is a 'stop, look, and listen' provision that requires each federal agency to consider the effects of its programs."). The DEIS repeatedly 13-6

falls short of these standards by deferring the identification of cultural resources and the development of mitigation measures until some future date. 13-6 cont.

I. The DEIS Fails to Identify and Analyze the Project's Significant Cultural Resource Impacts.

NEPA requires federal agencies to prepare an EIS for all "major Federal actions significantly affecting the quality of the human environment." 42 U.S.C. § 4332(2)(C). An EIS must take a "'hard look at environmental consequences' [and] provide for broad dissemination of relevant environmental information." *Robertson*, 490 U.S. at 350 (citations omitted). This "hard look" must include information about the project's impacts to cultural resources. *See* 40 C.F.R. § 1508.27 (An EIS must include information about "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."). Likewise, the NHPA requires federal agencies to consider the effects of their actions on historic properties, including significant cultural resources, before committing to those actions. *Muckleshoot*, 177 F.3d at 805.

Here, the DEIS's discussion of cultural resource impacts contains numerous flaws and deficiencies. For example:

Definition of Cultural Resources. As a preliminary matter, the DEIS suffers from a critically flawed definition of "cultural resources," which undermines the accuracy and quality of its subsequent analysis. The DEIS states at the outset that:

> A cultural resource is a location of human activity, occupation, or use identifiable through field inventory, historical documentation, or oral evidence. Cultural resources include both archaeological, historic, or architectural sites, structures, or places with important public and scientific uses, and may include definite locations (sites or places) of traditional cultural or religious importance to specified social and/or cultural groups, e.g., "traditional cultural property." The cultural resources that are evaluated in this section may fall under one of the following resource types: prehistoric archaeological resource, ethnographic resource, and historic-period archaeological and built-environment resources. Cultural resources may be but are not necessarily eligible for the National Register of Historic Places (NRHP).

DEIS at 3.5-1. The document does not provide any information on how BLM developed this definition of cultural resources, nor cite to legal authority in support of this definition. However, five paragraphs later, BLM further narrows the definition, stating, "[c]ultural resources are categorized as buildings, sites, structures, objects, and districts for the 13-7

purposes of complying with federal law (NEPA and the National Historic Preservation Act of 1966 [NHPA] § 106)." DEIS at 3.5-1. There is no basis for asserting that this narrow definition of "cultural resources" is compelled, or even allowed, by NEPA. BLM's second, narrower definition of cultural resources simply parrots NHPA's definition of "historic resource": 13-7 cont.

> "Historic property" or "historic resource" means any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on the National Register, including artifacts, records, and material remains related to such a property or resource.

16 U.S.C. § 470w(5). In contrast, NEPA guidelines specify that EIRs must address impacts to "historic *and* cultural resources." 40 C.F.R. § 1502.16(g) (emphasis supplied). BLM offers no justification for substituting the definition of "historic resources" in one statute for the definition of "cultural resources" in another statute. By paring its analysis of cultural resources under NEPA down to only those tangible phenomena listed in the NHPA definition of "historical resources," BLM excludes from consideration a host of important tangible and intangible cultural resources that are potentially affected by the project, such as viewsheds and landscapes, plants and animals used in and/or central to cultural and religious practices and creation stories, and religious and customary practices (e.g., hunting and gathering, religious ceremonies, and trail-walking). 13-8

Even when describing tangible archaeological resources, BLM artificially narrows its analysis. While the DEIS repeatedly acknowledges that "[c]ultural resources may be but are not necessarily eligible for the National Register of Historic Places (NRHP)," BLM nevertheless relies exclusively on that definition in undertaking its analysis. DEIS at 3.5-1; *see also* DEIS at 3.5-31 ("Cultural resources need not be determined eligible for the National Register of Historic Places (as in the NHPA) to receive consideration under NEPA"). Throughout its assessment of the affected environment and environmental consequences, BLM treats NRHP eligibility as determinative of whether an archaeological resource is a significant cultural resource for purposes of the NEPA analysis and ignores impacts on those sites that are not eligible. For example, Table 4.5-1 describes only the NRHP-eligible sites within the Project area that would be affected. DEIS at 4.5-5. It does not address the Project's impacts to the non-eligible archaeological sites. This is a significant oversight, as these prehistoric artifacts represent a tangible and significant connection to the ancestors of CRIT members. Their removal from CRIT's ancestral homeland, and the possibility of damage during excavation, represent a significant environmental and cultural consequence that cannot be ignored by the EIS. 13-9

Deferred Ethnographic Assessment. The DEIS's analysis of cultural resources focuses almost exclusively on archaeological resources, i.e., prehistoric artifacts, that could be impacted by the Project. DEIS at 4.5-3 to 4.5-6. When known archaeological resources are 13-10

discussed in the DEIS, they are discussed in terms of their scientific significance rather than their cultural or spiritual significance to native people and tribes. *E.g.,* DEIS at 3.5-29 (finding site MS-MH-P-001, a prehistoric ceramic scatter, eligible only under Criteria D, rather than Criteria A). By focusing on the scientific significance of these artifacts, the DEIS ignores their cultural and religious importance to CRIT and other nearby tribes. 13-10 cont.

BLM has implicitly acknowledged the inadequacy of this approach by proposing to conduct an Ethnographic Assessment ("Assessment") of the area that will purportedly assist BLM in identifying places of Native American cultural and spiritual significance, traditional practices, and other concerns that might be affected by the Project. McCoy Solar Energy Project Ethnographic Assessment Work Plan at 1. While CRIT agrees that such an Assessment is necessary, this work should have been completed *prior* to development of the DEIS. If the Ethnographic Assessment truthfully recognizes that the Project Area includes places of cultural and spiritual significance—as it is purportedly designed to do—this information will come too late to be of any real value. The Project is already designed, the public already will have had its one opportunity to comment on the environmental review document, and BLM will be well on its way to approving the project in time for the Obama Administration's December 2012 deadline.[1] Under these circumstances, the Ethnographic Assessment appears to be little more than an after-the-fact effort by BLM to show that it "took into account" the views of Indian tribes. *See also* Letter from Shute, Mihaly & Weinberger to Messrs. John Kalish & Jeffrey Childers re: McCoy Solar Energy Project Ethnographic Assessment Work Plan and Literature Review (2008(P) LLCAD06000 CACA-48728) (July 26, 2012). 13-11

Moreover, the DEIS ignores existing information regarding the cultural importance of both the region and the Project area. In the 1970s and 1980s, CRIT members participated in the designation of lands in the California Desert Conservation Area. This effort resulted in the creation of two maps regarding cultural resources and Native American concerns (attached as Exhibits 1 and 2). While these maps do not depict the full extent of cultural resources in the area, they are a helpful starting place. The Native American Element map in particular shows the sensitivity of the Project site and surrounding area. Yet BLM has uniformly ignored these existing resources for understanding the cultural sensitivity of the Project area and instead deferred its analysis to later studies. 13-12

Buried Resources. The DEIS briefly acknowledges the general possibility that the Project will unearth and damage buried cultural resources during grading and construction:

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[1] *See* The White House, Office of the Press Secretary "We Can't Wait: Obama Administration Announces Seven Major Renewable Energy Infrastructure Projects that Would Power 1.5 million Homes to be Expedited" (August 7, 2012).

> Ground-disturbing construction activities associated with project could directly affect cultural resources by damaging or displacing artifacts. . . . These historic properties, and any additional archaeological sites that are inadvertently discovered during construction, would be located within the full extent of the Project's below ground impacts . . . .

DEIS at 4.5-4. In addressing the impacts of the Project, however, the DEIS makes no effort to quantify the likelihood of this occurrence, to identify areas that may be more or less likely to contain buried resources, or to suggest non-invasive methods of ensuring that such resources are not harmed. The DEIS's effort in this regard can hardly be called a "hard look" at the environmental consequences of the proposed action. Instead, this statement amounts to a useless generality[2]—following similar logic, no area of the American Southwest is more or less suitable for utility-scale solar development, as all areas contain the "possibility" of additional discoveries. 13-13

Importantly, the DEIS elsewhere contains information that portions of this site are particularly likely to reveal buried resources if the Project applicant is allowed to grade the site to 20 feet. DEIS at 3.5-30 to 31 (stating that the site contains Holocene-age deposits with a high potential for buried archeological deposits and late Pleistocene deposits with a medium to high potential for shallow subsurface deposits); DEIS at 4.5-4. Given this information, NEPA requires BLM to complete additional analysis, revise the impact section to explain where these deposits are in relation to the Project impacts, and to identify alternatives and mitigation that would avoid these resources or lessen the likelihood of harm. 13-14

The DEIS also vastly understates the harm that will be caused by unearthing buried artifacts. As discussed above, the impact to CRIT goes beyond just the loss of scientific information about the people who occupied this place in the past; disturbing these artifacts causes cultural and spiritual harm to CRIT's members. This impact must be given adequate recognition in the DEIS. 13-15

To be clear, however, CRIT does not condone the use of invasive techniques to determine the location of these buried resources. CRIT has made repeated, direct efforts to express to BLM and the Obama administration that the wholesale transformation of our ancestral homeland is resulting in profound spiritual, cultural, and religious harm. These efforts have been uniformly rebuffed. As a consequence, CRIT is forced to resort to the procedural protections given by NEPA and the NHPA to make our voice heard and to hold BLM 13-16

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[2] Even more egregiously, when buried resources are ultimately discovered, BLM will undoubtedly point to this short section to argue that supplemental environmental review is not required, as at the Genesis Solar Energy Project.

accountable for its actions. NEPA requires a hard look at all environmental consequences of an action; in this instance, NEPA requires BLM to conduct further analysis to provide more than vague generalities regarding the Project's impacts on buried resources. This statement does not mean, however, that CRIT agrees with or supports NEPA's requirements. Under CRIT's view, disturbance of buried resources causes harm; it does not matter if such resources are disturbed in the name of "analysis" or project development. 13-16 cont.

Finally, the DEIS fails to acknowledge that the development of the Project could expose buried resources to an additional source of harm: flash floods. Flooding is common in this area—the proposed Project is located within a desert wash—and historic deposits in the area likely have been displaced by recurrent floods already. DEIS at 3.5-29, Appendix B-24. The removal of vegetation, grading, and other development activity required by the Project will increase the chances that these floods will unearth buried resources and expose them to damage by Project workers. *See* DEIS at 4.7-6 (stating that the preferred alternative will result in a "noticeable and possibly substantial increase in water erosion rates during low frequency, high intensity rainfall events"). Recent flooding at the Genesis site during project construction exposed and moved scores of buried artifacts that otherwise would have remained buried and intact. 13-17

Prehistoric Trails Network Cultural Landscape. The Project area overlaps with a network of prehistoric trails heading from past village sites to springs in the surrounding mountains and to the Colorado River, a source of spiritual cleaning. Many Tribal members hold this area to be sacred, as it is inextricably tied to mystical and spiritual world and has served as an abundant and sustainable source of food and medicine. The DEIS acknowledges that the Prehistoric Trails Network Cultural Landscape ("PTNCL") is a potential cultural landscape, and indicates that "[a]rchaeological sites that may not be eligible for inclusion in the NRHP or CRHR on their own may still be eligible as contributing elements to these potential cultural landscapes if the sites have integrity and can be tied to significant elements of the district as a whole." DEIS at 3.5-29. According to the DEIS, the NRHP criteria for the potential PTNCL are still being developed. DEIS at 3.5-50. However, BLM does not proposed or implemented an interim methodology for determining which non-NRHP-eligible prehistoric sites may contribute to the PTNCL. BLM has identified several prehistoric sites within the APE that it has determined are ineligible for NRHP listing, including lithic scatters, artifact scatters, and cairns (DEIS at D-8, Table 4), but it has not attempted to evaluate these sites for their relationship to the PTNCL. By failing to do so, it has improperly excluded these sites from consideration as part of the cultural landscape of the PTNCL, and has understated the Project's potential cultural resource impacts. 13-18

Avoidance. The DEIS finds that 18 "unevaluated archaeological and historic sites within the Project area of potential effects would be avoided by Project design and through the imposition of site management conditions." DEIS at 4.5-5. However, the location and description of these sites is absent, and the DEIS does not elaborate on how impacts to 13-19

them will be avoided. While CRIT understands the need to keep information about the location of these sites confidential, tribes with connections to these resources, such as CRIT, must not be asked to take on faith the assertion that unspecified "conditions" will avoid them. At the very least, the DEIS should specify exactly what "site management conditions" will be used, how they will be implemented, and how effective they will be. CRIT also requests information about how the project will be designed to avoid impacts to these known sites. 13-19 cont.

Cumulative Impacts. The DEIS focuses its discussion of cumulative impacts to cultural resources too narrowly, and does not consider them in the context of the larger push to transform federally owned land in this area of the American Southwest into a region for solar energy development. *See* Bureau of Land Management, Final Programmatic Environmental Impact Statement for Solar Energy Development in Six Southwest States, Appendix B (listing 8 approved and 50 pending solar project applications in Arizona and California, totaling nearly 600,000 acres, as of May 31, 2012); White House Office of the Press Secretary "We Can't Wait: Obama Administration Announces Seven Major Renewable Energy Infrastructure Projects that Would Power 1.5 million Homes to be Expedited" (August 7, 2012). The DEIS should be revised to include a description of this phenomenon and to analyze the cumulative impacts the Project will have on the Tribes' cultural resources and ancestral homeland within the broader context of increased project development in the region as a whole. *See* 40 C.F.R. § 1508.7; *Blue Mountains Biodiversity Project v. Blackwood*, 161 F.3d 1208, 1215 (9th Cir. 1998) (NEPA requires analysis of the cumulative impacts of all "reasonably foreseeable" future projects); *Grand Canyon Trust v. Federal Aviation Administration*, 290 F.3d 339, 347 (D.C. Cir. 2002) (holding that where many projects across a geographic area contribute to a similar environmental impacts, the cumulative impacts of all projects must be analyzed under NEPA). The cultural resources in the this region of the American Southwest are finite. They are also irreplaceable. While this Project concerns only 5,000 acres, when its impacts are combined with those of the myriad other projects in the region, it is clear that, in aggregate, the depletion and degradation of these resources is vast. The DEIS does not acknowledge, let alone take a hard look at, this issue. 13-20

Even BLM's list of reasonably foreseeable future projects downplays the extent of impacts across the landscape. The list of proposed projects focuses almost exclusively in eastern Riverside County. Numerous solar projects in Arizona, located less than 10 miles from the Project site, are relegated to a single line in the cumulative projects table. DEIS at 4.1-13. In particular, the analysis fails to mention that the Quartzite Project (AZA 034666), a 1,500-acre power tower, is already undergoing environmental review and is located less than 25 miles from the Project. The cumulative impact section must be revised to more fully explain these Arizona projects and to take their cumulative impacts into account. 13-21

Visual Resources. The Visual Resources section of the DEIS does not address the cultural implications of the Project's disruption of the visual landscape. While the DEIS considers impacts to motorists on Interstate Highway 10, and "[u]sers of OHV routes on the Palo Verde Mesa and dispersed users of the surrounding mountains seeking solitude and unconfined recreation" (DEIS at 4.19-10), it fails to consider the Project's visual impact on Tribal members. The Palo Verde Mesa and the McCoy and Big Maria Mountains are more than a recreational resource for the Tribes; they have longstanding cultural and spiritual significance as ancestral lands. Any large-scale visual alteration to this space disturbs the sanctity of the outdoor environment and constitutes a significant impact. Despite this special significance, the DEIS does not mention the visual impact on CRIT members in the Visual Resources section, and the DEIS does not indicate that CRIT was consulted for this section. 13-22

The DEIS also does not include a vantage point in the McCoy Mountains as a "Key Observation Point." BLM should consult with the Tribes' representatives to determine the full significance of the visual landscape of the Palo Verde Mesa and the McCoy and Big Maria Mountains as a cultural resource, and to explore possible additional or alternative mitigation that would best minimize visual impacts as a whole. 13-23

Similarly, by ignoring tribal use of the area, BLM erroneously assigns a visual sensitivity rating of "medium" to the areas affected by the Project solar plant site. DEIS at 3.19-9. The DEIS states that this rating is based on "relatively low levels of recreation use, a history of low-level development of private lands in the area, and use as a transportation and utility corridor." *Id.* In other situations where the visual landscape has important cultural and religious values, BLM has acknowledged an increased visual sensitivity. *See, e.g.*, Draft Environmental Impact Statement for the Quartzsite Solar Energy Project. This recognition is appropriate: tribal users are not able to simply chose a new destination if a project causes severe visual impacts to a landscape. Here, applying the correct sensitivity rating of "high" would necessarily change the EIS's analysis. It would shift the Project area into a VRM Class II classification (*see* DEIS Table 3.19-3), the objective of which is to "retain the existing character of the landscape." DEIS at 4.19-1. According to the DEIS's own analysis, the Project does not conform with these management objectives. DEIS at 4.19-6 to 10. 13-24

Impact to Sacred Plants. CRIT is also concerned about the harm to certain biological resources that are important to our culture. The DEIS does not discuss the impact to plants as a cultural resource, either in the cultural resources section (as discussed above), or in the biological resources section. Creosote (*Larrea tridentata*) and mesquite (*Prosopis glandulosa*) in particular are valuable to the Tribes, both medicinally and aesthetically. For centuries, creosote has been utilized and respected for its cleansing and healing properties. Further, as one of the oldest, longest-living flowering plants in the region, it holds particular value to the area ecosystem, as habitat, shade, and a source of visual beauty. Mesquite wood is an integral part of the Mohave creation story, and thus has had a direct bearing on the existence of the Mohave people since time immemorial. In addition, it has played and continues to play significant functional and ceremonial roles throughout the lives of CRIT 13-25

members, including as cradle board for children, as a source of food and fuel, and in cremation ceremonies.

The DEIS indicates the Project would directly impact 4,711 acres of creosote bush scrub habitat, and all mesquite trees in the 4,960-acre Project site. DEIS at 4.3-5 to 7. The loss of these plants is a significant cultural impact that is not addressed in the DEIS. 13-25 (cont.)

The measures proposed in the DEIS as mitigation for impacts to creosote and mesquite are inadequate to avoid or reduce the cultural resource impacts of their loss. The DEIS states only that a special-status species avoidance and mitigation plan will somehow compensate for the loss of native plant communities. *Id.* The off-site compensation portion of this plan is not yet developed, and could include land acquisition, restoration projects, or simply a "special status plant species distribution study." DEIS at 4.3-33 to 39. It is unclear how a special status plant study could remedy the loss of native habitats as a cultural resource. Even if the other mitigation options are available, it is unclear whether Tribal members will be able to continue to use the plants in their traditional fashion and/or whether the compensation lands will be located within CRIT's traditional homeland. The DEIS must be revised to analyze the impacts of the loss of this plant species on the Tribes and to minimize or mitigate for these cultural impacts. 13-26

Consultation with Tribal Parties. BLM's consultation with CRIT has been perfunctory at best. Consultation under the NHPA means more than an invitation to comment. *See Quechan Tribe of Fort Yuma Indian Reservation v. U.S. Dept. of Interior*, 755 F. Supp. 2d 1104, 1119 (S.D. Cal. 2010) ("While public informational meetings, consultations with individual tribal members, meetings with government staff or contracted investigators, and written updates are obviously a helpful and necessary part of the process, they don't amount to the type of 'government-to-government' consultation contemplated by the regulations."). Meaningful government-to-government consultation with CRIT requires that BLM meet with CRIT's Tribal Council and acknowledge and address the Tribes' concerns and input. To date, this has not occurred. CRIT encourages BLM to set up a time to meet with CRIT's Tribal Council to discuss the Tribe's concerns. 13-27

In addition, the "Native American Coordination" section of the Cultural Resources analysis, DEIS at 3.5-27, must include a more extensive review of all of the consulted Tribes' participation in the environmental review process in order to fully disclose those Tribes' concerns. 13-28

Environmental Justice. One of the most substantial environmental costs of the proposed Project is the destruction of cultural resources. This cost is borne exclusively by the people who are indigenous to the area, including CRIT's members. The power produced at the proposed Project, however, will likely go to serve residents of southern California. The climate change benefits will be spread across the globe. This imbalanced allocation of costs 13-29

and benefits, which disproportionately disadvantages a minority population while providing them little or no benefit from the project, satisfies any recognized definition of environmental injustice. *See, e.g.*, Executive Order 12898, "Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations" (Feb. 11, 1994) (defining environmental justice as addressing "disproportionately high and adverse [] environmental effects of [] programs, policies, and activities on minority populations and low-income populations"). As BLM has elsewhere acknowledged regarding the federal government's environmental justice policy, "[t]he spirit of this policy—and not a mechanical threshold—should guide any analysis of disproportional impact." Bureau of Land Management, Final Programmatic Environmental Impact Statement for Solar Energy Development in Six Southwest States, Response to Comments at 181. 13-29 cont.

Nonetheless, the DEIS concludes that, because of the Colorado River Indian Reservation's "extended geography" and distance of 15 or more miles from the project site, the project's potential for disproportionately high adverse impacts on the people living on the Reservation is "diminished." It therefore concludes that the Reservation is not within the affected area for purposes of considering environmental justice. DEIS at 4.6-3. BLM offers no justification for summarily concluding on these grounds that Tribal members are not disproportionately affected by the project. The Reservation contains a population for which nearly two-thirds identify as minority, and over one quarter of the population lives below the federal poverty line. DEIS at 3.6-3. Additionally, many tribal members live outside the Reservation but in proximity to the Project area. Given the significant environmental impacts created by the Project on resources and land that are uniquely important to the Tribes, and on which they have depended for centuries, this section should be revised to acknowledge the significant environmental justice impacts to the Tribes.

Finally, as a technical issue, Section 3.6 of the DEIS does not acknowledge that areas within the designated environmental justice impact area have poverty levels "meaningfully greater" than the general population. Please revise accordingly. 13-30

II. The DEIS Improperly Defers the Development of Mitigation.

The DEIS also fails to identify adequate mitigation measures, as required NEPA. 40 C.F.R. § 1502.14(f); *Robertson*, 490 U.S. at 352 ("omission of a reasonably complete discussion of possible mitigation measures would undermine the 'action-forcing' function of NEPA"). In fact, the document contains only one proposed measure to mitigate impacts to cultural resources, which, BLM admits, may not fully avoid project-related impacts on cultural resources. DEIS at 4.5-11. The measure, CUL-1, calls simply for the future execution of a Memorandum of Agreement ("MOA") between BLM and consulting parties and the future preparation of a Historic Properties Treatment Plan ("HPTP"). DEIS at 4.5-9. Neither of these documents has yet been developed. By declining to discuss any specific mitigation measures that will be used to minimize or avoid impacts to cultural resources on the Project 13-31

site, the DEIS fails to identify in sufficient detail the ways in which impacts to cultural resources will actually be avoided or minimized, and fails as an informational document.

BLM's deferral of identifying and detailing specific mitigation measures until the execution of the MOA and the development of the HPTP means that CRIT and other interested parties currently have no way of determining what the mitigation measures will actually be, or, therefore, what the impacts will eventually be. The Tribes cannot submit meaningful comments on the impacts to cultural resources without a fuller understanding of how BLM and the project proponent propose to avoid or minimize these impacts. BLM has provided no justification for deferring the development of reasonably detailed mitigation measures until after the public has had an opportunity to comment on them. 13-31 cont.

Because the DEIS finds that Mitigation Measure CUL-1 would reduce but may not fully avoid impacts on cultural resources (DEIS at 4.5-11), BLM's proposal to develop mitigation measures in the future and acknowledgment that those future measures may not be effective in avoiding impacts to cultural resources is tantamount to avoiding NEPA's mitigation requirement entirely.

Moreover, both the NHPA and the proposed Monitoring and Treatment Plan contemplate that cultural resources should be avoided if possible. DEIS 3.6-2, 4.6-8; 36 C.F.R. § 800.6. However, if the Project is planned and approved before any substantive cultural resources analysis is complete, it will be practically impossible to modify those plans later to avoid resources once they are found. This cart-before-the-horse approach resulted in serious conflicts at the Genesis Solar Energy Project when scores of buried artifacts were found in a 100-acre area of the Project site during project construction. Following the discovery, the project applicant argued to BLM that it would be economically infeasible to avoid the resources at that point because the Project had already been approved and was in the midst of construction. BLM apparently concurred. As a result, those cultural artifacts, which are sacred to the Tribes and which the Tribes believe should not be disturbed, were unearthed and damaged by project grading. As is clear from this experience, the only way to avoid areas where cultural resources exist are to determine where those areas are *before* Project approval. 13-32

The DEIS also states that BLM's obligations under Section 106 of the NHPA will be satisfied upon execution of the MOA. Not so. The MOA is simply a plan for carrying out the agency's obligations under federal law; failure to comply with the plan is a violation of the NHPA. 36 C.F.R. § 800.6 ("A memorandum of agreement executed and *implemented* pursuant to this section evidences the agency official's compliance with section 106 and this part and shall govern the undertaking and all of its parts."); *see Quechan Tribe of Fort Yuma Indian Reservation v. U.S. Dept. of Interior*, 755 F. Supp. 2d 1104, 1110 (S.D. Cal. 2010). The DEIS should be revised to clarify this point. 13-33

III. The DEIS' Identified "Purpose and Need" Artificially Constrain Consideration of Alternatives.

The DEIS states that "BLM's purpose and need for the [Project] is to respond to the Applicant's application under Title V of the Federal Land Policy and Management Act . . . for a ROW grant to construct, operate, maintain and decommission a solar PV facility on public lands . . . ." DEIS at ES-2. This statement casts BLM in an entirely reactionary role. Instead of addressing a valid public purpose—the development of renewable energy—this statement of purpose and need responds only to NextEra's proposal at this particular site. Such a narrow scope impermissible constrains the analysis in the DEIS. The Ninth Circuit held that BLM violated NEPA for a similarly confined EIS in *National Parks and Conservation Association v. Bureau of Land Management*, 606 F.3d 1058, 1072 (9th Cir. 2010). In that case, BLM's purpose and need included one valid public purpose (meeting long-term landfill demand) along with three developer-oriented goals. In striking down the EIS, the court held that BLM may not "adopt[] private interests to draft a narrow purpose and need statement that excludes alternatives that fail to meet specific private objectives." But BLM has done exactly that—responded nearly exclusively to NextEra's private interests—in this case. 13-34

This tactic has severe consequences for the DEIS's consideration of alternatives. In particular, the DEIS eliminated a distributed solar technology alternative from detailed analysis, based in part on the alternative's failure to "meet BLM's purpose and need." DEIS at 2-61.[3] According to the DEIS, this alternative passes the feasibility test. *Id.* Moreover, while the DEIS contains no discussion of this alternative's environmental impacts (*see id.*), it is clear that distributed generation generally has less environmental impacts than utility-scale solar facilities, as such technology can be readily incorporated in the built environment. If BLM were to redefine the purpose of the Project to express more directly the *public* goals—reducing dependence on greenhouse gas emissions, providing energy, creating jobs, and reducing dependence on foreign energy sources—it is clear that the distributed generation alternative should be given a detailed analysis. 13-35

[3] While the DEIS concludes that this alternative also fails because it is "remote and speculative," this reasoning is unsupported. DEIS at 2-61 to 62. The DEIS states that "approximately 3,500 acres of distributed generation" would be required to match the Project's output, but provides no information to support the conclusion that statewide development of this scope this would be infeasible. *Id.*

IV. The Significant Diminishment of Sensitive Values by Industrial Development of Class L Lands Violates FLPMA.

Under the Federal Land Policy and Management Act ("FLPMA"), Congress determined that the California Desert contains "historical, scenic, archeological, environmental, biological, cultural, scientific, educational, recreational, and economic resources that are uniquely located adjacent to an area of large population" and as such, these resources, including "numerous archeological and historic sites, are seriously threatened." 43 U.S.C. § 1781. In response, Congress directed BLM to prepare a land use management plan for the area that would protect these fragile and threatened resources. *Id.*

BLM's subsequent California Desert Conservation Act Plan ("CDCA Plan") includes four land use classifications (Classes C, L, M, and I) that direct the multiple uses accommodated on BLM land into appropriate areas. The Project area falls entirely within Class L, which is intended to "protect[] sensitive natural, scenic, ecological, and cultural resource values." DEIS at 3.10-3. Therefore, lands designated as Class L must be "managed to provide for generally lower-intensity, carefully controlled multiple use of resources, while *ensuring that sensitive values are not significantly diminished*." *Id.* (emphasis added).

As outlined in this comment letter, it is clear that sensitive values within the Project site—particularly cultural and visual resources—are significantly diminished by the proposed Project. CRIT does not concur with BLM's determination that all cultural resources impacts and all adverse effects to places of traditional cultural or religious importance can be "resolved" via a MOA under the NHPA (DEIS at 4.10-11 to 12), particularly given that BLM has acknowledged it does not yet know what the full extent of Project impacts will be. As such, any approval of the Project as currently designed would violate both the CDCA Plan and FLPMA. *See also* CDCA Plan, Table 1 (requiring projects within Class L lands to preserve and protect archaeological resources and Native American cultural and religious values). 13-36

V. Conclusion

The DEIS for the McCoy Solar Energy Project contains significant flaws. As CRIT has seen on a number of solar energy projects throughout the region, BLM seems intent on pushing analysis of cultural resource impacts further and further down the road, until it becomes little more than an after-the-fact effort to acknowledge the significant detrimental effect of these projects only after construction has begun. CRIT strongly objects to this tactic in general and to any project—including the McCoy Solar Energy Project—that is reviewed by BLM in such circumstances. 13-37

Sincerely,

Secretary, Merving Scott, Jr.
Colorado River Indian Tribes

430106.1

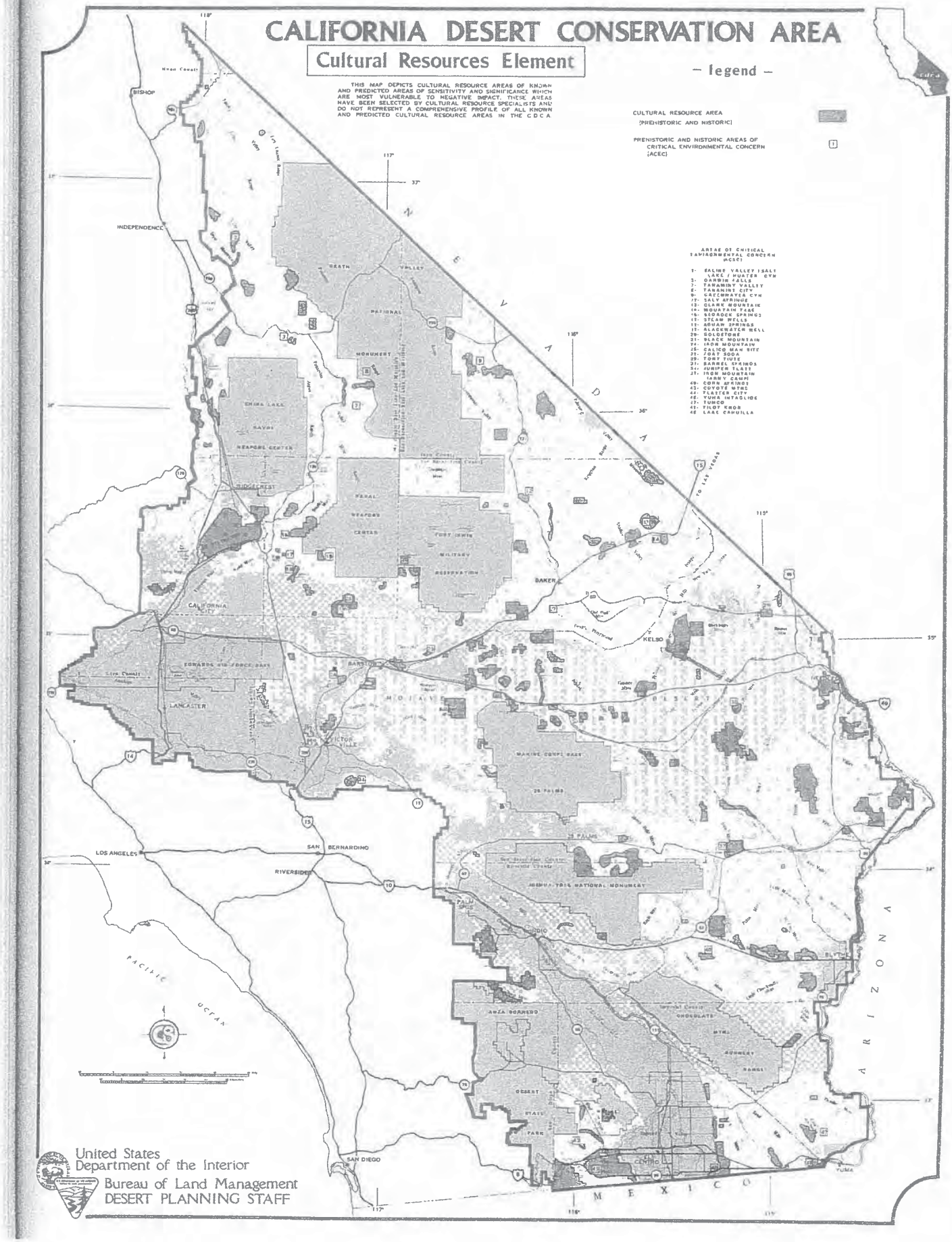
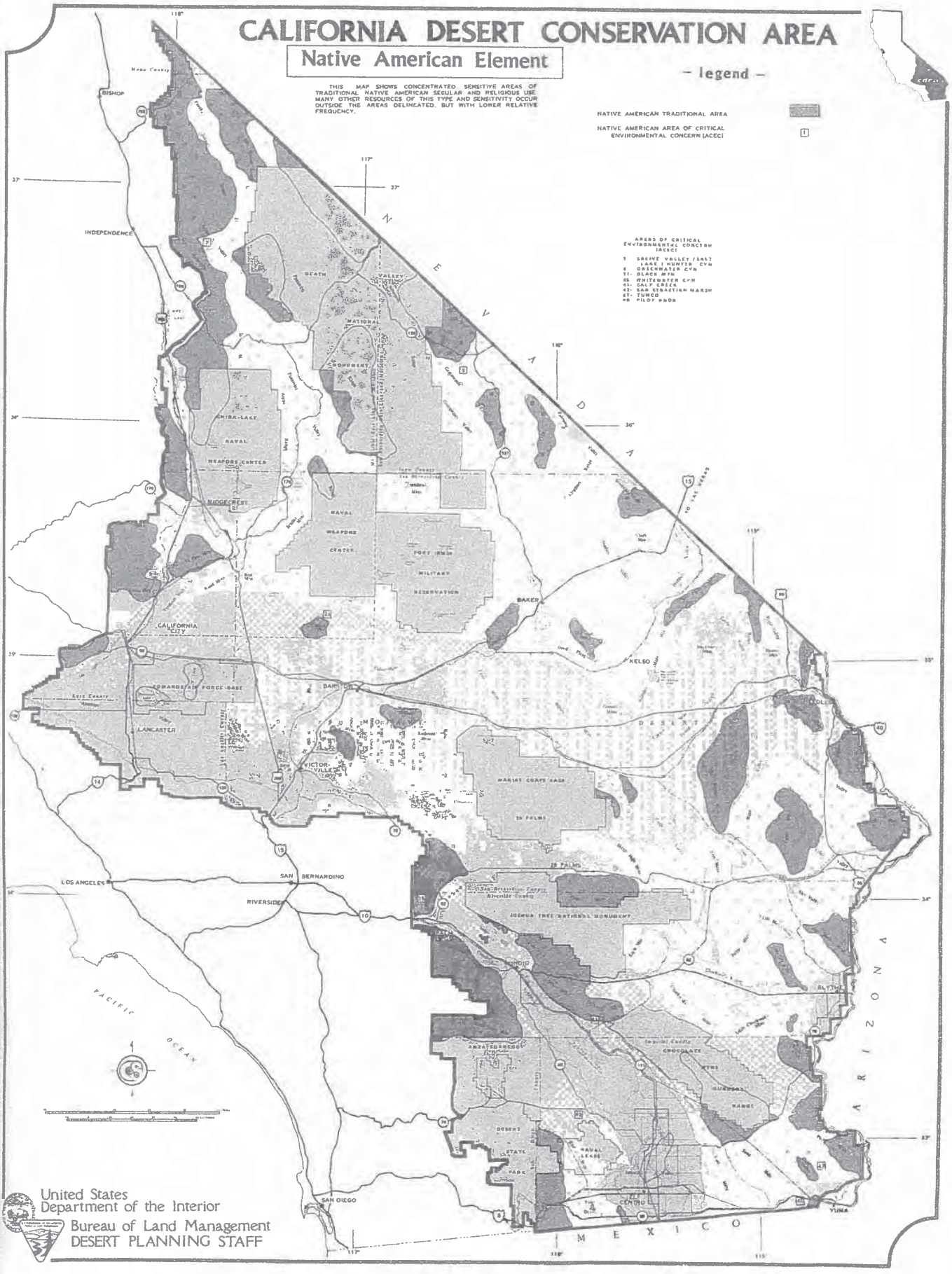

CALIFORNIA DESERT CONSERVATION AREA
Cultural Resources Element
THIS MAP DEPICTS CULTURAL RESOURCE AREAS OF KNOWN AND PREDICTED AREAS OF SENSITIVITY AND SIGNIFICANCE WHICH ARE MOST VULNERABLE TO NEGATIVE IMPACT. THESE AREAS HAVE BEEN SELECTED BY CULTURAL RESOURCE SPECIALISTS AND DO NOT REPRESENT A COMPRENENSIVE PROFILE OF ALL KNOWN AND PREDICTED CULTURAL RESOURCE AREAS IN THE C D C A.
— legend —
CULTURAL RESOURCE AREA (PREHISTORIC AND HISTORIC)
PREHISTORIC AND HISTORIC AREAS OF CRITICAL ENVIRONMENTAL CONCERN (ACEC)
AREAS OF CRITICAL ENVIRONMENTAL CONCERN (ACEC)
1- SALINE VALLEY (SALT LAKE / HUATER CYN
3- DARWIN FALLS
7- TARANTULA VALLEY
8- TARANTULA CITY
9- GREENWATER CYN
12- SALT SPRINGS
13- CLARK MOUNTAIN
14- MOUNTAIN PASS
15- SEGROCK SPRINGS
17- STEAM WELLS
18- ADAMS SPRINGS
19- BLACKWATER WELL
20- GOLDSTONE
21- BLACK MOUNTAIN
24- IRON MOUNTAIN
26- CALICO MAN SITE
32- /OAT SODA
29- TORT TUSE
31- BARREL SPRINGS
34- JUNIPER FLATS
37- IRON MOUNTAIN (ARMY CAMP)
40- CORN SPRINGS
43- COYOTE MTNS
44- FLASTER CITY
46- YUMA INTAGLIOS
47- YUMCO
48- TILOT KNOB
48 LAKE CAHUILLA
NEVADA
ARIZONA
MEXICO
PACIFIC OCEAN
BISHOP
INDEPENDENCE
DEATH VALLEY NATIONAL MONUMENT
CHINA LAKE NAVAL WEAPONS CENTER
RIDGECREST
NAVAL WEAPONS CENTER
FORT IRWIN MILITARY RESERVATION
BAKER
CALIFORNIA CITY
EDWARDS AIR FORCE BASE
LANCASTER
VICTOR VILLE
BARSTOW
KELSO
MOJAVE
MARINE CORPS BASE
29 PALMS
LOS ANGELES
SAN BERNARDINO
RIVERSIDE
JOSHUA TREE NATIONAL MONUMENT
INDIO
ANZA BORREGO
CHOCOLATE MTNS
OROCOPIA RANGE
DESERT PLAIN PARK
SAN DIEGO
United States Department of the Interior
Bureau of Land Management
DESERT PLANNING STAFF

EXHIBIT 1


CALIFORNIA DESERT CONSERVATION AREA
Native American Element
THIS MAP SHOWS CONCENTRATED, SENSITIVE AREAS OF TRADITIONAL NATIVE AMERICAN SECULAR AND RELIGIOUS USE. MANY OTHER RESOURCES OF THIS TYPE AND SENSITIVITY OCCUR OUTSIDE THE AREAS DELINEATED, BUT WITH LOWER RELATIVE FREQUENCY.
– legend –
NATIVE AMERICAN TRADITIONAL AREA
NATIVE AMERICAN AREA OF CRITICAL ENVIRONMENTAL CONCERN (ACEC)
AREAS OF CRITICAL ENVIRONMENTAL CONCERN (ACEC)
BISHOP
INDEPENDENCE
DEATH VALLEY NATIONAL MONUMENT
CHINA LAKE NAVAL WEAPONS CENTER
RIDGECREST
NAVAL WEAPONS CENTER
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BAKER
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VICTORVILLE
MOJAVE
DESERT
MARINE CORPS BASE
29 PALMS
LOS ANGELES
SAN BERNARDINO
RIVERSIDE
JOSHUA TREE NATIONAL MONUMENT
INDIO
BLYTHE
PACIFIC OCEAN
ANZA-BORREGO DESERT STATE PARK
CHOCOLATE MTNS
NAVAL LEASE
CENTRO
YUMA
SAN DIEGO
NEVADA
ARIZONA
MEXICO
United States Department of the Interior
Bureau of Land Management
DESERT PLANNING STAFF

EXHIBIT 2

Comment Letter 14

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August 23, 2012

Jeffrey Childers, Project Manager
Bureau of Land Management
California Desert District
22835 Calle San Juan de Los Lagos
Moreno Valley, CA 92553.
camccoysep@blm.gov

RE: Draft Plan Amendment / EIS for the McCoy Solar Energy Project prepared by BLM Palm Springs – South Coast Field Office, Publication Index #BLM/CA-ES-2012-012+1793, Department of Interior ("DOI") Control #DES 12-21, and Application #CACA-048728

Dear Mr. Childers,

I am writing on behalf of Laborers International Union of North America, Local Union No. 1184, and its members living in Riverside County ("LIUNA Local Union No. 1184" or "Commentors"), concerning the Draft Plan Amendment / EIS for the McCoy Solar Energy Project prepared by BLM Palm Springs – South Coast Field Office, Publication Index #BLM/CA-ES-2012-012+1793, Department of Interior ("DOI") Control #DES 12-21, and Application #CACA-048728. McCoy Solar LLC is seeking to build an up-to-750 megawatt ("MW") photovoltaic (PV) solar energy generating facility in unincorporated Riverside County. In order to build the project would require BLM granting a 7,700-acre right-of-way and amending the California Desert Conservation Area Plan of 1980 ("CDCA Plan").

We have prepared these comments with the assistance of Michael F. McGowan, Ph.D., an expert wildlife biologist with more than 25 years of experience that includes conducting ecological research, teaching university classes in ecology, teaching post-graduate environmental management on topics such as NEPA, CEQA, permitting and regulatory compliance, and drafting portions of other EIR and EIS documents including those for solar energy development in Southern California. His comments and curriculum vitae are attached hereto as Exhibit 1 and are incorporated by reference in their entirety. Each of McGowan's comments must be commented to separately.

LIUNA Local Union No. 1184 recognizes that the development of renewable energy is critical for the reduction of greenhouse gas emissions. Renewable energy is essential to forestall the worst consequences of climate change and to help the state of California meet its ambitions emissions reductions goals. LIUNA Local Union No. 1184 supports the development of renewable energy production, including the development of solar power generation through both appropriately sited solar "farms" and distributed solar power generation. All solar power projects must be properly sited and carefully planned to minimize impacts on the environment. Renewable energy projects should avoid impacts to sensitive species and habitats and should be sited in proximity to electricity consumers to reduce the costs and impacts associated with new transmission corridors. Only by maintaining the highest standards in these and other ways can 14-1
renewable energy production be truly sustainable. Unfortunately, the proposed project falls short in these and other ways. As a consequence, the Draft Environmental Impact Statement ("DEIS") will need to be revised and recirculated, as set forth below. 14-2

I. BACKGROUND

McCoy Solar LLC, a subsidiary of NextEra Energy Resources LLC, proposes to construct, operate, maintain, and decommission an up-to-750 megawatt (MW) photovoltaic solar energy generating facility and related infrastructure in unincorporated Riverside County, California, to be known as the McCoy Solar Energy Project ("MSEP"). The majority of the MSEP would be developed on public land administered by the Bureau of Land Management (BLM). Approximately 477 acres of privately owned land would be included in the proposed solar plant site boundary. The Project would generate and deliver solar-generated power to the California electrical grid through an interconnection at the Colorado River Substation (CRS) owned by Southern California Edison (SCE).

McCoy Solar LLC has submitted a Standard Form (SF)-299 to the Bureau of Land Management ("BLM") requesting a right-of-way (ROW) for the approximately 7,700-acre portion of the MSEP that would be developed on BLM-administered land. Moreover, a land use plan amendment to the California Desert Conservation Area Plan of 1980 ("CDCA Plan") identifying the area in which the MSEP is to be developed as appropriate for the proposed use is required.

Additionally, McCoy Solar LLC filed an Application for Land Use and Development with the Riverside County (County) Planning Department seeking a Conditional Use Permit ("CUP") for the portion of the solar plant site that would be developed on private land under the County's land use jurisdiction and a Public Use Permit (PUP) for the portion of the gen-tie line that would be developed on private land and on a small area of County-owned property.

The MSEP is proposed to be constructed on approximately 7,700 acres of BLM land and 477 acres of private land. The MSEP would be located in the southern California inland desert, approximately 13 miles northwest of the City of Blythe and 6 miles north of the Interstate 10 (I-10) freeway in Riverside County, California.

II. STANDING

Members of LIUNA Local Union No. 1184 live, work, and recreate in the immediate vicinity of the proposed Project site. These members will suffer the impacts of a poorly executed or inadequately mitigated Project, just as would the members of any nearby homeowners association, community group, or environmental group. Hundreds of LIUNA Local Union No. 1184 members live and work in areas that will be affected by traffic, air pollution, and water pollution generated by the Project.

In addition, construction workers will suffer many of the most significant impacts from the Project as currently proposed, such as from air pollution emissions, poorly maintained or controlled construction equipment and other impacts. Therefore, LIUNA Local Union No. 1184 and its members have a direct interest in ensuring that the Project is adequately analyzed and that its environmental and public health impacts are mitigated to the fullest extent feasible.

III. LEGAL STANDARDS

A. National Environmental Policy Act ("NEPA")

Congress enacted NEPA in recognition of the "profound impact of man's activity on the interrelations of all components of the natural environment," including "industrial expansion, resource exploitation, and new and expanding technological advances." 42 U.S.C. § 4331(a). NEPA is the "basic national charter for protection of the environment." 40 C.F.R. § 1500.1(a).

NEPA requires that federal agencies prepare a "detailed statement" — known as an EIS — for all "major Federal actions significantly affecting the quality of the human environment." 42 U.S.C. § 4332. The environmental impact statement ("EIS") is intended to create an open, informed, and public decision-making process that insures "that environmental information is available to public officials and citizens before decisions are made and before actions are taken" and "to help public officials make decisions that are based on understanding of environmental consequences, and take actions that protect, restore, and enhance the environment." 40 C.F.R. § 1500.1. A federal agency's obligation to prepare an EIS extends to any federal action that "will or may" have a significant effect on the environment. 40 C.F.R. § 1508.3. The federal agency must "[r]igorously explore and objectively evaluate" a range of alternatives to proposed federal actions and their impacts in the EIS. 40 C.F.R. § 1502.14(a).

The evaluation of mitigation measures is an essential component of an EIS. A federal agency is required to evaluate possible mitigation measures in defining the scope of the EIS, in examining impacts of the proposed action and alternatives, and in explaining its ultimate decision. *See* 40 C.F.R. §§ 1502.14(f), 1502.16(h), 1505.2(c), 1508.25(b).

Agencies must insure the professional integrity, including scientific integrity, of the discussion and analysis in an EIS. 40 C.F.R. § 1502.24. The information in an EIS must be of high quality, as accurate scientific analysis, expert agency comments, and public scrutiny are essential to implementing NEPA. 40 C.F.R. §§ 1500.1(b), 1502.24.

B. The Federal Land Policy and Management Act ("FLPMA")

FLPMA sets forth the general management framework for the public lands based on the principles of multiple use and sustained yield. See 43 U.S.C. § 1732(a). FLPMA requires that BLM "develop, maintain, and, when appropriate, revise land use plans" for the public lands, 43 U.S.C. § 1712(a), and that the agency "[i]n managing the public lands . . . take any action necessary to prevent unnecessary or undue degradation of the lands." 43 U.S.C. § 1732(b).

FLPMA establishes a heightened standard for the management of the CDCA — the act specifically provides "for the immediate and future protection and administration of the public lands in the California desert within the framework of a program of multiple use and sustained yield, and the maintenance of environmental quality." 43 U.S.C. § 1781(b).

FLPMA mandated the preparation of the California Desert Conservation Area Plan, see 43 U.S.C. § 1781(d), the goal of which is:

> to provide for the use of the public lands, and resources of the California Desert Conservation Area, including economic, education, scientific, and recreational uses, in a manner which enhances wherever possible—and which does not diminish, on balance—the environmental, cultural, and aesthetic values of the Desert and its productivity.

(BLM, The California Desert Conservation Area Plan 1980 as amended at 5-6 (1999)).

The BLM derives its authority to grant ROWs for the distribution of electric energy from FLPMA, Title V (43 U.S.C. §§ 1761-1771) and its implementing regulations (43 C.F.R. Part 2800). FLPMA authorizes BLM to "grant, issue, or renew rights-of-way over, upon, under, or through" the public lands for, among other uses, "systems for generation, transmission, and distribution of electric energy." 43 U.S.C. § 1761(a). Each ROW shall contain terms and conditions that, among other purposes, will "require compliance with State standards for public health and safety, environmental protection…if those standards are more stringent than applicable federal standards." Each ROW permit must contain terms and conditions which will

"minimize the damage to scenic and esthetic values and fish and wildlife habitat and otherwise protect the environment." 43 U.S.C. § 1765(a)(ii). Furthermore, each ROW shall contain terms and conditions that "require compliance with State standards for public health and safety, environmental protection, and siting, construction, operation, and maintenance of or for rights-of-way for similar purposes if those standards are more stringent than applicable Federal standards." 43 U.S.C. § 1765(a)(iv).

Under 43 C.F.R. § 2805.12(a), the project applicant is obligated to comply with the Secretary's terms and conditions in the ROW permit requiring compliance with all existing Federal laws and regulations and state laws and regulations applicable to the authorized use, with the Secretary's terms and conditions relating to preventing damage to "[s]cenic, aesthetic, cultural, and environmental values, including fish and wildlife habitat" 43 C.F.R. § 2805.12(i)(3)(i), and "[p]ublic health and safety" 43 C.F.R. § 2805.12(iii) and with those state standards that are more stringent than federal standards and that relate to public health and safety, environmental protection, and siting, constructing operating and maintaining any facilities on the ROW. 43 C.F.R. § 2805.12(i)(6).

C. Endangered Species Act ("ESA")

The ESA, 16 U.S.C. § 1531 et seq, protects threatened and endangered species listed under the Act. The ESA prohibits the unauthorized "take" of a listed species. 16 U.S.C. § 1538(a)(1)(B). Federal agencies are required to ensure that "any action *authorized* [by the agency] . . . is not likely to jeopardize the continues existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species . . . ." 16 U.S.C. § 1536(a)(2).

Formal consultation with the United States Fish & Wildlife Service ("USFWS") is required for any federal action that may adversely affect a federally listed species. 16 U.S.C. § 1536. The lead agency for a federal project must initiate a consultation through the preparation and submittal of a Biological Assessment ("BA"), 16 U.S.C. § 1536(c), which would describe the Proposed Action to the USFWS. Following review of the BA, the USFWS is required to issue a Biological Opinion (BO). The lead agency must complete its consultation prior to releasing a Final Environmental Impact Statement.

D. The Administrative Procedure Act ("APA")

The APA provides that a "person suffering legal wrong because of agency action, or adversely affected or aggrieved by agency action within the meaning of a relevant statute, is entitled to judicial review thereof." 5 U.S.C. § 702. The APA provides that a court shall set aside agency "findings, conclusions, and actions" that are "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law." 5 U.S.C. § 706(2)(A).

IV. THE DEIS VIOLATES NEPA

A. Biological Soil Crust

Michael F. McGowan, Ph.D., an expert wildlife biologist with more than 25 years experience, concluded that the DEIS failed to consider impacts to the invaluable soil crust of the California desert.

Construction and operation of the MSEP would permanently damage critical biological soil crust habitat. Biological soil crust supports critical microorganisms, reduce erosion, and provide habitat for desert plants and animals.[1] Human activity generally affects biological soil crusts to diminish their ecological functioning, leading to negative effects on landscape stability, biodiversity, and biogeochemistry. Recovery of biological soil crusts may take up to 300 years so impacts to them by the Project should be considered permanent.

The DEIS only gives passing references to the impact that the MSEP would have on biological soil crust. The DEIS on p. 3.7-10 mentions biological soil crusts as being an important factor with regard to limiting erosion. In Chapter 4 p. 4.3-7 the DEIS lists as a potential indirect impact to special status plants, "disturbance of the structure and ecological functioning of biological soil crusts, which may affect seed germination, reduce soil nutrition, and render the soil vulnerable to water and wind erosion." 14-3

The treatment of biological resources in the DEIS is incomplete without a complete discussion of potential impacts to biological soil crusts in the project area. This discussion should include distribution maps as well as the kinds and significance of impacts to the soil crusts and the consequences of these impacts to plants, animals, hydrology, erosion, and generation of dust. Mitigation for these impacts should consider the uncertainty of restoration and the environmental consequences of a permanent change to such an important desert feature.

B. Mitigation Measures

Michael F. McGowan, Ph.D., an expert wildlife biologist with more than 25 years experience, concluded that the DEIS failed to consider mitigation measures that would be required to be implemented as part of the project. A federal agency is required to evaluate 14-4

[1] States, J. S. Commentary on Biological (Microphytic) Soil Crusts in the Rawlins Resource Management Area. http://www.voiceforthewild.org/greatdivide/states_soil.html accessed 8/20/2012 (Exhibit 2); Nagy, M. L., Perez, A., and F. Garcia-Pichel. 2005 The prokaryotic diversity of biological soil crusts in the Sonoran Desert (Organ Pipe Cactus National Monument, AZ). FEMS Microbiology Ecology 54 (2005):233–245 (Exhibit 3); Belknap, J., et al. 2001. Biological soil crusts: ecology and management. Technical Reference 1730-2. BLM/USDI/ST-01/001+1730 (Exhibit 4).

possible mitigation measures in examining the impacts of the proposed action and alternatives as well as in its' final decision. *See* 40 C.F.R. §§ 1502.14(f), 1502.16(h), 1505.2(c), 1508.25(b).

Several of the mitigation measures cited in the EIS refer to unspecified mitigation measures that will in implemented as part of unwritten plans: the Biological Resources Mitigation Implementation & Monitoring Plan, the Invasive Weed Management Plan, the Special-Status Species Plant Impact Avoidance and Mitigation Plan, and several wildlife mitigation, relocation, and monitoring plans (DEIR p. 4.3-21).

BLM is required to evaluate possible mitigation measures as part of the EIS, examine the impacts of the proposed action in light of the mitigation measures, and explain why the agency believes that those mitigation measures are sufficient. In particular 40 C.F.R. § 1502.14(f) states that the alternatives section of an EIS must "[i]nclude *appropriate mitigation measures* . . . ." 40 C.F.R. § 1502.16(h) states that the environmental consequences section of an EIS must state the *"means to mitigate* adverse environmental impacts." Moreover, 40 C.F.R. § 1505.16(h) requires that the final Record of Decision after an EIS has been adopted "[s]tate *whether all practicable means to avoid or minimize environmental harm* from the alternative selected have been adopted." BLM cannot finalize the NEPA process without stating, *with specificity*, the environmental mitigation measures that MSEP will be required to implement. 14-5

C. Toxic Chemical Impacts Related to Cadmium Telluride

The DEIS inadequately analyzes toxic chemical risks related to the Project. The Project may install thousands of panels containing cadmium telluride ("CdTe") encapsulated between two sheets of glass. The potential for cadmium to leach from broken panels has been observed in research papers.[2]

A recent study conducted on the potential leaching risks of cadmium from broken PV panels found cadmium concentration in water at the point of breakage to be between 4 micrograms per liter ("μg/L") to 6 μg/L.[3] This exceeds the groundwater and surface water (freshwater) Environmental Screening Levels established by the California Regional Water Quality Control Board("ESLs") of 0.25 μg/L by more than three times for the "protection of aquatic habitats" and "protection against leaching and subsequent impacts to groundwater." 14-6

At the end of their life, all of these panels are likely to end up in a landfill. Panels containing CdTe are likely to cause significant problems with landfill leachate and disposal – similar to the problems caused by household batteries containing mercury and cadmium, which 14-7

[2] Fate and Transport Evaluations of Potential Leaching Risks from Cadmium Telluride Photovoltaics (2012). Environmental Toxicology and Chemistry, Vol. 31, No. 7 (Exhibit 5).
[3] Salton Sea Restoration, Final Preferred Project Report, Salton Sea Authority, July 2004, available at http://www.saltonsea.ca.gov/media/ppr_final.pdf (Exhibit 6).

are now a significant problem at landfills throughout the state. Failing to analyze this foreseeable impact now constitutes both an inadequate project description and a piecemealing of the project, which will necessarily involve both installation and disposal. 14-7 (cont.)

The EIR should consider the alternative of requiring the use of less toxic silicon-based PV panels, which are readily available. An EIR must describe a range of reasonable alternatives to the Project, or to the location of the Project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives. 14-8

D. Air Quality Impacts

1. Valley Fever

The DEIS fails to address the possibility that MSEP could increase occurrences of valley fever among residents of Riverside County as well as those who may work on the Project.

Valley Fever is an illness caused by the C. immitis fungus that usually affects the lungs.[4] C. immitis grows in areas of low rainfall, high summer temperatures, and moderate winter temperatures. The Valley Fever fungus is found in some areas of the southwestern United States, and in parts of Mexico and Central and South America, which have soil and weather conditions that allow the fungus to grow. The fungal spores are generally found in the upper 30 centimeters of the soil horizon, especially in virgin undisturbed soils. The spores become airborne when uncultivated soil is disturbed by winds, construction, farming, and other activities. An estimated 150,000 Coccidioides infections occur each year in the United States, although more than half of these infections do not produce any symptoms. 14-9

In susceptible people and animals, infection occurs when a spore is inhaled. Valley Fever infection is highest in California from June to November. People working in occupations such as construction, agriculture, and archeology have an increased risk of exposure and disease because these jobs result in disturbance of soils where fungal spores may be found. Valley Fever symptoms (fatigue, cough, chest pain, fever, rash, headache and joint aches) generally occur within 3 weeks of exposure. There is currently no vaccine.

[4] Nat'l Institute for Health, Valley Fever: San Joaquin Valley Fever; Coccidioidomycosis PubMed Health(2011), *available at* http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0002299/ (Exhibit 7).

BLM should explore the impact that the MSEP would have on Valley Fever occurrences in Riverside County as well as possible mitigation measure. BLM should adopt mitigation measures adopted by the County of San Luis Obispo to protect worker safety at the MSEP site.[5] 14-9 (cont.)

2. Diesel Particulate Matter ("DPM")

The DEIS fails to discuss the impact of DPM emissions, generated from diesel-powered engines, on construction worker health and regional air quality from any activities associated with Project construction and operation. Project construction and operation will require the use of diesel-powered trucks and equipment, including on-site diesel emergency power generators and diesel-fueled off-road vehicles. (DEIS 3.2-8). Construction activities at the site are going to be so heavily dependent upon diesel powered equipment to necessitate erecting an above-ground 3,600-gallon diesel tank during construction. (DEIS p. 4.9-5). The Project will generate significant DPM emissions and impact construction worker health.

Exposure to DPM may cause irritation to the eyes, nose, throat, and lungs, as well as neurological effects. DPM is classified as a "likely carcinogen."[6] The California Office of Environmental Health Hazard Assessment ("OEHHA") states that truck drivers and equipment operators who are exposed to diesel exhaust are more likely to develop cancer than those not exposed. Short-term exposures to diesel exhaust include eye, nose, throat, and lung irritation, coughs, headaches, nausea, and lung tissue damage.[7] 14-10

To protect worker health and to estimate impacts on regional air quality, DPM emissions must be quantified. If emissions are found to be harmful to human health, as determined by a risk assessment, and found to further degrade regional air quality, mitigation needs to be identified to include measures commonly implemented under CEQA and NEPA:

- Regular preventive maintenance to prevent emission increases due to engine problems;
- Use of low sulfur and low aromatic fuel meeting California standards for motor vehicle diesel fuel;
- Reduce equipment and vehicle idle times. Diesel equipment standing idle for more than five minutes shall be turned off. This includes trucks waiting to

[5] San Luis Obispo County Health Agency Public Health Bulletin, Spring 2008, *available at* http://www.slocounty.ca.gov/Assets/PH/Bulletins/2003+to+2008/2008+Spring+SLO+Public+Health+Bulletin.pdf (Exhibit 8); San Luis Obispo County Health Agency, Valley Fever Recommendations, *available at* http://www.slocounty.ca.gov/Assets/PH/Epidemiology/Cocci+Recomendations.pdf (Exhibit 9).

[6] Diesel Particulate Matter, U.S. Environmental Protection Agency, Region 1: EPA New England, available at http://www.epa.gov/region1/eco/airtox/diesel.html (Exhibit 10).

[7] Health Effects of Diesel Exhaust, Office of Environmental Health Hazard Assessment, available at http://oehha.ca.gov/public_info/facts/dieselfacts.html (Exhibit 11).

deliver or receive aggregate or other bulk materials. Rotating drum concrete trucks could keep their engines running continuously as long as they were onsite;

- Use of low-emitting Diesel engines meeting federal emissions standards;
- Diesel engines from 50 to 750 horsepower are to meet Tier 3 California Emission Standards for Off-road Compression-Ignition Engines;
- Off-road equipment with diesel engines larger than 750 horsepower shall meet Tier 2 California Emission Standards;
- All equipment shall be turned off when not in use. Engine idling of all equipment shall be minimized;
- All equipment engines shall be maintained in good operating condition and in tune per manufacturers' specification; and
- Meet Tier 3 California emission standards for off-road compression-ignition engines (for engines between 50 horsepower and 750 horsepower).

14-10 (cont.)

Despite the likelihood that there may be potentially significant impacts from DPM emissions associated with Project construction on construction worker health and regional air quality, the DEIS does not analyze this issue. A revised DEIS must be prepared that identifies, evaluates, and quantifies these emissions. 14-11

3. Greenhouse Gas Emissions ("GHG")

The DEIS improperly disregards the significant amount of GHG emissions that would be generated by the project. The DEIS estimates that lifetime GHG emissions from the MSEP, including construction, operation, and decommissioning, would total 8,313 metric tons of carbon dioxide equivalent ("$MTCO_2E$") per year. (DEIS p. 4.8-7). The DEIS also states that these emissions are below a GHG threshold of 25,000 $MTCO_2E$ per year and therefore, the Project's GHG emissions are not significant. (*Id.*) 14-12

The 25,000 $MTCO_2E$ threshold cited by the DEIS is not a threshold but a reporting limit set by EPA.[8] This reporting limit has been set by EPA and requires that industrial facilities emitting over 25,000 $MTCO_2E$ report their emissions and obtain a permit.[9] Therefore, this is not an appropriate threshold to compare the Project's GHG emissions. Although the Mojave Desert Air Quality Management District does not have GHG thresholds, the nearby County of San 14-13

[8] Fact Sheet: Mandatory Reporting of Greenhouse Gases (40 CFR part 98), U.S. Environmental Protection Agency, June 2011, available at http://www.epa.gov/climatechange/emissions/downloads09/FactSheet.pdf (Exhibit 12).

[9] Fact Sheet -- Proposed Rule: Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule, U.S. Environmental Protection Agency, available at http://www.epa.gov/nsr/fs20090930action.html (Exhibit 13).

Diego recommends a threshold of 900 $MTCO_2E$ per year based on a paper by the California Air Pollution Control Officer Association ("CAPCOA").[10] 14-13 (cont.)

The Project's construction and operational GHG emissions are significant when compared to the 900 $MTCO_2E$/year CAPCOA threshold. A revised DEIS needs to be prepared that compares Project emissions to appropriate thresholds and identify them as significant. It must provide mitigation measures to reduce these emissions to the maximum extent feasible, to include:

- Require preparation of a traffic control plan;
- Demonstrate proper inspection and maintenance of construction equipment;
- Implement a carpool program for construction workers;
- Employ a construction site manager to verify that engines are properly maintained and keep a maintenance log;
- Configure construction parking to minimize traffic interference;
- Consolidate truck deliveries when possible;
- Provide dedicated turn lanes for movement of construction trucks and equipment on and off site; 14-14
- Suspend use of all construction equipment operations during second stage smog alerts;
- Establish a staging zone for trucks that are waiting to load or unload material at the work zone in a location where diesel emissions from the trucks will have minimum impact on abutters and the general public;
- Locate construction equipment away from sensitive receptors such as fresh air intakes to buildings, air conditioners and operable windows;
- Require all diesel trucks used by construction contractor(s) at the site, or for on-road hauling of construction material, to be post-1996 models;
- Diesel portable generators less than 50 horsepower ("hp") shall not be allowed at the construction site;
- Use of hybrid and fuel efficient construction equipment and support vehicles (e.g., pick-up trucks);
- Use of grid electricity for smaller equipment such as saws, pumps, and welders;[11]

[10] Draft Count of San Diego Interim Guidelines for Determining Significance and Report Format and Content Requirements Climate Change, Dept. of Planning and Land Use, Department of Public Works, Oct. 23, 2008 - Nov. 21, 2008 (circulated for public review), available at http://www.co.san-diego.ca.us/dplu/docs/bpr/ccguidelines.pdf (Exhibit 14).

[11] Quantifying Greenhouse Gas Mitigation Measures - A Resource for Local Government to Assess Emission Reductions From Greenhouse Gas Mitigation Measures, California Air Pollution Control Officers Association, Aug.

- Reduction in vehicle miles traveled in construction crew commutes through carpooling, trip reduction, and bus service measures; and
- Use of a Heavy-Duty Off-Road Vehicle Plan to ensure compliances with construction mitigation measures (e.g., hourly meters on equipment, documenting the serial number, horsepower, manufacture age, fuel, etc. of all onsite equipment and daily logging of the operating hours of the equipment).[12]

14-14 (cont.)

VIII. THE PROJECT VIOLATES FLPMA

A. Land Use Amendment Process

The MSEP DEIR fails to make required findings under the CDCA Plan Amendment Process. In particular, the CDCA Plan Amendment Process requires that the BLM District Manager:

1. Determine if the request has been properly submitted and if any law or regulation prohibits granting the requested amendment;

2. Determine if alternative locations within the CDCA are available that would meet the applicant's needs *without requiring a change in the plan's classification*, or an amendment to any plan element;

3. Determine the environmental effects of granting and/or implementing the applicant's request;

4. Consider the economic and social impacts of granting and/or implementing the applicant's request;

5. Provide opportunities for and consideration of public comment on the proposed amendment, including input from the public and from federal, state, and local government agencies; and

6. Evaluate the effect of the proposed amendment on BLM management's desert-wide obligation to achieve and maintain a balance between resource use and resource protection.

(DEIR p. 1-7) (emphasis added).

2010, at 47, available at http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf (Exhibit 15).

[12] *Id.* at 431.

The MSEP DEIR, while it reviews possible alternative sites (DEIR p. 2-59–60), does not find whether any of these potential sites do not require a plan amendment. The CDCA Plan requires that all sites associated with power generation or transmission not identified in the 1980 Plan will be considered through the plan amendment process. If the project is approved, a plan amendment will be necessary. The CDCA already contains multiple sites where energy generation is permitted under the Plan, and where construction and operation of a photovoltaic solar energy generating facility and related infrastructure would not require amending the CDCA plan. 14-15

B. California Desert Conservation Area

The MSEP falls within an area of the CDCA classified as Class L for limited use. The BLM is required to manage Class L lands "to protect sensitive, natural, scenic, ecological, and cultural resource values . . . . [providing] for generally lower-intensity, carefully controlled multiple uses that do not significantly diminish resource values." Bureau of Land Management, The California Desert Conservation Plan 1980, as amended 13 (1999).

> The CDCA Plan establishes four multiple use classes, multiple use class guidelines, and plan elements for specific resources or activities, such as motorized vehicle access, recreation, and vegetation. The MSEP site is currently classified as Multiple Use Class L (Limited Use). Approximately 4 million acres of public lands are classified as Class L. These lands are managed to protect sensitive, natural, scenic, ecological, and cultural resource values. They provide for generally lower-intensity, carefully controlled multiple uses that do not significantly diminish resource values. *Id.*

In addition to defining the required analyses and Decision Criteria for Plan Amendments, the CDCA Plan Energy Production and Utility Corridors Element (Energy Element) provides additional guidance for the location of energy facilities and utility corridors. The Energy Element identifies nine decision criteria to be evaluated when considering locating a new energy facility within the CDCA Plan area. These criteria are as follows:

1. Minimize the number of separate ROWs by using existing ROWs as a basis for planning corridors.
2. Encourage joint use of corridors for transmission lines, canals, pipelines, and cables.
3. Provide alternative corridors to be considered during the processing of applications.
4. *Avoid sensitive resources wherever possible.*
5. *Conform to local plans whenever possible.*

6. *Consider wilderness values and be consistent with final wilderness recommendations.*
7. Complete the delivery system network.
8. Consider ongoing projects for which decisions have been made.
9. Consider corridor networks that take into account power needs and alternative fuel resources.

(DEIR p. 1-7–8) (emphasis added).

The MSEP violates the CDCA plan because it fails to avoid sensitive resources, fails to conform to local plans (in particular the ACEC and Management Plan), it is inconsistent with wilderness values and is inconsistent with wilderness recommendations (in particular the ACEC and Management Plan). 14-16

IX. THE PROJECT VIOLATES THE ESA

A. Section 7 Consultation

The BLM should issue its Final EIS only after completing Section 7 Consultation with USFWS. USFWS requires that Section 7 Consultation be completed before a FEIS is issued. U.S. Fish &Wildlife Services, National Marine Fisheries Service, Endangered Species Consultation Handbook: Procedures for Conducting Consultation and Conference Activities Under Section 7 of the Endangered Species Act 4-11 (1998). In addition, BLM is required to submit the Section 7 Biological Opinion issued as a result of a Section 7 Consultation for public comment through the NEPA process, and provide the public comments to USFWS. 50 C.F.R. § 402.14(g)(5).

Moreover, BLM should have already integrated the findings of the Section 7 Consultation with USFWS at the draft stage. 40 C.F.R. § 1502.25 states that "draft environmental impact statements . . . [shall be] integrated with environmental impact analyses . . . required by . . . the Endangered Species Act . . . ." 14-17

The MSEP DEIS implies that BLM could complete the NEPA process without including the results of the Section 7 consultation. The MSEP DEIS states that the terms and conditions issued as a result of the Section 7 Consultation process would be "identified" within the MSEP's Biological Resources Mitigation Monitoring Plan. BLM is required to integrate the results of its Section 7 consultation, not merely "identify, into the BRMMP and submit them for public comment as part of the FEIS prior to approval of the MSEP.

X. CONCLUSION

LIUNA Local Union No. 1184 believes the DEIS is wholly inadequate and requires significant revision, recirculation and review. 14-18 Moreover, LIUNA believes that the Project as proposed would result in too many unmitigated adverse impacts on the environment to be justified. Thank you for your attention to these comments. Please include this letter and all attachments hereto in the record of proceedings for this project. 14-19

Sincerely,

Gideon Kracov
Attorney for LIUNA Local Union No. 1184

EXHIBIT 1

MARISTICS
Ecological and Environmental Consulting
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Michael F. McGowan, Ph.D.
Tel: (510) 593-6345
Email: maristics@comcast.net

August 22, 2012

Jeff Childers, Project Manager
Bureau of Land Management
California Desert District
22835 Calle San Juan De Los Lagos
Moreno Valley, CA, 92553

Subject: **Comments on the McCoy Solar Energy Project Draft Plan Amendment/Environmental Impact Statement**

Dear Mr. Childers:

Thank you for the opportunity to review the May 2012 McCoy Solar Energy Project ("Project") Draft Plan Amendment/ Environmental Impact Statement (PA/EIS). Clearly a lot of work went into the preparation of this document. I have some concerns about how adequately the potential impacts to plants, animals, and habitat were described, about the proposed mitigation for impacts, and the cumulative impacts of this and other projects. The overall issue I find with the PA/EIS is that the incomplete and postponed descriptions of project impacts result in inadequate disclosure of impacts and make it impossible for a reader of the report to assess impact likelihood, severity (significance), or success of mitigation. These concerns are described in more detail below.

I am a biologist with more than 25 years' experience that includes conducting ecological research, teaching university classes in ecology, teaching post-graduate environmental management topics such as NEPA, CEQA, permitting and regulatory compliance, and I have written and reviewed parts of other EIR and EIS documents including those for solar energy development in Southern California.

These comments focus on biological impacts of ground disturbance that would occur under any of the Project alternatives except for the "no action" and "no project" alternatives. Additional

comments are provided on the sustainability of the project and on the cumulative impact of this project on the biological resources of the site and region.

Project Description: McCoy Solar, LLC (Applicant) is proposing to develop an up to 750-megawatt (MW) solar energy plant in Riverside County, California. The Draft Plan Amendment/Environmental Impact Statement, PA/EIS (BLM 2012), considers five alternatives in addition to the preferred alternative of the 750-MW solar energy plant.

The environmental impacts of the project to vegetation and wildlife include up to 4,900 acres of native vegetation and wildlife habitat affected by construction and operation and maintenance (PA/EIS Table ES-1 on p. ES-7). The native vegetation includes 7 species of plants with special conservation status that were documented to occur at the site and 34 additional special status plants with the potential to occur at the site (Table 3.3-2 on pp. 3.3-11 and 3.3-12). The wildlife potentially affected includes 16 species of animals with special status. The special status species include the desert tortoise (*Gopherus agassizii*), listed as threatened under the federal endangered species act (ESA) and the California endangered species act (CESA). Critical habitat for the desert tortoise has been defined and designated.

Comment 1: Biological Soil Crust omitted from analysis. Arid regions including the Sonoran and Mojave deserts have a unique biological element, the soil crust. This is a community of microorganisms, such as blue green algae, green algae, fungi, lichens, and mosses that inhabit the surface soil layer in arid and semiarid landscapes (J. S. States, online 2012). This soil crust habitat provides many ecosystem services including reducing erosion, binding atmospheric nitrogen for use by plants, contributing organic matter and retaining water in soils, and providing favorable sites for plant seed germination and favorable growth conditions for plants that provide forage and habitat for animals (Belknap et al. 2001). Sonoran biological soil crusts have many undescribed species of microorganisms (Nagy et al. 2005), an unknown reservoir of biodiversity. They may also provide a natural barrier to establishment of weedy annual plants. Human activity generally affects biological soil crusts to diminish their ecological functioning leading to negative effects on landscape stability, biodiversity, and biogeochemistry. Recovery of biological soil crusts may take up to 300 years so impacts to them by the Project should be considered permanent. This was acknowledged in the Supplement to the Draft Solar PEIS (BLM 2011) that stated on p. 2-53 that, "Impacts on biological soil crusts would be long term and possibly irreversible". The same document (BLM 2011) also stated (p. 2-54) that impacts to biological soil crusts would be one of the likely significant impacts of solar energy development to vegetation.

The PA/EIS on p. 3.7-10 mentions biological soil crusts as being an important factor with regard to limiting erosion. The ecological role of soil crusts is not mentioned further in Chapter 3: Affected Environment in the PA/EIS. In Chapter 4 p. 4.3-7 the PA/EIS lists as a potential indirect impact to special status plants, "disturbance of the structure and ecological functioning of biological soil crusts, which may affect seed germination, reduce soil nutrition, and render the soil vulnerable to water and wind erosion". This is the only reference to biological soil crusts; there is no further mention of them in Chapter 4 or subsequently in the PA/DEIS. The treatment of biological resources in the Draft PA/EIS is incomplete without a complete discussion of potential impacts to biological soil crusts in the project area. This discussion should include distribution maps as well as the kinds and significance of impacts to the soil crusts and the consequences of these impacts to plants, animals, hydrology, erosion, and generation of dust. Mitigation for these impacts should consider the uncertainty of restoration and the environmental consequences of a permanent change to such an important desert feature.

Comment 2. Mitigation measures are not fully described in Draft PA/DEIS. Chapter 4 of the PA/DEIS refers to mitigation measures VEG-1 through VEG-10 and states that these measures will reduce the significance of the impacts to vegetation, especially special status plant species. Several of the mitigation measures involve unwritten plans: the Biological Resources Mitigation Implementation & Monitoring Plan, the Invasive Weed Management Plan, the Special-Status Species Plant Impact Avoidance and Mitigation Plan, and several wildlife mitigation, relocation, and monitoring plans (p. 4.3-21). How can the public assess the severity of project impacts or the adequacy of measures to mitigate environmental impacts of the project if the proposed mitigation plans and measures are not available to review?

Comment 3. No Biological Opinion available to establish USFWS requirements for avoiding impacts to sensitive species such as the desert tortoise. The Draft PA/EIS states that the project will comply with all USFWS and other permit requirements. What are these requirements? How can the public review the adequacy of the requirements or the performance of the project developer in complying with these requirements? The Draft PA/EIS as written is incomplete because it does not allow the public to ascertain if impacts have been fully disclosed or will be mitigated.

Comment 4. No Streambed Alteration Agreement. The Draft PA/EIS states that the project will comply with all CDFG Streambed Alteration Agreement requirements to avoid impacts to waters of the state, including ephemeral washes. What are these requirements? How can the public review the adequacy of the requirements or the performance of the project developer in complying with these requirements? The Draft PA/EIS as written is incomplete because it does not allow the public to ascertain if impacts have been fully disclosed or will be mitigated.

Comment 5. Cumulative impacts not adequately considered. Potential cumulative impacts are presented in PA/EIS Table 4.1-1. However, their impact is quantified by acreage. This is not appropriate for impacts such as blocking wildlife movement, or disrupting habitat continuity, or affecting the continuity and functioning of ephemeral stream beds. The cumulative impact of multiple solar projects should be assessed relative to known or probable wildlife corridors and known or estimated minimum sizes of habitat patches and desirable distances between patches, and impacts on large-scale and small landscape drainage patterns. All of these factors affect biological species and their habitats.

Comment 6. Sustainability and Decommissioning. Considering that decommissioning is predicted to have similar impacts to the original construction of the project and that the solar panels will still have electricity-generating potential after 30 years, why is the life of the project only 30 years and why must it be decommissioned and removed? The mandate for alternative energy will likely still exist. Ecological restoration is uncertain so why move the impacts of a solar project to another site? The document should explain the purpose and justification for the 30 year "sunset" provision because we need sustainable sources of clean energy.

Summary Comment. In my opinion this PA/DEIS does not adequately reveal the possible impacts of the proposed project, especially with regard to biological soil crusts, specifics of the mitigation and restoration plans, and cumulative impacts to vegetation and wildlife due to fragmentation of habitats and interruptions of migratory and drainage patterns. These omissions should be corrected and the revised draft recirculated for comment.

Sincerely,

Michael F. McGowan, Ph.D.

References

Belknap, J., et al. 2001. Biological soil crusts: ecology and management. Technical Reference 1730-2. BLM/USDI/ST-01/001+1730.

Bureau of Land Management (BLM). 2011. Supplement to the Draft Programmatic Environmental Impact Statement for Solar Energy Development in Six Southwestern States. October 2011. Bureau of Land Management and U.S. Department of Energy. DES 11-49. DOE/EIS-0403D-S. 582 pp.

Bureau of Land Management (BLM). 2012. McCoy Solar Energy Project. Draft Plan Amendment and Environmental Impact Statement. May 2012. CACA #048728. DOI Control #: DES 12-21. Publication Index #: BLM/CA-ES-2012-012+1793

Nagy, M. L., Perez, A., and F. Garcia-Pichel. 2005. The prokaryotic diversity of biological soil crusts in the Sonoran Desert (Organ Pipe Cactus National Monument, AZ). FEMS Microbiology Ecology 54 (2005):233–245.

States, J. S. Commentary on Biological (Microphytic) Soil Crusts in the Rawlins Resource Management Area. http://www.voiceforthewild.org/greatdivide/states_soil.html accessed 8/20/2012.

CURRICULUM VITAE 2012

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CURRENT POSITION: Independent consultant & Principal, Maristics, Berkeley, CA . Technical reviewer of environmental studies done for government agencies. Review and comment on NEPA & CEQA documents for alternative energy development. Expert consultant for the Gerson Lehrman Group, Inc. Expert witness on sewage spill impacts to water quality.

RECENT POSITIONS: (1) Senior Project Manager, Senior Technical Advisor, and Mentor for Biology Group at ETIC Engineering, Pleasant Hill, CA; reviewed and edited vegetation and wildlife survey reports for confidential utility company client,
(2) Adjunct Professor of Environmental Management, University of San Francisco, taught post-graduate course in Environmental Permits and Compliance,
(3) Science Director, Arc Ecology, analysis and communication to the public about CERCLA remediation of Hunters Point Shipyard superfund site and reviewing NEPA/CEQA and other permits for storm water treatment, wetland mitigation, and urban development

RECENT ACTIVITIES:
- Commented on NEPA & CEQA documents for alternative energy projects (wind and solar) in Southern California.
- Provided technical expertise under an EPA grant to a community organization with regard to environmental remediation and development of a contaminated site. Prepared fact sheets on CERCLA documents and reviewed Community Involvement Plan and Supplemental EIS.
-Reviewed ecosystem modeling proposal for the SF Bay-Delta Science Program
-Presented series of lectures on heavy metals in urban gardens
- Monitored potential take of CA Threatened fish species longfin smelt during dredging by U.S. Army Corps of Engineers in San Francisco Bay. Work done under my CA Scientific Collection Permit and CA Special Endangered Species Permit
-Developed and taught a course in Permitting and Compliance for the University of San Francisco Graduate Environmental Management Program
- Prepared Biological Opinions on impacts to state threatened longfin smelt of maintenance dredging in various SF Bay harbors
-Monitored light levels in eelgrass during dredging of the San Francisco Yacht Club marina
-Reviewed green sturgeon life history and habitat requirements for NOAA Critical Habitat designation for San Francisco Bay
-Reviewed CEQA EIR for San Francisco Southeast Waterfront development.
- Reviewed CEQA EIR for Treasure Island development.
- Reviewed proposed storm water quality treatment wetland for San Francisco Airport mitigation.
- Reviewed wetland mitigation and monitoring plan for U.S. Navy at Hunters Point Shipyard. Corrected misidentification of wetland plants and shortcomings in mitigation for sensitive species impacts.

-Critiqued use of riprap to armor shorelines in San Francisco where a living shoreline could provide better connectivity between wetlands and subtidal habitat.
- Commented on Hazardous Materials chapter of EIR (CEQA) for Concord Naval Weapons Station reuse plan.
- Prepared an EA and FONSI (NEPA), including Archeological and Natural Resources and Sensitive Species, for a NASA property transfer to a city in the Central Valley.
- Commented on Section 106 (Archeological Materials) aspects of an excavation along the SF Bay shoreline.
- Managed subconsultants contributing to radiological review of Feasibility Studies for remediation of Hunters Point Shipyard.
- Prepared a proposal for wetland delineation of a golf course for the City of Alameda.
- Proposed, conducted, and reported an ecological restoration project in Richardson Bay.
- Designed sampling survey, QA/QC plan, and analyzed results of SF Bay inventory of invasive non-native Spartina.
- Commented on the DOT's Draft EA for the Suisun Bay Reserve Fleet.
- Reviewed the NOAA study evaluating the pollution of San Francisco Bay by the Suisun Bay Reserve Fleet "the mothball fleet."
- Participated with representatives from EPA, DTSC, SFBRWQCB, on the Restoration Advisory Board for Hunters Point Shipyard.
- Prepared a technical report for the SF Mayor's Citizens Advisory Committee on hazards of construction dust containing naturally occurring asbestos and evaluated the adequacy of the monitoring of asbestos dust and particulate matter.

EDUCATION:

Institution	Degree	Years	Scientific Field
CIMAS, Univ. Miami	Postdoctoral	1985, 1986	Fisheries Oceanography
RSMAS, Univ.Miami	Ph.D.	1985	Biological Oceanography
SFSU	M.A.	1984	Marine Biology
SFSU	B.A.	1977	Biology

PROFESSIONAL DEVELOPMENT COURSES:
Department of Defense Environmental Data Quality Management 2012
Salmonid spawning habitat restoration, American Fisheries Society continuing education 2012
Safety training: root cause analysis and safe performance self-assessment 2012
CPR, First Aid, and Electro-defibrillator training 2012, current until 2014
HAZWOPER 40 hour training 2012
Advanced Wetlands Determination and Delineation using Arid West and Coast and Mountains Supplements to USACE 1987, RTC/SFSU 2011
Enhancing Program Performance with Logic Models, University of Wisconsin Extension 2011
Project Management 2008
Environmental 101, Science Related to Military Base Cleanup, US Navy 2007
Wetlands Determination & Delineation 40 hr Certification, RTC/SFSU, 2007
NEPA Policy and Implementation, TetraTech, S.F. 2003
Natural Resources Regulations and Permitting TetraTech, S.F., 2003
Coastal Management for Practitioners: Designing and Conducting a Collaborative Process, National Oceanic and Atmospheric Administration, 2001

Ecological Risk Assessment, U.C. Berkeley Extension, 1998
Instream Flow Incremental Methodology, U.S.G.S. Biol. Res. Division, 1998
Restoration Planning, New Academy for Ecological Restoration, 1997
Improving Wildlife Habitat through Restoration, New Academy for Ecological Restoration, 1997
Expert Witness Seminar, American Fisheries Society, 1996
Guidelines for Ecotoxicological Risk Assessment, CalEPA, U.C. Davis, 1995
CEQA/NEPA, EIR's and Land Use Planning, Merritt College; 1994
Managing and Communications, College of Marin; 1993
How to get things done through difficult employees, College of Marin; 1993
Professional Writers Workshop, University of Miami; 1988.
Ecosystem Ecology, Marine Biological Laboratory, Woods Hole; 1978.
Biology of Marine Mammals, UC Berkeley Extension, 1978

PROFESSIONAL EXPERIENCE:

2004 - present	Principal Ecologist/Environmental Consultant, Maristics, Berkeley
2011 - 2012	Senior Project Manager, ETIC Engineering Inc. Pleasant Hill CA
2010-2011	Adjunct Professor of Environmental Management, University of San Francisco
2007-Nov 2011	Scientist, Arc Ecology, San Francisco, CA
2003-2004	Ecologist, NASA Ames Research Center
2002-2003	Ecologist, PAI, Incorporated
2002 Autumn	Adjunct Professor of Biology (Oceanography), University of San Francisco
1999-2003	Adjunct Professor of Biology (Bio.Oceangr., Fishery Ecol.), SFSU
1994-2003	Senior Research Scientist, RTC, SFSU
1997	Principal Environmental Scientist, Montgomery Watson Americas
1994-1996	Senior Fisheries Ecologist, Garcia and Associates
1992-1993	Marine Ecologist, California Coastal Commission
1986-1991	Research Assistant Professor, RSMAS, Univ. Miami
1985-1986	Postdoctoral Fellow, CIMAS, NOAA/Univ. Miami
1980-1985	Fisheries Biologist, National Marine Fisheries Service
1979	Zoologist, U.S. Geological Survey, Menlo Park

RESEARCH INTERESTS:
Ecological research and environmental management in marine, estuarine, terrestrial, and freshwater habitats.
Fishes and their environment.
Environmental restoration and sustainable use of natural resources.
Ichthyoplankton taxonomy, ontogeny, and ecology.
Quantitative assessments, monitoring, and objective criteria for ecological restoration.
Applications of technology to biology: remote sensing, telemetry, and artificial intelligence.

HONORS AND AWARDS:
Appointed to the Bay Area Air Quality Management District (BAAQMD) Hearing Board as Public Representative Alternate 2011-2012.
Wastewater Enterprise Certificate of Recognition from the San Francisco Public Utilities Commission for contributions to the Southeast Digester Task Force June 2, 2010.

Invited speaker on Monitoring for Water Quality TMDL's at Environmental Justice Water Coalition Workshop October 2007.
Conducted "the most comprehensive site-specific account of (San Francisco) Bay fishes ever completed," NOAA Independent Peer Review Panel comment on URS Corporation study for San Francisco Airport Runway Project.
Conservationist of the Year 1999, San Francisco Tyee Club
NOAA Postdoctoral Fellowship, CIMAS, University of Miami, 1985, 1986
U.S. Department of Commerce (NMFS) Outstanding Performance Awards, 1983, 1984
Reitmeister Fellowship, Rosenstiel School of Marine and Atmospheric Science, 1983
Maytag Fellowship, Rosenstiel School of Marine and Atmospheric Science, 1980, 1981, 1982
President, Marine Science Graduate Student Assoc., RSMAS, Univ. Miami. 1981.
Noyes Scholarship (MBL Woods Hole) 1978
Honorable Mention, NSF Graduate Fellowship 1977
National Merit Scholarship 1965
Denis J. O'Connell H.S. Athletic Hall of Fame
US Masters Diving National Champion Platform Diving 2010

AUTHOR of 26 publications in scientific journals and books plus more than 50 technical reports, abstracts, and presentations at professional meetings.

CONTRACTS and RESEARCH GRANTS completed for:

- San Francisco Baykeeper
- Environmental Cost Management, Costa Mesa CA
- U.S. Army Corps of Engineers
- Salt River Construction Company
- Bay Planning Coalition
- Larkspur Lagoon Homeowners Association
- Invasive Spartina Project
- California Coastal Conservancy
- CalFed Bay Delta Program
- URS Corporation
- National Oceanographic and Atmospheric Administration
- National Audubon Society
- California Wildlife Foundation
- Friends of San Francisco Recreation and Park Department
- Allen Foundation (Tiburon, CA)
- Marin County Fish and Wildlife Advisory Committee
- California Dept. of Boating and Waterways
- Tomales Bay Association
- U.S. National Park Service
- San Francisco Public Utilities Commission

COLLABORATIONS:
Scott Cashen, Walnut Creek, CA
Doug Demko, Fishbio, Oakton, CA
Ellen Johnck, Bay Planning Coalition
Michael Donnelly, U.S. Army Corps of Engineers, San Francisco, CA

Zach Cohen, Salt River Construction Co., Tiburon, CA
Leslie Lundgren, CH2MHill
Mark Ripperda, USEPA
Tom Lanphar, DTSC/CalEPA
Erich Simon, SFBay Regional Water Quality Control Board
Amy Brownell, SF Dept. of Public Health
Keith Forman, US Navy, Remedial Program Manager, Hunters Point Shipyard
David Woodbury, NOAA Fisheries, Santa Rosa
Natalie Cosentino-Manning, NOAA Restoration Program, Santa Rosa
Mondy Lariz, California Trout, San Francisco Lake Merced Program
Michele Pearson, Executive Director, Tiburon Audubon Center
Katy Zaremba & Peggy Olofson, Invasive Spartina Project, SF Bay
Dr. Sarah Allen, National Park Service, Pt. Reyes Seashore
Dr. Patrick Baker, University of Florida
Dr. Ted Grosholz, UC Davis
Dr. Paul Olin, UC Coop. Extension/ Sea Grant
Dr. Chris Kitting, CSU Hayward
Dr. Richard Mooi, Cal. Academy of Sciences
Dr. William Cochlan, SFSU/RTC
Dr. Richard Dugdale, SFSU/RTC
Dr. Steve Obrebski, SFSU/RTC (retired)
Dr. Tom Niesen, SFSU Biology (retired)
Tom Moore, California Department of Fish and Game
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EXHIBIT 2

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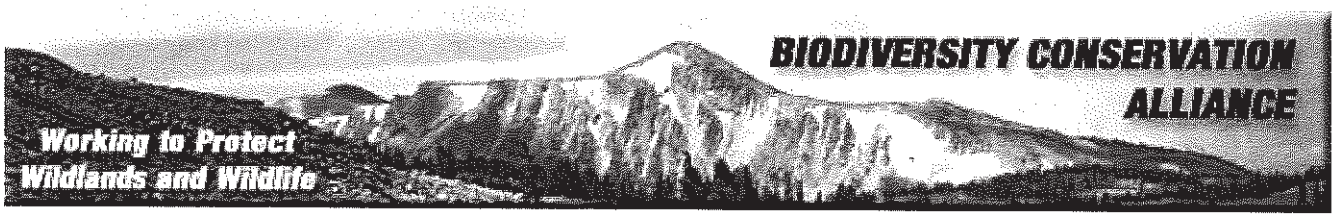

BACK

Commentary on Biological (Microphytic) Soil Crusts in the Rawlins Resource Management Area

HOME

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Introduction: The Scoping comments on biological soil crusts submitted below review their biological attributes, ecological roles and distribution within the boundaries of the Great Divide Basin and other lands of the BLM Rawlins Resource Management Area. Comments have been directed to the existing and potential adverse impacts of human related activities within the management area and their potential long-term consequences. The report concludes with management recommendations for assessment, mitigation, and monitoring.

Definition of Biological Soil Crusts.

Communities of microorganisms, predominantly cyanobacteria (blue green algae), green algae, filamentous fungi, lichens, and non-vascular plants (mosses), inhabit the surface soil layer in arid and semiarid landscapes throughout the world. These biological soil crusts (**BSC**), also known as cryptogamic, microbiotic, or microphytic crusts, consist of water-stable aggregations of soil particles, primarily silt and clay, held together by the vegetative bodies and adhesive properties of the colonizing organisms (1). Limited annual precipitation facilitates BSC development. Therefore BSC communities are found worldwide either within areas inhospitable to vascular plant growth or where plants are slow to establish and are marginally productive having sparse canopies and widely spaced individuals.

In the initial stage of development BSC are *smooth* in contour, often appearing as fragile, wafer-thin aggregations of surface soil particles. They are formed by the binding action of bluegreen algae, green algae and fungi. Soil erosion at the margins of crust colonies results in other crust forms (morphologies): *rough*, with markedly roughened surfaces; *rolling*, where they become evenly mounded; and *pinnacled*, pedicelate mounds that can be up to 15 cm high (1, 5). A predictable succession of algae and fungi, then lichens and finally mosses inhabit the crusts as they mature and become stabilized. Crust thickness and biological composition can often be used as indication of BSC age. Apart from human related disturbances, the rate at which crusts develop is strongly influenced by climatic factors and soil conditions. Whereas soil factors greatly influence vegetation structure and composition, the vegetation likewise influences the type and extent of crust development. As measured by observations of recovery following disturbance the time required for BSC to reach maturity ranges widely from 2 years in cool deserts to over 300 years in extreme deserts (2).

Ecological benefits: role in maintaining vegetation, watershed integrity and soils.

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By virtue of numerous scientific studies, BSC are regarded as important components of healthy arid and semiarid landscapes because they perform an essential role in maintaining vegetation, soil, and watershed integrity (3,10). Healthy landscapes have been defined as those with little or no evidence of active erosion, and the ability to support a diverse BSC and vascular plant cover. Perhaps the greatest asset of BSC to the fragile habitats in which they occur is the reduction of the erosive effects of wind and water (4, 7). It should be noted however that soil stabilization is not realized in dune areas where the sand content exceeds 80% and the soils are not frost-heaved (16). Human caused desertification processes have dramatically increased dune landscapes to the detriment of BSC communities on a worldwide scale (1).

Because semi-arid soils, like those of the Rawlins RMA, are generally nitrogen limited, BSC can be important sources of nitrogen for vascular plant growth. Crust-dwelling blue-green algae are capable of binding atmospheric nitrogen in a form available to and quickly utilized by plants and plant seedlings (12). Plant growth and establishment is also benefited in stable soil crust areas by their facilitation of flow and retention of water in the underlying soil (3). Crustal organisms contribute as much as 2 kilograms of organic matter per hectare which retains water against gravitational loss and also binds significant amounts of mineral nutrients needed for vascular plant growth. BSC enhance seed entrapment and provide favorable sites for the establishment of plant seedlings. The provision of suitable growth conditions for plants indirectly contributes to the long-term stability and production of animal forage in arid and semiarid landscapes (1). Another, but less studied benefit is the role of BSC as a natural barrier to the establishment of weedy annual species, like Cheat grass (11).

Distribution and habitats of soil-crust communities

The greatest development of biological crusts in Western North America is associated with the semiarid shrublands of the Great Basin. These soil crusts, heavily dominated by lichens and mosses, occur extensively over the entire region. They have been found to cover 80% or more of the soil surface in the absence of vascular plants (9). In both shrublands and woodlands, soil crusts occupy the interspaces between plants or beneath sparse canopies where sunlight, essential for crust growth, is available. Pinnacled crusts are more common in sagebrush steppe dominated by sagebrush species, and in coniferous woodlands with juniper and pine species. Rough crusts are typical of semi-desert shrublands with greasewood and shadscale/saltbush species as principal shrubs. Smooth crusts are typical of the mostly barren playas and the initial stages of crust succession in dunes (1).

Analysis of Wyoming soil crusts, distribution, condition, and trends

To date, assessment and monitoring of biological soil crusts in Wyoming has been largely neglected by both the scientific community and land resource managers. A recent survey of soil crusts in Wyoming showed them to be similar in morphology to those found in the sagebrush steppes of Utah, but not in composition. Well-developed crust cover was documented only in areas free from local grazing disturbances. Comparison of the prevalent crust species by presence and commonness in undisturbed and disturbed sites revealed both quantitative and qualitative decrease in diversity and abundance in the disturbed site (13, 14).

I conducted a cursory survey of biological soil crusts within the Great Divide Resource Area (GDRA), and verified the widespread presence of biological soil crusts. Crust composition and cover was inventoried in numerous sites in the following areas: a 50 mile transect through the Great Divide basin parallel to WY Highway 789; a 36 mile transect through BLM checkerboard lands parallel to Interstate 80; a 34 mile transect along US Highway 287 between Lamont and Rawlins; and various transect segments in the Ferris,

Laramie, Seminoe, and Shirley mountains, Shirley basin, and the upper north Platte River valley (States 2002. See APPENDIX for survey documentation).

As is typical of all grasslands bordering the eastern slopes of the Rocky Mountain front ranges, crust presence and cover in the eastern half of the GDRA (in Converse, Albany, Laramie and parts of Natrona counties) was sparse and often absent in areas of high cover vegetation. The greatest density and diversity was confined mostly to exposed ridges and escarpments. Bryophyte crusts were the most common indicating historical stability but limited tolerance to recent disturbances. Extensive soil crust destruction was observed in disturbed sites, highlighting the need for assessment disturbance factors.

In the western half of GDRA (Carbon, Sweetwater, Fremont and parts of Natrona counties) shrublands and woodland vegetation replace grasslands. Wyoming big sagebrush is the most abundant shrub and occurs in a vast mosaic intermixed with other species of sagebrush, greasewood, shadscale and juniper. Although soil crusts are widely distributed throughout these rangelands, they are only locally abundant and are often discontinuous as small fragmented patches harbored beneath shrub canopies. Crusts were also fairly abundant in a few management exclosures that had not been breached by livestock in recent years. Again a preponderance of bryophyte crusts was indicative of past crust stability and maturity but their current condition reflects a long history of disturbance continuing up to the present. On the basis of BSC survey results from analogous sagebrush steppe and desert shrubland areas in Idaho and Utah (9), the relative abundance and diversity of soil crusts were found to be considerably lower than expected. Of the 60 sites selected for soil crust inventory, few were free from disturbance impacts (see Appendix for photographic illustrations of crust disturbance).

Disturbance factors and soil crust recovery potential.

Likely causes for soil crust disturbance observed in the GDRA survey:

- Trampling by domestic livestock and ungulate wildlife species (e.g. antelope, wild horses)
- Mineral Resource Industry activities (seismic exploration, oil & gas development, coalbed methane development)
- Recreation activities (ORV/vehicle trampling, hiker trampling)
- Invasive weeds and agricultural crops (decades of encroachment)
- Rodents and other soil dwelling/digging animals (minimal area affected)
- Fire (appears to be particularly damaging in shrub communities; less in grasslands)
- Climatological events (e.g. Extreme drought, soil erosion and burial of crusts esp. in dunes)
- Chemical spills and other biogeochemical changes (potential impacts by airborne pollutants)

The highly degraded condition of soil crusts in the GDRA is indicative of the dire need for additional investigation, mapping and assessment. Human activities, particularly land-use by the mineral resource industry, livestock grazing and agriculture with associated introduction of crop and invasive plants, and recreation have been and will undoubtedly be major contributors to (1) decrease in BSC density/abundance, (2) alteration of crust species composition and (3) diminution of their ecological role. Collectively, this will have a direct effect on the stability, biodiversity, and biogeochemistry of the landscapes where they are found (4, 2). Recovery from long-term disturbance has been documented, but it may require protection for many years, depending on climate, soil type, and severity of disturbance (2). Additionally, timing and intensity of disturbance impacts will, to a large degree, dictate the success of restoration efforts.

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Management of biological soil crusts.

There is good evidence that BSC will recover if given the opportunity (2). Recommendations and guidelines for the management of landscapes containing BSC have been documented in a recent BLM publication (18). Of great significance is the fact that many of the same factors that threaten crust survival and ecosystem functioning are also common to the shrubs, particularly sagebrush, in shared habitats. For the most part management strategies developed for shrublands, including assessment, monitoring, and mitigation protocols, are also applicable to biological soil crusts. BLM studies in sagebrush steppe in Idaho indicate a strong correlation between the Biological Soil Crust Stability Index (BSCSI) and the health of sagebrush steppe (10). Unfortunately there has been only minimal testing of this model but its further refinement and application is urgently needed (see recommendations). The urgent need for improved management of Wyoming's 50,000 square miles of sagebrush was succinctly expressed in a editorial by Tom Reed in Wyoming Wildlife, the official publication of the Wyoming Game and Fish Commission: "Many sagebrush stands are imperiled. Drought, oil and gas development; overgrazing by livestock, feral horses, and wildlife; conversion of sagebrush grasslands to monocultures of grass and weeds; and ORV use are all having significant impacts on the State's sagebrush communities." (17).

Sagebrush steppe, a dominant feature of the Wyoming landscape for thousands of years, has been shown to be sensitive to disturbance by animal and vehicular trampling, the effects of which are still visible on the landscape from decades past. Historic trampling by grazing animals may be responsible for the observed decline in the associated biological crusts today (8). Careful study is needed in this area since some range managers refute the scientific evidence given for the beneficial role of soil crusts (19). They assert with counterarguments that intensive cattle grazing and associated trampling serves to destroy crusts which have been retarding the advance of the whole community for thousands of years. However, this is not likely to be the case since the ecological benefits of BSC and the detrimental impacts of livestock trampling to those benefits has been documented and validated in many scientifically reliable laboratory and field studies around the world (7).

Need for GDRA management objectives to address the deterioration in quality of rangelands containing biological soil crusts.

In a careful review of the GDRA RMP (15) no evidence was found to indicate the recognition of, or concern for, the extent and degree to which activities of the mineral extraction industry might have on BSC and associated soils and vegetation. Although concerns and management recommendations are available in BLM publications (18), there were no management objectives or mitigation guidelines pertaining to soil crust disturbance set forth in either the RMP or any recent POD (e.g. Cow Creek, Blue Sky, Sun Dog) issued for the GDRA. To the contrary, general management objectives of the GRDA- RMP (15) focus on providing habitat quality for wildlife species in specially designated high priority habitats at the expense of the vegetative condition and ecological quality in habitats of lower priority. The rationale given for this approach is simply stated as follows: "because lower priority habitats have less wildlife and vegetative diversity, they can be subjected to the disturbances of multiple, conflicting uses more readily without sustaining significant adverse impacts to wildlife." This may well be the case for immediate or short-term responses to most land-use impacts. However, considering the present condition of habitats in moderate and low priority categories, cumulative long-term effects have led to potentially serious degradation of soil and vegetation resources throughout the GDRA. All habitat types containing biological crusts are presently classified as either moderate priority (sagebrush steppe, and woodlands) or low priority (saltbush steppe, greasewood,

badlands, and sand dunes). Given the current state of degradation, it appears that resource managers have not been able to achieve the stated general management objectives for these habitats under the existing management guidelines (15).

Identification of assessment, mitigation and monitoring needs for BSC habitat improvement and management to be included as requirements in the RMP revision.

Assessment of the cumulative long-term effects of extractive industry impacts on BSC should be prescribed in the RMP revision. Long term monitoring is required to assess rangeland health relative to the ecological roles fulfilled by BSC communities. Monitoring has been used to assess impacts of specific land uses, to measure recovery, and to determine "normal" background variation and "functional potential" of BSC in the absence of disturbance (11). BSC, particularly the lichen component, have been successfully used to monitor biodiversity and ecosystem function and health in grasslands and sagebrush steppes similar to those found in the GDRA (10). Monitoring with morphological crust groups has been shown to be an effective approach in measuring both biological crust condition and that of associated vegetation (3). Soil crusts can be evaluated using standard or slightly modified rangeland assessment techniques, including line-intercept, line-point, and quadrat based methods (11).

Conduct detailed surveys and mapping of critical resource areas. Remote sensing technologies used to map soil crust distribution have been developed but additional research is needed to refine the methodology (6). Both ground based and aerial photography was useful in this paper to identify areas of disturbance attributable to gas and coalbed methane seismic exploration (See Appendix). Ground validation of aerial photography will be necessary for accurate analysis of the visual impacts.

Analyses of the environmental impacts on biological soil crusts should be required of all development projects including but not limited to right-of-ways, coal, oil, gas and seismic exploration permits, and permits to drill and test.

BSC should be used to monitor biodiversity and ecosystem function and health in grasslands and sagebrush steppes of the GDRA The potential for the BSCSI to serve as an area-wide management indicator should be explored with the objective of establishing response benchmarks on which to base mitigation actions

Recommended mitigation actions (based on literature sources and personal observation)

1. Establish management objectives and mitigation guidelines to reduce the cumulative effects and disturbance footprints of energy development on BSC:
    - require lighter impact alternatives to seismic exploration and eliminate thumper-trucks in the fragile BSC areas.
    - close and restore the unused energy exploration corridors to pre-disturbance conditions and limit grazing disturbance to wildlife use until recovery is achieved.
    - reduce the amount of land that will be trampled, scraped and impacted with roads and drill pads (i.e. employ directional drilling technology)
2. Develop and implement long-term monitoring protocols for the restoration of soil crust communities
    - adapt/refine monitoring protocols, in particular the Biological Soil Crust Stability Index, for evaluation of existing BSC condition. When used in conjunction with corresponding measures of landscape stability, biotic integrity, and watershed function, the BSCSI can be used to help

determine the relative health of grassland and sagebrush communities.

3. Implement livestock management strategies to reduce disturbance in areas where BSC represent 15% or more of the ground cover. :
    - locate livestock watering and salt supplements on sites with low crust potential
    - disperse livestock supplements throughout the grazing area
    - limit livestock numbers, the site specific levels to be determined under the following range conditions: (1) areas of coarse grained or sandy soils with low water holding capacity (2) periods of low water availability (low annual precipitation and drought prone areas. Winter grazing reduces impacts to soil crusts when snow covered and has also been shown to be beneficial to vascular plant communities), (3) steep slopes, ridges and escarpments, (4) areas recovering from natural disturbance such as drought and fire.
4. Confine recreational vehicles and uses to designated roads, trails and campsites. Encourage low-density use in sensitive areas. Promote late fall or winter use by hikers, backpackers and animal packers. Provide educational opportunities and information on the importance and value of biological crusts.
5. Identify, map and protect from human related disturbances any remaining areas (refugia) where BSC represent 50% or more of the total ground cover (These are unlikely to represent more than 0.1% of the GRDA). This action provides for the conservation and recovery of naturally occurring BSC that can then serve as ecological reference sites for evaluation of responses to mitigation and monitoring activities. Although it is feasible to restore crusts by inoculating disturbed areas with crust layers salvaged and stored prior to disturbance projects, it is much easier and cheaper to conserve existing BSC.

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APPENDIX

COMMENTARY ON BIOLOGICAL (MICROPHYTIC) SOIL CRUSTS IN THE RAWLINS RESOURCE MANAGEMENT AREA

Dr. Jack States

I. Map: Location of BSC inventory sites within the Great Divide Resource Area

II. Photo illustrations of damage to sagebrush steppe caused by seismic exploration

III. Aerial photograph of seismic exploration lines visible on a sagebrush landscape

IV. Photo illustrations of pedicelled BSC in sites within the GDRA (1 page)

V. Photo illustrations of BSC in disturbed sites within the GDRA (5 pages)

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EXHIBIT 3

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The prokaryotic diversity of biological soil crusts in the Sonoran Desert (Organ Pipe Cactus National Monument, AZ)

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Abstract

We studied prokaryotic community structure and composition in biological soil crusts (BSCs) from the Sonoran Desert, and their variability over space and time, using statistically analyzed, PCR-based molecular surveys of environmental 16S rRNA genes. Four sites, tens of km apart, were sampled, 3 times over a 1 year period, collecting 10 duplicate samples every 50 m in each site. Denaturing gradient gel electrophoresis (DGGE) revealed communities much less diverse than those of typical soil assemblages, displaying dominance of some bacterial types. No differences in crust microbial diversity or composition were detected between crusts under plant canopies and those in plant interspaces, indicating a likely crust independence from higher plant resources. However, statistically significant variability with space and time could be detected, and samples within a site were more similar than samples between sites. Both temporal and spatial variability in community composition involved non-dominant members of the community. Extensive sequencing and phylogenetic analysis revealed a large array of bacterial types, many novel. The most common included members of Cyanobacteria, Proteobacteria, Actinobacteria and Acidobacteria. Bacteriodetes, Chloroflexi and Gemmatimonadetes were not seen in high numbers, but were present in all sites, and Deinococci were also detected. Archaea were present, but as minor components. Sonoran BSC communities were distinct in rough compositional character from those in bulk arid soils or agricultural soils, and contained reoccurring, uncultured microbes.
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Keywords: Biological soil crusts; Denaturing gradient gel electrophoresis; Real-time PCR; Non-metric multidimensional scaling; Rarefaction analysis; Cyanobacteria

1. Introduction

Biological soil crusts (BSCs) are complex, spatially organized macroscopic associations of microorganisms, lichens and sometimes mosses, located on topsoils in many geographic and climatic soil environments; they are restricted, however, to areas where the environment limits the growth of higher plants to the extent that litter accumulation does not prevent the soil surface from being illuminated [1]. They form in plant interspaces and under plant canopies. BSCs stabilize the soil against erosion [2,3] and are key in nutrient import [4,5]. Bacteria are important components in BSCs, with cyanobacteria typically being the founders and dominant primary producers, largely responsible for both carbon and nitrogen inputs.

The composition of primary producers (cyanobacteria and microalgae) in BSCs has been studied with traditional cultivation-dependent and microscopy methods in a variety of localities [2,6–9]. Recently, polyphasic and molecular studies of crust cyanobacteria have also been presented [10,11]. A few studies have described bacteria directly associated with BSCs [11–13], but no single, exhaustive study of their bacterial components has yet

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been conducted [1]. Thus, little is known about the diversity of non-phototrophic bacterial groups directly associated with BSCs, or about their geographical and climatic variability in arid regions. Nothing is known about the abundance and contributions of Archaea, even though they are known components of other soil systems [14,15].

The fertility island hypothesis, one of the oldest and most widely accepted theories in desert ecology, states that microbial community structure in the soil and the biogeochemical transformations associated with it are dependent on the proximity to higher plants, usually sparse in arid environments [16]. This fact has found support in studies by Herman et al. [17] in Chihuahuan desert soils and Aguilera et al. [18] in Chilean arid soils. Community composition in arid grassland soils varies with depth in the soil profile (0–30 cm; [13]), and variations have been detected in geographically distinct arid soils [19]. In the case of BSCs, shifts in community composition occur at the small vertical scale (stratification), particularly within the top 1 cm [12], and soil chemical composition can affect the composition of cyanobacteria [10]. However, geographic, climatic or other factors, including proximity to plants have not been addressed. In fact, it is plausible that the island hypothesis does not apply to BSCs, since they are independent of plant-bound resources for at least carbon and nitrogen inputs, and can be considered themselves as "mantles of fertility".

We analyzed the prokaryotic community structure of typical BSCs from the Sonoran Desert in a diversity of soil settings, over space and time, by sampling select transects in Organ Pipe Cactus National Monument located in the Sonoran Desert of Arizona. This region is one of the hottest and most arid desert regions in the United States, with mean annual temperature ranges of 15–24 °C and receiving only 75–255 mm of average annual rainfall [20]. Prokaryotic communities were analyzed from environmental nucleic acid extracts using denaturing gradient gel electrophoresis (DGGE) separation of PCR amplified 16S rDNA gene fragments. Nonmetric Multidimensional Scaling (NMDS) was used to address sample variability in time and space, as well as the influence of higher plant proximity. Direct sequencing from DGGE bands, phylogenetic analyses and statistical analyses were used to address the species composition, proportion and estimated population in BSCs. Real-time PCR analysis was used as an additional detection and estimation of Archaea.

2. Materials and methods

2.1. Site selection, description and sampling

Four sites were chosen based on accessibility, variability in soil type and visual observation of BSC development. These sites will be referred to as Bates Well Road (BWR), Camino de Dos Repúblicas (CDR), Puerto Blanco Drive (PBD), and Quitobaquito (QBQ). BWR was sampled at three time points: November 2002 (Time 1), April 2003 (Time 2), and October 2003 (Time 3). The other three sites were sampled at times 2 and 3 only.

Site BWR (32°12.044′ N latitude and 112°4.123′ W longitude) was flat to gently sloping and contained "hyperthermic arid 6" soil, according to the classification of Jay et al. [21]. Vegetation was sparse with some creosote bush (*Larrea tridentata*) and Prickly pear (*Opuntia* spp.) present. BSCs were inconspicuous and mostly flat in plant interspaces, with some pedicelled (displaying somewhat convoluted surface microtopography) crusts under small plant canopies. They were light in color, with *Peltula* spp. (containing cyanobacteria as symbionts) as the only lichen present. During time point 2, but not at other sampling times, a significant cover of short grasses was also present.

The CDR site (31°53.322′ N latitude and 112°54.136′ W longitude) had "hyperthermic arid type 4" soils [21], and contained extensive areas of desert pavement (gravel sized rocks mixed with sand as topsoil feature), which locally excluded BSCs. Most crusts here were in close proximity to plants (*Larrea tridentata* and *Opuntia* spp.), with hardly any annual grasses present. BSCs were visually similar to those at BWR. No lichens were apparent in soil samples.

The PBD site (31°56.359′ N; 112°59.602′ W) was gently sloping, on "hyperthermic arid type 4" soils [21]. There was little visual difference between the two time periods sampled. BSCs were well developed both under plants and in interspaces, pedicelled and contained dark areas, due to an abundance of sunscreen-bearing cyanobacteria and cyanolichens. The lichens *Placidium lacinulatum*, *Peltula* spp., and *Collema coccophorum* were identified here. *Larrea tridentata* and *Opuntia* spp. were present, with hardly any annual grasses.

The QBQ site (31°56.534′ N; 113°01.192′ W) contained soils classified as "hyperthermic arid type 4" [21]. The uppermost surface was very fine-grained and whitish in color, due to the presence of evaporitic salt deposits originating from waters in nearby Quitobaquito springs. BSCs here were highly pedicelled, with a large presence of black and orange colored lichens and mosses (*Peltula* spp., *Peltula peltulata*, *Placidium* spp., and *Collema coccophorum* were identified). Cholla (*Opuntia* spp.) cacti were common, in addition to prickly pear and creosote, and there were no noticeable differences in vegetation cover between sampling times.

Sampling for each site and time was done with 5 cm diameter Petri dishes; the deeper end of the dish was pushed onto the BSC, previously wetted with filter-purified water, to capture the topsoil. The sample was then displaced using a trowel and secured with a dish cover.

This allowed for intact collection of the crust, approximately 1–2 cm of topsoil. Samples were dehydrated before storage to prevent microbial activity after collection, sealed with tape and placed in individual plastic zip-lock bags, to prevent cross-sample contamination. For each site and time a total of 20 sample plates were taken along a linear transect covering 500 m, consisting of 10, 50 m-distant sampling points. Each point was sampled in duplicate. All samples were coded with GPS, transect position and qualitative proximity to plants ("under plant" or "interspace"). Bulk soil samples (1–10 cm deep) for soil chemical analysis were also taken at each site. Samples were stored dry until analysis.

2.2. BSC community DNA extraction and PCR amplification

The DNA in approximately 1 g of vertically sliced soil from each 1–2 cm deep sample was extracted using a MoBio soil DNA kit (MoBio Laboratories Inc., Solano Beach, CA, USA). Extracted DNA was quantified on a 1% agarose gel with TAE buffer base, by comparison with Bio-Rad EZ Load precision molecular mass ruler (Bio-Rad Laboratories, Hercules, CA, USA). Agarose gels were stained with ethidium bromide, then visualized and quantified with a Bio-Rad Fluor-S MultiImager system and Quantity One 4.2.1 (Bio-Rad Laboratories, Hercules, CA, USA). All DNA extracts were stored at −80 °C.

PCR amplification specific for ca. 590 bp-long 16S rRNA gene fragments from the heterogenous bacterial community extract was done using a (GC-clamped) forward primer BAC GM5F(GC) and a reverse primer BAC 907R, universal for the domain Bacteria [22]. For Archaea, forward primer ARCH 931F and reverse (GC clamped) primer UNIV 1392R (GC) were used for amplification of a ca. 460 bp-long 16S rRNA gene fragments [23]. Between 5 and 10 ng of environmental DNA template were used for PCR. For primers GM5F(GC) and 907R, the thermal cycling program from Wade and Garcia Pichel [24] was used. For primer pair 931F/1392(GC)R, 26 cycles of the following were run; 95 °C for 45 s (denaturation), 56 °C for 45 s (annealing) and 72 °C for 45 s (extension), and lastly 1 cycle of 72 °C for 7 min (final extension). All reactions were done in a Bio-Rad iCycler thermal cycler (Bio-Rad Laboratories, Hercules, CA, USA) and began with denaturation at 95 °C (hot start) for 5 min (bacteria) and 2 min (archaea) with the addition of 2.5 units of Takara Ex Taq DNA polymerase (PanVera Corporation, Madison, WI, USA) to each reaction at 80 °C. Each 100 μL reaction contained the following: 10 μL of 10× Takara Ex Taq DNA polymerase, 8 μL of Takara dNTP mixture (2.5 mM each), 50 pmol of each primer (synthesized by Operon Technologies, Inc., Alameda, CA, USA), 200 μg of bovine serum albumin (BSA, PanVera), 20 μL of 5× Eppendorf TaqMaster PCR-enhancer (Brinkmann Instruments, Inc., Westbury, NY, USA), and 5–10 ng of template DNA. Quantification of products was done as described for DNA extracts.

2.3. Denaturing gradient gel electrophoresis fingerprinting procedures and analysis

For each sample, 350 ng of PCR product was used in DGGE analysis. The DGGE protocol followed that of Muyzer [25]. Bacterial DGGE gels were constructed with a 30–50% denaturant gradient (80% denaturant consisting of 48 ml of formamide and 50.4 g of urea). Archaeal DGGE gels were constructed with a gradient of 30–80%. All DGGE gels were run at 60 °C, at 200 V, for 4 h in a Bio-Rad DCODE universal mutation detection system (Bio-Rad Laboratories, Hercules, CA, USA). The gels were stained with ethidium bromide and de-stained with nanopure water. Imaging and gel documentation was the same as in agarose gel procedures, and relative intensities of bands were quantified with Quantity One image analyses software. To insure the standard quantification among different gels the same detection sensitivity was used. For PCR amplification of specific alleles, bands were excised from gels with a sterile scalpel and placed in 10% Tris-buffer solution for elution of DNA. Multiple bands in the same gradient line were excised for sequence comparison. The solution (1 μL) was then used for PCR with non-GC clamped primers for bacteria (BAC GM5F and BAC 907R) or Archaea (ARCH 931F and UNIV 1392R), using the thermocycling program above.

DGGE standards were prepared using 16S rRNA fragments three bacterial isolates that had been cultivated from the Colorado Plateau. The standards had been chosen to separate consistently at a given percentage of denaturant and their combination made a useful ladder. These standards were used to align DGGE fingerprint images. Initially, a set of 10 sample duplicates were run to confirm identical sample fingerprints and eliminate any technical variability. Separate DGGE gels were run loaded with samples from each of the 4 sites to allow for direct intra-site comparison. Comparative gels were run with selected samples from each site to allow for inter-site or time-course comparisons.

2.4. Sequencing and phylogenetic analysis

PCR products were purified using the Qiagen PCR Purification kit (Qiagen Sciences, MD, USA) and 100 ng of purified product was used for sequencing. All sequencing was performed commercially with an ABI prism 377 DNA sequencer (Applied Biosystems,

Foster City, CA, USA). Both forward and reverse sequences were obtained and a consensus sequence was determined using the program Sequence Navigator (Applied Biosystems, Foster City, CA, USA). No chimeras were found when sequences were checked with Bellerophon [27]. Clustal W was used to align sequences in ARB [26], where phylogenetic reconstructions were performed by inserting band sequences into base trees previously constructed with virtually complete 16S rRNA sequences, obtained from GenBank. Trees were constructed using a maximum likelihood algorithm and band sequences were inserted by a parsimony algorithm.

2.5. Real-time PCR analysis

We used real-time PCR to estimate the absolute number of copies of Bacterial 16S rDNA present in the DNA extracts. The primer set used was BAC GM5F/BAC 907R. Genomic DNA from *Escherichia coli* was used as a template standard. Real-time analysis was performed on an ABI Prism 700HT sequence detection system (Applied Biosystems, Foster City, CA, USA) using "SYBR green" as a fluorescent dye for detection of dsDNA product. The cycle threshold for each sample was determined, from sample fluorescence, using SDS detection and recording software (Applied Biosystems, Foster City, CA, USA). The quantity of template in the environmental sample was interpolated in a linear regression obtained from standards. Quantity was transformed from mass to 16S rDNA gene copies, knowing that *Escherichia coli* has 7 rRNA operons [28].

2.6. Soil analyses

Analysis of soil physical and chemical properties was performed on approximately 200 g of soil from each of the 4 sites. Measurements of percent organic matter, pH, electrical conductivity, and particle composition (sand, clay, and silt), total reactive nitrogen, phosphorous, and nitrate, plant-available potassium, and the sodium absorption ratio of calcium, potassium, magnesium, and sodium were obtained. All analysis was performed commercially at the Brigham Young University Soil and Plant Analysis Lab, using previously published procedures [29–35].

2.7. Data analyses and statistics

For community fingerprint comparison of different samples we quantified both 16S rRNA gene allele richness (number of detectable bands) in each lane and Shannon–Weaver Diversity Index [36] using automatic detection and quantification of bands by image analyses. For rarefaction analyses we calculated cumulative richness in samples from the 4 sampling sites using the approach of Nübel et al. [37].

Statistical significance in diversity and richness estimates among samples was determined using a student's *t*-test [38]. For comparison of fingerprints sets, UPGMA (Unweighted pair-wise group arithmetic averages) values were calculated using Quantity One software. NMDS was also used to analyze the similarity among fingerprints of interest. For inter-site, time-course comparisons, and in order to discount procedural variability, a selected representative subset of three samples from each site (or time point), chosen after all sample fingerprints were viewed, was run in a single DGGE gel. Construction of DGGE banding pattern analyses was done according to the methods of van Hannen et al. [39]. Binary matrices from fingerprints (1: band presence and 0: band absence) were imported into SYSTAT software, where a distance matrix was calculated and used for NMDS. This analysis constructs a two-dimensional plot depicting the relationships among a number of observations, presented in a Euclidean plane where measurements that are very similar plot close to each other.

2.8. Nucleotide sequence accession numbers

The sequences found from DGGE analysis included in this study have been deposited with GenBank as Accession Nos. AY647884 through AY647917, AY823515 through AY823518, AY648699, AY61551, and AY833647.

3. Results

3.1. Soil chemistry

All sites were similar in terms of particle size distribution and overall chemical characteristics (data not shown), even though QBQ was somewhat more saline (Sodium-SAR: 201.70 ppm and conductivity at 1.24 $\Delta s/M$). There were, however, marked differences in nutrient availability; nitrogen to phosphorus molar ratios varied from almost 40 (PDB) to around 16 (QBQ) [40].

3.2. Archaea

One DGGE fingerprint using Archaea-specific primers run with samples from BWR (not shown) showed distinct bands throughout the 30–80% denaturant gradient. However, sequences obtained from 20 different bands excised from this gel yielded only one Archaeal match, most similar to the Crenarcheota (Table 1), but only with low similarity (85%). All other sequences matched members of the domain Bacteria, indicating a high degree of non-specific amplification,

Table 1
Unique sequences obtained in this study with accession number and nearest BLAST match in Genbank, percent similarity to it, and phylum assignment

Accession Number	Band ID	Closest relative	Similarity (%)	Phylum
AY647896	35a1	α-Proteobacterium	93	Proteobacteria
AY661551	475	*Chelatococcus asaccharovorans*	97	
AY648699	19a1	*Massilia timonae*	98	
AY647884	19a2	*Massilia timonae*	96	
AY647885	711	*Massilia timonae*	95	
AY647887	431	β-Proteobacterium	89	
AY647886	491	δ-Proteobacterium	91	
AY647888	31a6	Uncultured actinobacterium	98	Actinobacteria
AY647889	652	Uncultured actinobacterium	95	
AY647890	991	Rubrobacteriadae	88	
AY647891	29b4	Chloroflexaceae	91	Chloroflexi
AY647892	651	Dehalococcoides	97	
AY647893	1154	*Hymenobacter* sp.	85	Bacteriodetes
AY647894	615	*Hymenobacter* sp.	85	
AY647895	1011	*Flavobacterium* sp.	95	
AY647897	29F	*Taxeobacter* sp.	91	
AY647909	1132	Alga (AF497903)	90	Cyanobacteria
AY647905	1152	*Chroococidiopsis* sp.	89	
AY647901	1193	Clone (AY099254)	91	
AY647899	691	*Cylindrospermum* sp.	92	
AY647900	1192	*Cylindrospermum* sp.	92	
AY647902	451	*Cylindrospermum* sp.	92	
AY647898	1191	Clone (AF428508)	91	
AY647903	1153	Clone (AF42850)	91	
AY647907	1172	Clone (AF428532)	93	
AY647904	452	Cyanobacterium	99	
AY647906	1131	*Scytonema hyalinum*	89	
AY647908	872	*Synechococcus* sp.	90	
AY647910	19a3	*Microcoleus vaginatus*	98	
AY647911	631	*Microcoleus vaginatus*	93	
AY647912	21a2	*Microcoleus steenstruii*	93	
AY647913	453	*Microcoleus steenstrupii*	95	
AY647914	19a7	*Microcoleus steenstrupii*	95	
AY647915	612	*Microcoleus steenstrupii*	95	
AY647916	614	*Microcoleus steenstrupii*	79	
AY647917	412	*Occilatoria* sp.	94	
AY823515	35a4	Gemmatimonadetes	93	Gemmatimonadetes
AY823516	693	*Deinococcus* sp.	86	Deinococcus-Thermus
AY823517	492	*Holophaga* sp.	82	Acidobacterium
AY823518	35a2	Bacterium (AB094797)	85	*incertae sedis*
AY833647	233a	Uncultured crenarchaeote	94	Crenarcheaota

Additional sequences, differing by less than 2% from those listed here, are not included, but were used in the analyses.

probably due to a lack of an appropriate amount of template.

3.3. Bacterial quantification

We quantified, by real-time PCR, the abundance of amplifiable 16S rDNA copies of Bacteria. In site BWR, CDR, PBD and QBQ the 16S gene copy totals were 1.62×10^8, 1.58×10^8, 1.39×10^8, and 9.03×10^8, respectively. Bacteria copy numbers estimated with this method were congruent with bacterial abundance measured in BSCs by DAPI staining elsewhere [12].

3.4. Bacterial DGGE fingerprints

We ran DGGE profiles specific for Bacteria for each transect at time periods 1 and 2. DGGE fingerprints for each transect at each time period are summarized by measurements of average richness, average Shannon–Weaver Diversity Index and UPGMA similarity (Table 2). There were no statistically significant differences in estimates of average Shannon–Weaver Diversity among different sites. However, differences were significant for estimates of average richness among sites and between time points at sites PBD and CDR. UPGMA similarity

Table 2
Summary of diversity and richness for each site and time obtained from quantified DGGE fingerprints

Site	Time period	Samples for analysis	Richness (R) (# of Bands)	Shannon–Weaver diversity indices (H')	UPGMA[a]	UPGMA[b]
BWR	1	9	19 ± 3	2.73 ± 0.42	0.40	N/A
	2	10	22 ± 4*	3.02 ± 0.28	0.43	N/A
	3	9	22 ± 4*	2.66 ± 0.31	0.30	0.42
CDR	2	10	25 ± 4*,**	2.38 ± 0.39	0.43	N/A
	3	3	14 ± 1*,**	2.31 ± 0.27	0.38	0.50
QBQ	2	10	12 ± 3*	2.04 ± 0.23	0.49	0.60
	3	3	14 ± 3*	2.60 ± 0.74	0.38	0.57
PBD	2	10	19 ± 6**	2.03 ± 0.49	0.25	0.40
	3	3	14 ± 6*,**	2.32 ± 0.32	0.38	0.42

[a] Minimum similarity between all samples in a transect.
[b] Minimum similarity between transect samples, with 1 sample outlier eliminated.
* Indicates significance of 0.05 or less from the total mean of all measurements.
** Indicates significance of 0.05 or less between time point means.

values for intra-site sample comparisons were below 0.49 in all cases, and increased significantly if the most deviant sample in each set (outlier) was omitted from the analysis. For comparison, the UPGMA similarity among samples in all 4 sites (run separately at time point 2) was only 0.39.

NMDS analyses specifically aimed at probing differences in community structure in samples from under plant canopies vs. those situated in plant interspaces (done on samples from all sites at time period 2), could not detect any, even though they showed that samples in interspaces tended to be more variable than samples under plants (Fig. 1(a)). An NMDS comparison of a subset of three samples from all sites (at time points 2 and 3) also indicated that variability within sites was smaller than overall variability (Fig. 1(b)), as was suggested by UPGMA results (see above). Temporal variations were also detected by NMDS with fingerprints obtained in samples from one site at one time period being more similar than overall temporal similarity (Fig. 2) in the same site. The plot also indicates a step-wise shift in community composition with time.

3.5. General molecular survey of community members

Sequencing efforts of bacterial DGGE bands were extensive and involved BWR at times 1 and 2, as well as CDR, PBD and QBQ at time 2. We could successfully retrieve, sequence and identify bands whose contribution to total PCR-amplified DNA, as detected by our imaging software, averaged 31% per sample. In total, we obtained and analyzed 74 sequences. Extrapolation of cumulative richness plots (rarefaction) indicated that in the 4 sites at time period 2 there were some 62 unique sequence types to be potentially detected by our methods when using a large number of samples (Fig. 3); 40 unique sequence types were actually obtained (Table 1). This is much less than the 74 bands sequenced, since many of the sequences were retrieved repeatedly, and independently, from different fingerprints. When rarefaction analyses were carried out on a single transect (data not shown), estimates around 30 maximally detectable phylotypes were obtained, where 10 had been successfully sequenced.

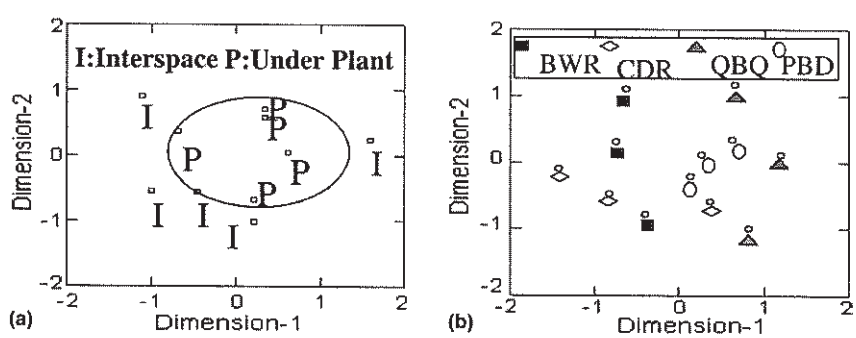

Fig. 1. Non-metric Multi-Dimensional Scaling (NMDS) plot comparison of fingerprints. (a) Samples from plant interspace crusts (I) and under plant canopy crusts (P) in site CDR at time period 2; divergence in community structure within the subset P (circled) is smaller that that of subset I. (b) Samples from all sites (legend in insert); overall divergence is much larger that that obtained within each site.

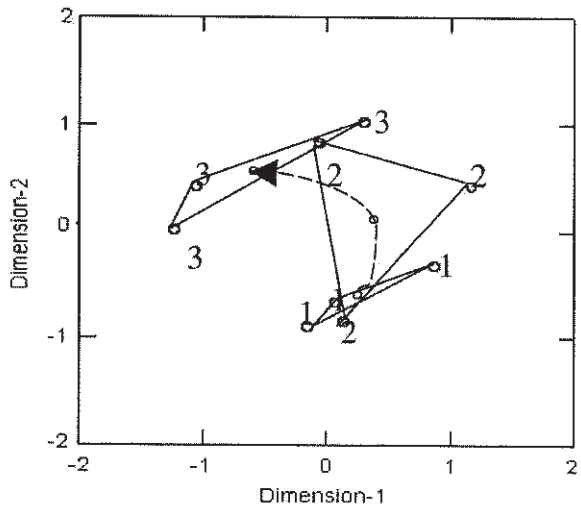

Fig. 2. NMDS analyses to assess temporal variability in community structure in site BWR. Points are labeled according to the time-point of sampling (1 = November 2002, 2 = April 2003, 3 = October 2003). Overall divergence in fingerprints is much larger than the divergence obtained at any one time-point, indicating the role of temporally varying parameters in determining community composition. A vector of dynamic change was been constructed by joining the center of mass of the respective triangles formed by samples in each time point to describe the general trends in community composition with time within the two-dimensional space.

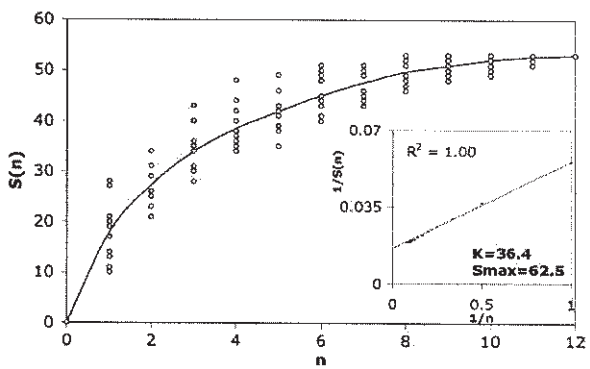

Fig. 3. Rarefaction analyses of bacterial diversity estimates for the entire set of sites. The cumulative number of unique denaturing gradient gel electrophoresis (DGGE) bands $S(n)$, is plotted as a function of the number of samples analyzed, n. All possible sequence combinations are included with equal weight to eliminate the possibility of variation in curve shape due to the order of accumulation. Double reciprocal plot fit is in insert, with Pearson correlation coefficients, R^2, estimates of asymptotic total regional richness, S_{max}, and half saturation constants, K, are shown.

Overall, representatives of 9 bacterial phyla, and several novel, deep-rooted lines of descent were found. A simple tally of sequences assigned to known phyla is in Fig. 4. Cyanobacteria were the most abundant, followed by the Proteobacteria, Actinobacteria, Bacteriodetes, Chloroflexi as common, and the Acidobacteria, Deinococcus and Gemmatimonadetes present in detectable quantities. One sequence had so little similarity to known phyla that it was treated as a separate, "unknown" group. This simple tally does not really measure the abundance of each phylotype in the original DNA extracts, since some sequences represented common and strong DGGE bands while others were obtained from weak and/or sparsely occurring bands. To account for this we calculated the relative contribution of each phylotype to the total 16S rDNA amplified by PCR, by using frequency of occurrence in the various transects, and the relative intensity of the corresponding bands in a sample. When this was done, the importance of Actinobacteria and Acidobacteria to the overall community increased greatly.

Phylogenetic neighbor-joining trees for the Cyanobacteria, Proteobacteria, Actinobacteria, Bacteriodetes, and Chloroflexi, were constructed with public, full 16S rRNA gene sequences; band sequences were inserted therein using parsimony. Trees are shown for the Proteobacteria and Cyanobacteria (Fig. 5(a) and (b)), the groups from which the most sequences were obtained. In the Cyanobacteria (Fig. 5(a)), a numerous and diverse clade was evident within the heterocystous (Nostocales), with a closest match to the genus *Scytonema*. Another large, diverse clade closely matched cultured sequences from soil crust isolates assigned to the morphogenus *Microcoleus steenstrupii*. These sequences represented the most common and abundant single microbial group in the crusts. Two sequences grouped closely with strains of the morphospecies *M. vaginatus*. Individual sequences grouped closely with the heterocystous groups (*Scytonema* and *Anabaenopsis*), and a unicellular cyanobacterium (*Synechococcus*).

In the β-Proteobacteria (Fig. 5(b)), all sequences were close to cultured members of the Oxalobacteraceae (one *Massilia* spp. clone, two phenanthrene-degrading bacteria and a *Massilia timonae* strain). Together they make up one of the most clearly defined and common nonphototrophic groups in the crusts. Two other proteobacterial phylotypes, grouped basal to the main proteobacterial subdivisions, and a third was allied closely with a strain *Bosea thiooxidans*. One sequence grouped closely with an uncultured "candidate division OP8" environmental clone.

For Actinobacteria, phylotypes did not group with known species, but together in a cluster basal to the *Rubrobacter* subdivision. Three sequences were obtained for the Bacteriodetes. One grouped closely with a *Flavobacterium frigoris* strain and the other two matched closest to a soil crust strain obtained from this same environment (Nagy and Garcia-Pichel, unpublished research). Two phylotypes fit in the Chloroflexi, grouped basally to the branch of phototrophs (*Chloroflexus* and *Roseiflexus* clades), and more distant to the halogenated-compound respirers (*Dehalococcoides* clade).

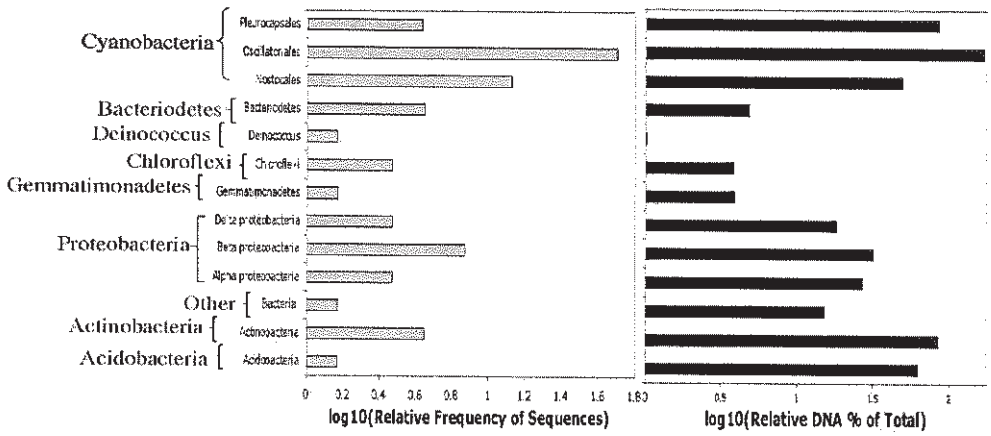

Fig. 4. Relative contribution of major bacterial divisions to the communities in biological soil crusts from Organ Pipe National Monument on the basis of a tally of BLAST placement in sequences recovered from all fingerprints. The right graph is a simple frequency distribution of unique 16S rDNA sequences. In the left graph, each sequence has been weighted by its relative abundance in the total PCR amplification as calculated by image analyses of band intensity and frequency of occurrence.

Alternative neighbor joining trees with bootstrap analyses using Paup 4.0b10, and based on the 500–600 bp fragment common to database sequences and DGGE sequences, yielded almost identical results to trees made with ARB (data not shown). The only exception was the placement of sequence "Band 651", which clustered within, rather than outside, the *Dehalococcoides* branch in the Chloroflexi (with a bootstrap value of 80%).

4. Discussion

4.1. Diversity, spatial and temporal variations in BSC community structure

Community diversity in Sonoran BSCs as judged, for example, by simple transect-averaged richness estimates, which varied between 14 and 24 detectable DGGE bands per sample, must be considered relatively low compared with the typical patterns obtained using similar techniques in mesic, non-stressed soil communities. There, the number of detectable bands can be in the hundreds, with no clear dominance patterns present [41]. BSC richness values are in the range of those obtained (using DGGE fingerprints with Bacteria-specific primers) in other cyanobacteria-dominated biofilms, such as microbial mats [42] or in plant-associated soil communities [43]. This low level of diversity may be due to the extreme nature of the crust microhabitat, which is exposed to high levels of solar radiation and very high temperatures, as well as strong and recurrent short-lived wetting-desiccation events [44]. It could also be due to the functional dependence of the community on rather simple carbon source excretion products and decaying biomass of cyanobacteria. It is probably this comparatively low level of richness that enabled the depth of coverage attained in our survey, as estimated by rarefaction analyses (Fig. 3), which may have required a significantly larger effort in typical soil environments [45]. Statistically significant differences in richness could be detected among sites, however, and also between sampling times in the same site. This was not mirrored by significant changes in Shannon–Weaver Diversity indices, which remained stable over space and time. Judging from qualitative observations of the DGGE fingerprints, this was due to the fact that dominant bands, which play a large role in determining the value of Shannon–Weaver Diversity wherever clear dominant members exist, were widespread and did not vary much. It was minor bacterial components that fluctuated the most.

NMDS analysis, which uses un-weighted absence/presence for typifying a particular fingerprint and therefore equates minor and major components, helped visualize such changes. That variability in community structure among samples in a single site was smaller than the overall variability between sites (Fig. 2(b)), speaks for a role of particular microclimatic or edaphic characteristics in influencing, if surely not determining, community composition. Interestingly, BSC communities under plant canopies or in plant interspaces could not be distinguished on the basis of community fingerprint similarity (by UPGMA) nor by overall richness or diversity, indicating that at this site the influence of plants is not significant. This contributes to the theory that BSCs are "mantles" of fertility, independent of "fertility islands". However, under-plant samples showed less internal variability than interspace samples. Plants may indeed dampen environmental factors that cause variation in community composition causing community structure to remain more homogeneous. We

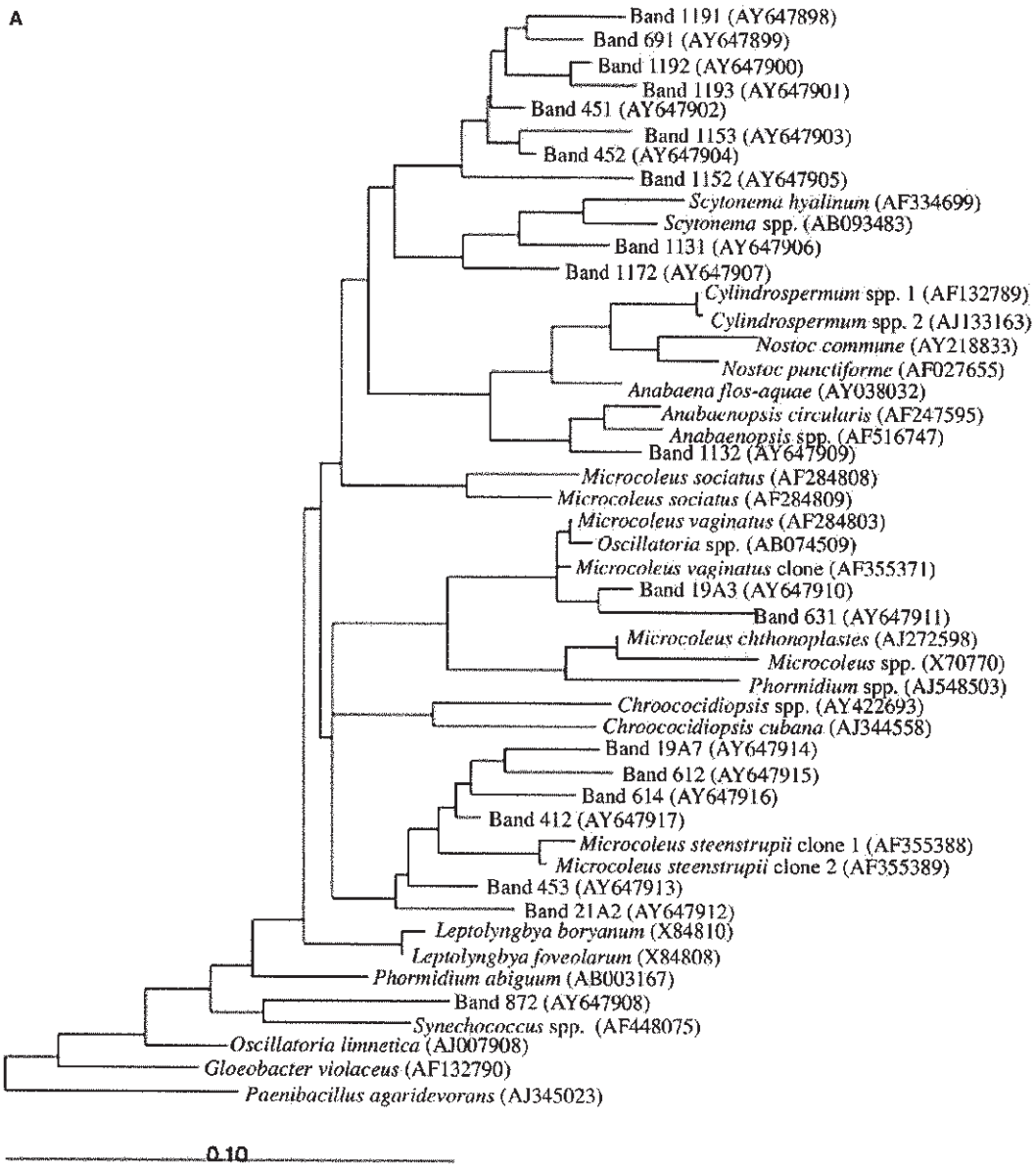

Fig. 5. Reconstruction of phylogenetic relationships of the two major groups of bacteria detected by sequencing. Separate maximum likelihood trees (with one outgroup sequence) were constructed using ARB, including virtually complete 16S rRNA gene sequences available publicly and selected according to initial BLAST similarity to our novel (partial) sequences. Partial sequences were then inserted into the corresponding tree using maximum parsimony without changing the overall tree topology. A: Cyanobacteria, B: Proteobacteria.

could also detect temporal shifts in community structure in a single site that appeared to happen in a successional mode, with samples separated by longer periods being more dissimilar. These changes (again, involving the least abundant phylotypes) could be due to a steady increase in precipitation events over the course of the year sampled, after a very prolonged drought period that had taken place prior to the first sampling date (see Larson, [46]). But temporal sampling was neither dense nor sustained enough to correlate the shifts with any particular seasonal or pulsed events.

4.2. Community composition

We are cognizant of the possible biases and problems associated with the use of PCR-based molecular surveys such as differential extraction and amplification, and the presence of multiple 16S rRNA operons in some taxa [47]. Also, fingerprinting techniques such as DGGE have limited resolution [48]. Nevertheless the picture drawn by this survey was internally consistent, in that common bands (and sequences) were repeatedly obtained in independent analyses and variations in

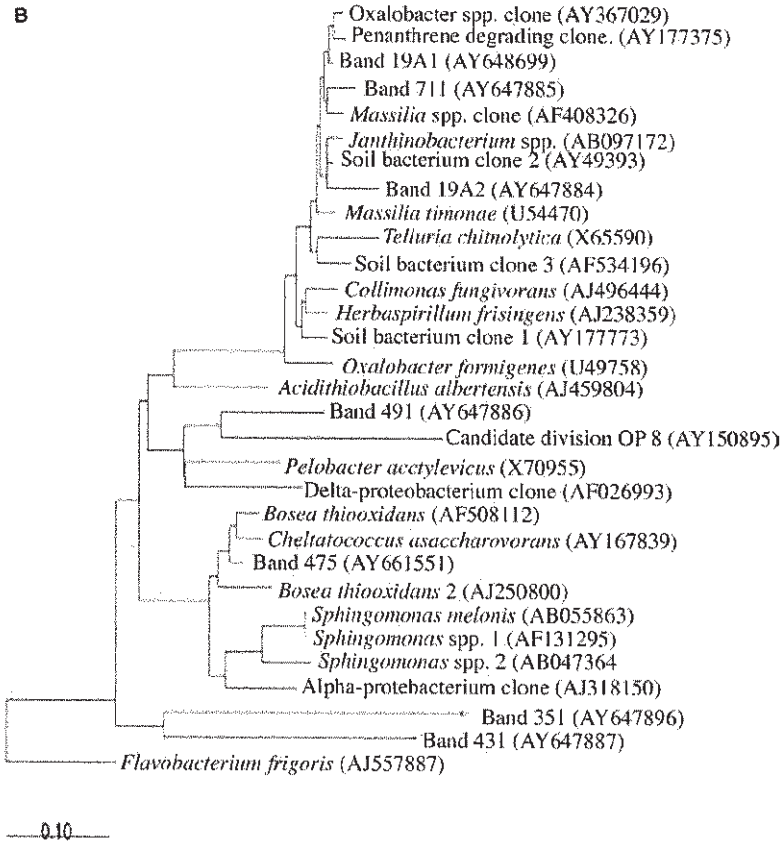

Fig. 5 (*continued*)

community composition among samples in a transect involved usually the least abundant members. While we regard frequencies and tallies as indicative rather than absolute, the rough traits of community composition seem robust and clearly differentiate the surveys of BSC microbial assemblages here from those obtained with a variety of methods in other soil communities (Table 3). Major and minor bacterial components of Sonoran Desert BSCs are most similar to BSCs from the Colorado Plateau, and less similar to communities in bulk arid soils and even less to those of bulk mesic agricultural soils, respectively.

In contrast to Archaea, the Bacteria were major components of Sonoran BSCs, with a diverse array of phylotypes present. Cyanobacteria were clearly the most abundant members of BSCs in this environment (other

Table 3
Ranking comparison of bacteria detected and identified from various molecular based surveys, in different soil environments

Sonoran BSCs (percent of DNA amplified and identified)[a]	Colorado Plataeu BSCs (percent of DNA amplified and identified)[b]	Arid soils (percent of clones)[c]	Agricultural soils (percent rRNA present in soil)[d]
Cyanobacteria (54.8)	Cyanobacteria (38.4)	Acidobacteria-like (51.1)	Proteobacteria (27)
Actinobacteria (15.1)	Proteobacteria (16.3)	Proteobacteria (15.5)	Actinobacteria (11.1)
Proteobacteria (13.8)	Actinobacteria (11.8)	Flexibacteria and relatives (13.3)	Planctomycetes (7.2)
Acidobacteria (11.1)	Bacteriodetes (10.6)	Actinobacteria (6.7)	Acidobacteria (3.5)
Bacteriodetes (0.9)	Firmicutes/Bacilli (5.2)	Planctomycetes (4.5)	Verrucomicrobia (1.9)
Chloroflexi (0.7)	Thermomicrobiales (2.9)	Unknown (8.9)	Bacteriodetes (0.4)
Gemmatimonadetes (0.7)	Acidobacteria (2.5)		
Deinococcus/Thermus (0.2)	Unaffiliated alleles (12.6)		
Unknown (2.7%)			

[a] This work.
[b] Gundlapally and Garcia-Pichel, unpublished.
[c] Kuske et al. [52].
[d] Buckley and Schmidt [51].

oxygenic phototrophs such as the green algal *Geminella*, however, may be dominant in acidic crusts; [49]). This was expected from previous work, both microscopic and molecular in nature. The clade of sequences around that of *M. steenstrupii*, a small, filamentous cyanobacterium previously reported from BSCs [47,50] was the most abundant and diverse. The abundance and dominance of sequences in the *M. steenstrupii* clade was surprising, since the dominant cyanobacterium in BSC from the Colorado Plateau and other locations is clearly *M. vaginatus* [3,10,12]. Obviously BSCs from different biogeographical provinces may select for different filamentous cyanobacteria as a dominant prokaryotic member. These two dominant species may have very different adaptive abilities, perhaps related to freezing (uncommon in the Sonoran, but common in the high Plateau) or to maximal temperatures (higher in the Sonoran). It is noteworthy that the morphogenus *Microcoleus* is not well supported by phylogetic studies [10], and actually the *M. vaginatus* and *M. steentrupii* clades are not closely related, in spite of sharing a generic epithet.

Another important cyanobacterial clade of environmental sequences was among the heterocystous cyanobacteria, as could also be expected from microscopy surveys, but many of those phylotypes formed a phylogenetic group hard to ally with well-known morphogenera. These organisms are likely responsible for the large rates of nitrogen fixation measured in most BSCs and probably ecologically key to mature BSCs.

Among non-phototrophs, the Proteobacteria were the most important group. They are also quite common in BSCs from the Colorado Plateau [12], and in bulk arid soils [51]. In these BSCs, β-Proteobacteria were the most prominent subdivision, primarily matching members of the family Oxalobacteraceae, whereas α-Proteobacteria are the most important in agricultural soils [50]. The high relative abundance of Oxalobacteria seems to be a trait particular to the BSC communities and it may be interesting to speculate if it has to do with their ability to degrade oxalate, a compound accumulated or excreted by many desert plants, lichens and fungi. The Actinobacteria were the next major component of Sonoran BSC communities. They are also important in agricultural soils and have been detected in BSCs from the Colorado Plateau [12], and bulk arid soils [52]. One sequence matched well the genus *Rubrobacter*, a deeply branching subdivision of the Actinobacteria previously described from Australian arid soils [53]. The rest formed its own deep rooting branch in the tree, basal to the *Rubrobacter* subdivision and represent clearly novel, uncultivated members of the community. The Acidobacteria are a little known, but important component of desert soils at large [13,52] and relatively minor components of agricultural soils [50] and Colorado Plateau BSCs [12]. They were abundant in our crusts, if perhaps less prominent than in bulk arid soils. Also detected in small quantities were members allied to *Hymenobacter*, *Taxeobacter* and *Flavobacterium* in the Bacteriodetes. Members of the Bacteriodetes have been detected previously in BSCs [12] from the Colorado Plateau, and in low abundance in agricultural soils [50], but not in bulk arid soils. Interestingly, representatives from the Chloroflexi were also obtained, which were well distributed if not very abundant; there are no previous reports of Chloroflexi members from arid soils, either from the phototrophic branch or the heterotrophic branch. Phototrophic Chloroflexi are common in marine microbial mats and hot springs [54,55] in many occasions associated with cyanobacteria. Preliminary pigment analyses by HPLC (not shown) failed to detect bacteriochlorophylls in support of a possible role for anoygenic phototrophs in BSC communities. The *Dehalococcoides* are a clade of organohalide respirers, typical of contaminated sites [56]; this offers little for speculation, since BSCs are pristine natural communities not typically subject to contamination. Obviously the functional significance of these Chloroflexi relatives remains an open question. Members of the Gemmatimonadetes, a phylum recently cultured from common soil [57], were also detected as another minor component in BSCs. Among the Deinococci, common in arid soils, a single sequence was also obtained. But a sizable proportion of the total diversity detected was represented by *sequentiae incertae sedis*, which correspond in one case to possible novel divisions, in another to a relative of the proposed candidate division OP8 from hot springs, and in the last to some quite deeply branching Proteobacteria, which may constitute by themselves a novel subdivision.

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EXHIBIT 4

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NOTES

CHAPTER 1

INTRODUCTION TO BIOLOGICAL SOIL CRUSTS

In arid and semi-arid lands throughout the world, vegetation cover is often sparse or absent. Nevertheless, in open spaces between the higher plants, the soil surface is generally not bare of autotrophic life, but covered by a community of highly specialized organisms (Fig. 1.1). These communities are referred to as biological soil crusts, or cryptogamic, cryptobiotic, microbiotic, or microphytic soil crusts (Harper and Marble 1988; West 1990). Biological soil crusts are a complex mosaic of cyanobacteria, green algae, lichens, mosses, microfungi, and other bacteria. Cyanobacterial and microfungal filaments weave through the top few millimeters of soil, gluing loose particles together and forming a matrix that stabilizes and protects soil surfaces from erosive forces (Cameron 1966; Friedmann and Galun 1974; Friedmann and Ocampo-Paus 1976; Belnap and Gardner 1993). These crusts occur in all hot, cool, and cold arid and semi-arid regions. They may constitute up to 70% of the living cover in some plant communities (Belnap 1994). However, biological soil crusts have only recently been recognized as having a major influence on terrestrial ecosystems.

Globally, this consortium of soil biota has many similarities in function, structure, and composition, in spite of their unconnected

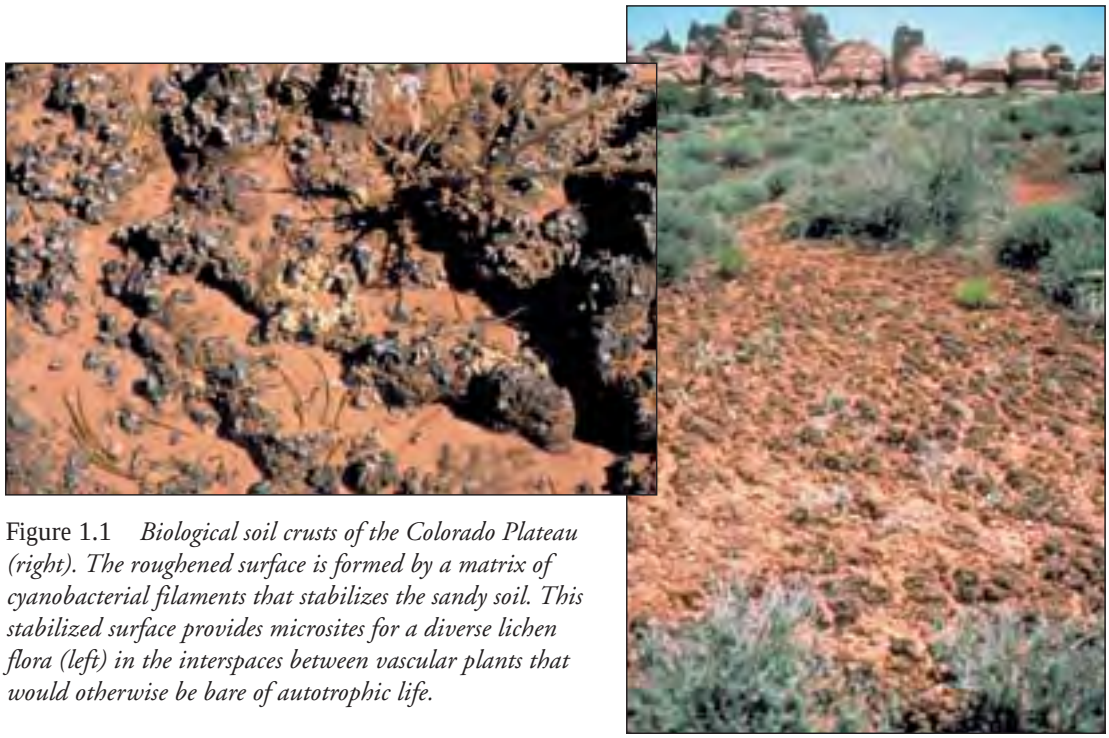

Figure 1.1 *Biological soil crusts of the Colorado Plateau (right). The roughened surface is formed by a matrix of cyanobacterial filaments that stabilizes the sandy soil. This stabilized surface provides microsites for a diverse lichen flora (left) in the interspaces between vascular plants that would otherwise be bare of autotrophic life.*

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and seemingly dissimilar environments. Crusts are found in an astonishing variety of habitats throughout the world:
in desert and semi-desert plant communities, ranging from shrub and succulent deserts to open woodlands; in steppe formations in both the northern and southern hemispheres; in the gaps between evergreen shrubs and in forests in the Mediterranean-type climate; and on open ground or between alpine or tundra vegetation. On a small scale, biological soil crust communities are found in open types of vegetation in temperate climatic regions; for example, they are frequently present in (and often restricted to) areas of a few square meters in xerothermic local steppe formations in central Europe and in the pine barrens of the eastern United States.

In rangelands, biological soil crusts can be viewed from functional, structural, and compositional perspectives. They function as living mulch by retaining soil moisture and discouraging annual weed growth. They reduce wind and water erosion, fix atmospheric nitrogen, and contribute to soil organic matter (Eldridge and Greene 1994). Structurally, biological crusts are a rough, uneven carpet or skin of low stature (1 to10 cm in height). Below ground, lichen and moss rhizines, fungal hyphae, and cyanobacterial filaments form a matrix that binds soil particles together (Belnap 1995). Horizontally, soil crusts occupy the nutrient-poor zones between vegetation clumps in many types of arid-land vegetation. Compositionally, biological soil crusts are diverse. In many arid and semi-arid communities there are often many more species associated with the biological soil crust at a given site than there are vascular plants (Rosentreter 1986; Ponzetti et al. 1998).

Rangeland managers in North America have historically used key indicator plants for determining the ecological trend and health of vegetation (USDA 1937; Stoddart et al. 1943). Biological soil crusts can also be used as indicators of ecological health. In addition, they act as indicators of abiotic factors, such as the presence of calcareous soils. Crustal organisms read environmental factors differently from and on separate time scales than do vascular plants (McCune and Antos 1982). Most crustal organisms are biologically active during the cool seasons when the soil surface is moist (Rosentreter 1986). In contrast, vascular plants are active in spring and summer when air temperatures are above freezing.

Unlike vascular plants, crustal organisms, particularly lichens, are not greatly influenced by short-term climatic conditions. This makes them ideal indicators of long-term environmental factors. Therefore, each community component can provide information that may complement, explain, or indicate something about a site's characteristics and disturbance history for rangeland management and evaluation. Just as plants increase or decrease with livestock grazing, many biological soil crust components are good indicators of physical

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disturbance, such as by livestock, human foot traffic, or motorized vehicles (Belnap 1995).

Land managers have been slow to use biological soil crusts in rangeland evaluations. Descriptions of vegetation or "habitat types" used by public land management agencies sometimes include biological soil crusts (e.g., Daubenmire 1970; Hironaka et al. 1983) but rarely present them as a dominant factor even when they are prevalent. This is partly because of perceived difficulties with identification (see Chapter 6). The problem of identification is exacerbated by the small size of these organisms, which often lack reproductive structures due to the harsh environments where they grow. However, identification problems can be substantially reduced by grouping organisms by function or general morphological characteristics (see sections 1.3 and 6.1.2).

1.1 Biological Soil Crust Components

Biological soil crusts are usually composed of multiple, unrelated organisms that occur together on the soil surface. The various types of organisms that comprise the crust share some interesting physiological traits. They are all capable of drying out and temporarily suspending respiration without negative effects, unlike vascular plants that either die or must regrow new tissue. These types of organisms are referred to as "poikilohydric." Most of them equilibrate their water content with the atmospheric humidity or soil surface moisture content. Poikilohydric organisms generally become photosynthetically active very quickly, producing carbohydrates or sugars minutes after wetting. However, most species still require high levels of hydration for optimal physiological functioning. The moisture content threshold for activity is species specific and helps determine the distribution of the various taxa that make up the biological crust. Many of these organisms perform under a variety of light intensities and prefer to dry out rapidly. Because they lack a waxy epidermis, crustal organisms also tend to leak nutrients into the surrounding soil upon wetting and drying.

Biological soil crusts have both macro- and microscopic components. Components that comprise these crusts are common in desert soils throughout the world. They will be discussed throughout this document in the context of their roles when they combine with other organisms as part of a biological soil crust. The term "total soil crust" will be used to refer to the combination of organisms. When visible cover (i.e., moss and/or lichen cover) alone is being discussed (thus excluding cyanobacteria), this will be specifically stated.

Bacteria are a diverse group of primitive, single-celled organisms. Bacteria can be either autotrophic (i.e., they synthesize

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carbon compounds from inorganic sources) or heterotrophic (i.e., they utilize carbon-containing substrates, such as organic matter in soil, for food). Some bacteria contribute to soil fertility by fixing nitrogen. Others are important in decomposition.

Microfungi occur either as free-living organisms or in mycorrhizal associations with plant roots. Free-living microfungi function as decomposers. They also contribute substantially to the living biomass in soils. Fungal filaments (hyphae) bind soil particles together, increasing soil water-holding capacity.

Cyanobacteria ("blue-green algae") are primitive filamentous or single-celled bacteria that can photosynthesize and, under anaerobic conditions, fix atmospheric nitrogen into a form that is available to higher plants (NH_4^+). Cyanobacteria can be heterocystic (i.e., they have special cells where nitrogen fixation takes place), or non-hetero-cystic (i.e., they lack these specialized cells). One of the most common cyanobacteria worldwide is the non-hetero-cystic, filamentous species *Microcoleus vaginatus. Microcoleus* can be seen with a 10x hand lens on the edge of a broken clump of soil. Under higher magnification, *Microcoleus* occurs as a cluster of filaments surrounded by a gelatinous sheath (Fig. 1.2). Single-celled cyanobacteria appear as small, blackish cells mixed with surface soil. When soils contain high amounts of cyanobacteria, they often have a slightly to highly roughened surface due to the organisms' binding of soil particles, coupled with processes like frost-heaving and erosion. For nitrogen fixation to occur in non-heterocystic cyanobacteria, the organisms need to be in an anaerobic environment, created by layering of cyanobacterial filaments just beneath the soil surface.

Green algae are light green to black, single-celled, photosynthetic organisms. Algae that occur on or just below the soil surface dry out in a vegetative condition and become physiologically functional when moistened. They do not rely on resting spores to regrow after dry periods, as do aquatic algae that inhabit ephemeral ponds or lakes. Therefore, they are well adapted to living and reproducing in dry desert environments. Algae are difficult to observe without a microscope (100x to 400x), but sometimes give the soil surface a green tint. Their growth period is often linked to cool, moist weather, and they may be difficult to detect when dry.

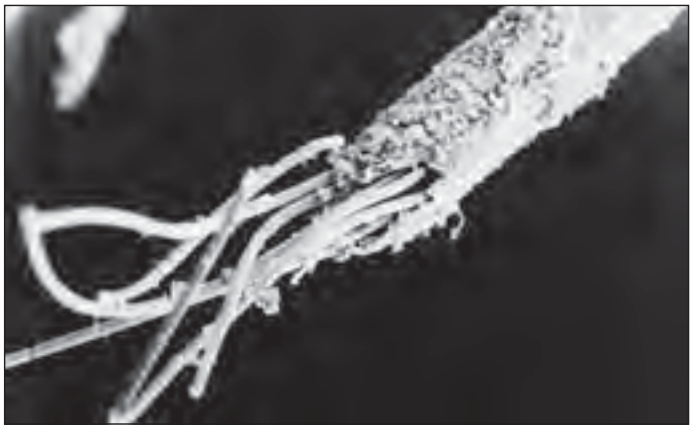

Figure 1.2 Microcoleus vaginatus*, one of the predominant cyanobacteria comprising biological soil crusts.* Microcoleus *exists as a cluster of filaments, surrounded by a gelatinous sheath (seen here with soil particles attached). The living filaments can migrate through the soil, leaving abandoned sheath material and a stabilized soil matrix behind. (2000x magnification)*

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Bryophytes are tiny non-vascular plants. This group includes both mosses and liverworts. Having greenish leaves when moist, mosses are generally easy to identify. They reproduce by spore capsules that rise above the leaves. The spore capsules greatly simplify the identification of genera and species. However, in arid environments, mosses often lack reproductive structures and will reproduce asexually by simple or specialized fragmentation. Therefore, arid-land mosses are often difficult to identify in the field. Liverworts come in two general forms: thalloid or leafy. The thalloid form has a greenish-black thallus or flat, narrow ribbon of dichotomously branching material. Thalloid liverworts are adnate to the soil surface, and some can fold in half, almost disappearing from view (they look like thin black lines on the soil surface when dry). Leafy liverworts are rare in arid environments. They look like mosses but are smaller, and when dry the leaves are very black . Both types of liverworts reproduce by spores and by specialized asexual structures called "gemmae." The spores are often produced in a structure within the upper surface of the liverwort and look like a black or smutty spot on a green background. The asexual gemmae are variable in size (1 to 3 mm), but are usually green, circular structures that easily break off the parent plant when mature.

Lichens are fungi that capture and cultivate algae or cyanobacteria, resulting in a new morphological entity. Lichens are typically used in ecology courses to illustrate the concept of symbiosis, as the algae or cyanobacteria provide the fungus with energy in the form of carbohydrates produced by photosynthesis, while the fungus provides protection from desiccation. Lichens come in a wide variety of shapes, sizes, and colors. They generally have an outer fungal layer, which, if cut in cross section, reveals a layer of algal cells. Lichens can cover the soil surface like a layer of skin or they can be three dimensional and leaf-like in appearance. Lichens occur in a variety of colors, including green, red, brown, white, and black. Sexual reproduction is limited to the fungal partner. Reproductive structures are generally round, dark-colored sessile disks on the lichen surface. Lichens can also reproduce asexually (as the combined organism) and have several types of specialized fragmentation structures to facilitate this type of dispersal. Lichens that reproduce asexually can colonize disturbed sites much more rapidly than those species that lack this ability.

1.2 Microstructure

The dominant components of biological soil crusts are photosynthetic and therefore require sunlight. When soils are dry, the bulk of the cyanobacterial biomass is 0.2 to 0.5 mm below the soil surface,

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where sufficient light for net carbon gain is available but UV exposure is reduced. *Microcoleus vaginatus*, which lacks UV-screening pigments, migrates to the surface for short time periods when soils are moistened and returns to subsurface zones as they dry (Fig. 1.2). Populations of *Scytonema* and *Nostoc*, cyanobacteria containing UV-screening pigments, are more commonly found directly on the soil surface.

1.3 Morphological Groups

Morphological groups consist of organisms that are similar in shape and general appearance. The crust morphology largely determines its ecological function relative to water infiltration, erosion, water retention, and resistance and resiliency to disturbance (Eldridge and Rosentreter 1999). Morphological groups also convey an image of a particular organism. Table 1.1 outlines the major morphological groups for biological crusts. Ecological function and management implications relative to morphological groups will be discussed in detail in later chapters.

1.4 Differentiating Types of Biological Soil Crusts in the Field

Biological soil crusts are usually composed of various organisms and morphological groups, unless the crust is in an early-successional stage. However, one or two morphological groups will normally dominate the crust. The following are examples of morphological groupings:

- *Cyanobacterial crusts* are dark colored or black. When moist, the organisms may be visible as black filaments on and near the soil surface.
- *Green algal crusts* are not always visible, but might appear as a green cast on the soil surface when it is moist.
- *Moss crusts* are easily observed as a furry carpet with patches of green, gold, brown, and/or black.
- *Liverworts* are difficult to detect and usually occur in a mosaic with other dominant organisms. Close examination with a hand lens will reveal tiny black ribbons that become more obvious with moistening.
- *Lichen crusts* can be identified by their diversity of shapes and colors. The lichen morphological groups form an anatomical gradient from a low, simple morphology to taller and three-dimensional growth forms.
    - *Crustose lichens* are flat and fused to the substrate.
    - *Gelatinous lichens* are usually black and may appear flat or three-dimensional. They become jelly-like in texture when

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moistened and will swell to several times their size when wet. This is an important group to identify from a functional perspective because they have cyanobacteria as their phytobiont and therefore fix atmospheric nitrogen.

- *Squamulose lichens* occur as small individual flakes or scales that often grow in colonies or clusters.
- *Foliose lichens* are leaf-like and loosely appressed to the substrate. In dry habitats, foliose lichens inhabit the relatively moist microsites under plant canopies and on north aspects.
- *Fruticose lichens* are three dimensional and are often upright, branched, or thread-like.

1.5 What Biological Soil Crusts are Not: Physical Soil Crusts

Non-biotic soil surface crusts are a major structural feature in many arid regions. Their properties and manner of formation have been studied for many years, primarily because of their detrimental effects on agricultural crops. These crusts are transient soil-surface layers (ranging in thickness from less than 1 mm to a few cm) that are structurally different from the material immediately beneath them. Physical crusts reduce water infiltration and can prevent the emergence of vascular plant seedlings (Fig. 1.3).

The most important process in the formation of non-biotic crusts is generally raindrop impact, which breaks up soil aggregates on unprotected surfaces. Smaller particles wash into spaces between larger particles, clogging soil pores and reducing infiltration rates by as much as 90%. This can occur within the first few minutes of a rainstorm. As drying takes place, surface tension pulls soil components together, forming a dense, strong layer. Thackett and Pearson (1965) showed that physical crusts formed under simulated rainfall had a dense surface layer 1 to 3 mm thick, coated with a thin layer of well-oriented clay. The crust was underlain by a more porous structure, and the water permeability of the underlying material was about five times that of the surface 0 to 5 mm. Rain-formed crusts are thicker when the raindrops are larger because these larger drops have more energy and “blast” deeper holes, destroying the original structure to a greater depth. In general, rain-formed crusts are less than 5 mm thick. This layer is often harder than the rest of the soil because compounds such as salts, lime, and silica are deposited at the surface as water evaporates. Because large pores are absent, the crust usually has low saturated hydraulic conductivity and limits infiltration. This increases water runoff and soil erosion.

Soil aggregate structure is also destroyed by machinery or the hooves of grazing animals. Trampling moist soils destroys existing soil

Table 1.1 *Morphological groups for biological soil crust components with examples of common taxa or groups.*

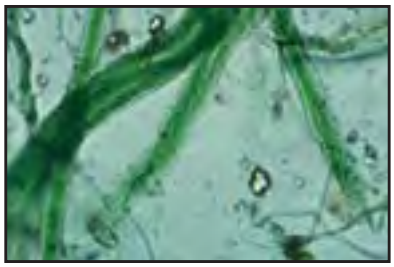
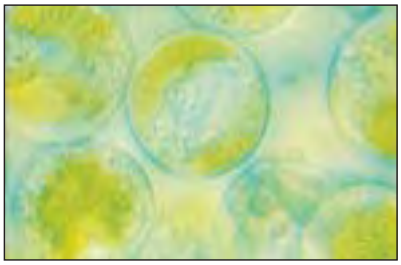
Morphological Group		Description and Representative Taxa
cyanobacteria		colonies are black to blue-green and visible primarily when moist *(Microcoleus vaginatus)*
algae		primarily occur as single-celled organisms; difficult to detect (coccoids)
BRYOPHYTES: short moss		mosses <10mm in height *(Bryum* spp.*, Ceratodon purpureus)*
tall moss		mosses >10mm in height *(Tortula ruralis)*
liverwort		flat, narrow ribbon or green-black dichotomously branching material on the soil surface *(Riccia)*

Table 1.1 (continued)

Morphological Group		Description and Representative Taxa
LICHENS:		
crustose lichen		crust-like growth tightly attached to the substrate *(Lecanora muralis)*
gelatinous lichen		blackish, jelly-like when moistened *(Collema coccophorum)*
squamulose lichen		discrete flakes that are round or ear-shaped, convex or concave, and often have lobed margins *(Psora decipiens)*
foliose lichen		"leafy," tending to be flattened with definite upper and lower surfaces *(Peltigera occidentalis)*
fruticose lichen		three-dimensional, ropey or branching, without definite upper and lower surfaces *(Aspicilia hispida)*

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Figure 1.3 *Physical soil crusts. Vascular plant establishment is limited to cracks between polygons on physically crusted areas due to an impenetrable surface layer.*

aggregates by compacting them into a comparatively impermeable surface layer. These compacted surfaces have reduced infiltration rates and increased surface runoff. In this sense, they function hydrologically in a manner similar to raindrop-induced crusts.

Physical crusts may form on soil of almost any texture except coarse sandy soils containing very low silt and clay (Lemos and Lutz 1957). Soils especially susceptible to crusting are those with low organic matter and high silt, sodium, or calcium carbonate content. These characteristics are all related to soils with low structural and aggregate stability. Organic matter increases aggregate stability (through gluing of particles and moderation of forces that reduce aggregate stability), and places where plant residues are incorporated generally become planes of weakness, decreasing crust strength. Silts form strong bonds on drying, thus forming a hard crust. Silts also have low swelling and shrinking properties, so that the crust does not crack or disintegrate by itself.

Intensive grazing is often used to break up physical crusts. However, this result is short-lived, as the soil surface is resealed after the first minutes of an intense rainstorm. To effectively address a physical soil crusting problem, livestock grazing systems must promote greater soil aggregate stability (Thurow 1991). Therefore, management systems that promote soil surface protection (through plant and biological soil crust cover) and increase soil organic matter are the only lasting solution to physical soil crust reduction (Blackburn 1983).

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CHAPTER 2

DISTRIBUTION AND FACTORS INFLUENCING SPECIES COMPOSITION

2.1 Distribution

Biological soil crusts in North America are diverse and are most evident in arid and semi-arid ecoregions (Fig. 2.1, 2.2). They are also found on shallow lithic sites and in alpine habitats throughout the continent and in many early-successional vegetation types in moister ecoregions. Some crustal organisms are good indicators of a specific vegetation type or ecoregion. Others, including *Microcoleus*, *Nostoc*, *Collema*, *Psora decipiens*, *Cladonia* spp., and *Bryum* spp. are common to many different geographic, climatic, and vegetation types. For instance, the same soil lichens (*Collema*, *Placidium*, *Psora*) dominate crusts of both the Sonoran and Great Basin deserts, as well as areas of South Africa and Australia, although vascular plant species and climate vary greatly between these regions. While most algae, lichens, and bryophytes are cosmopolitan, a few are endemic and may be common on a local or regional level (Table 2.1). For example, several of the squamulose lichens, such as *Placidium squamulosum*, *Psora decipiens*, *Psora cerebriformis*, and *Psora tuckermanii*, have very broad geographic ranges. Others, including *Catepyrenium congestum* and *Psora montana*, are endemic to North America or have narrow geographic ranges within the continent. Squamulose lichens have more endemic species worldwide than any other lichen morphological group.

Similarities in species composition may occur due to similar environmental conditions during the active growth period for crustal organisms. For example, alpine biological crusts actively grow in summer under moisture and temperature conditions that are similar to winter environmental conditions in the Sonoran Desert. Most crust growth occurs during wet, cool periods. In most North American deserts, this is generally late fall to early spring.

The appearance of biological crusts is variable. Physical structure of biological crusts is very similar in the hot deserts of the world, such as the Atacama, Sonoran, Chihuahuan, and Australian deserts, while very different from the physical structure in cool and cold deserts, such as the Colorado Plateau, Great Basin, and the Arctic (Fig. 2.3). Pinnacled crusts are found in areas where crusts are dominated by cyanobacteria, freezing temperatures are common, and vascular plant roots are lacking. Winter freezing heaves the soil upward, forming pinnacle-type microtopography. Subsequent

Figure 2.1 *Arid and semi-arid ecoregions of western North America. Areas shaded in black are cool deserts, while grey-shaded areas are hot deserts.*

Figure 2.2 *Biological soil crusts of the Great Basin (top) and Sonoran (bottom) deserts. Compare the overall appearance of these crusts with those of the Colorado Plateau (Fig. 1.1).*

Table 2.1 *Soil crust lichens endemic to North America with both wide and limited distributions. Note that there are very few endemic species.*

Species	Distribution	Reference
Aspicilia californica	California Chaparral	Rosentreter 1998
Aspicilia filiformis	western North America	Rosentreter 1998
Aspicilia reptans	North America	Looman 1964
Catapyrenium congestum	Great Basin	Bruess and McCune 1994
Psora montana	western North America	Timdal 1986
Psora tuckermanii	Great Basin	Timdal 1986
Texosporium sancti-jacobi	western North America	McCune & Rosentreter 1992

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differential growth and erosion results in highly dissected pinnacles to 10 cm high (e.g., Colorado Plateau). Where freezing is common but soils are held in place with a heavy cover of lichens, mosses, and vascular plant roots, soil surfaces have a rolling rather than pinnacled topography (e.g., northern Great Basin). Where freezing is rare, crusts are flat when only cyanobacteria are present or rugose where lichens and/or mosses occur (e.g., the Sonoran Desert; Fig. 2.2, 2.3). In non-freezing regions, a layer of pebbles often covers cyanobacterial portions of the crust.

On the broad scale of western North America there are several different vegetation zones or ecoregions that contain biological soil crusts as major components (Fig. 2.1, Table 2.2, 2.3). The ecoregions used here are similar to those used by Bailey (1998). The most prevalent arid soils in North America are silt-loams and are more susceptible to physical disturbance than are clay-loams common to many other arid regions in the world, such as the red clay-loams of Australia.

2.2 Factors Influencing Distribution

2.2.1 Elevation

Total crust cover is inversely related to vascular plant cover, as less plant cover results in more surface available for colonization and growth of crustal organisms (Fig. 2.4-A). Thus, when all crust types are combined (cyanobacterial, moss, lichen), cover is greatest at lower elevation inland sites (less than 1,000 m) compared to mid-elevation sites (1,000 to 2,500 m; Hansen et al. 1999; Fig. 2.4-B). However, relative lichen and moss cover increases with elevation and effective precipitation until vascular plant cover precludes their growth (Fig. 2.4-C). Crust organisms have reduced water and nutrient

Figure 2.3 *Biological soil crust forms based on temperature characteristics of the environment.*

HOT DESERTS

flat

rugose

COOL DESERTS

rolling

pinnacled

Table 2.2 *Soil, climatic, and vegetative characteristics for low and mid elevations in temperate North American arid and semi-arid ecoregions. Adapted from Bailey (*1995).

Ecoregion (Bailey's Ecoregion Province)	Dominant Soil Order	Soil Moisture/ Temperature	Average Annual Precipitation (mm)	Moisture Season/Form	Mean Annual Temperature Range (°C)	Predominant Evolutionary Disturbance	Vegetation Type
COOL DESERTS							
Columbia Basin (temperate semidesert)	mollisol	xeric/mesic	230-635	winter/rain spring/rain	4-14	drought	perennial grassland
Great Basin (temperate semidesert and desert)	aridisol	aridic/mesic to cryic	180-380	winter/snow spring/rain	4-13	drought	sagebrush steppe
Colorado Plateau (temperate semidesert and desert)	alfisol	xeric/thermic	205-510	winter/snow spring/rain summer/rain	4-13	drought	shrubland woodland
Great Plains (temperate steppe and dry steppe)	mollisol	ustic/mesic	485-735	winter/snow spring/rain summer/rain	8-15	fire, grazing	prairie
HOT DESERTS							
Mojave Desert (tropical/subtropical desert on sand)	aridisol	aridic/hyperthermic	100-150	winter/rain	13-29	drought	shrubland
Chihuahuan Desert (tropical/subtropical semidesert and desert on sand)	aridisol	aridic/thermic	205-325	summer/rain	10-18	drought	shrubland
Sonoran Desert (tropical/subtropical desert on sand)	aridisol	aridic/thermic	75-255	summer/rain fall/rain	10-24	drought	mixed thorn scrub
COASTAL CHAPARRAL							
California Chaparral (Mediterranean dry steppe)	mollisol	xeric/thermic	255-635	winter/rain	16-18	fire	chaparral

Table 2.3 *Dominant biological soil crust components and forms in North American arid and semi-arid ecoregions.*

Ecoregion	Dominant Biological Crust Components	Crust Morphology
Columbia Basin	tall mosses, green algae	rolling
Great Basin	moss, lichen	rolling
Colorado Plateau	non-heterocystic cyanobacteria *(Microcoleus)*, nitrogen-fixing lichens *(Collema)*	pinnacled
Great Plains	vagrant and foliose lichens	flat to rugose or rolling
Mojave Desert	non-heterocystic cyanobacteria *(Microcoleus)*, nitrogen-fixing lichens *(Collema)*, squamulose lichens, short mosses	flat to pinnacled
Chihuahuan Desert	heterocystic cyanobacteria *(Nostoc, Schizothrix)*, short moss	flat
Sonoran Desert	heterocystic cyanobacteria *(Nostoc, Schizothrix)*, gelatinous (nitroen-fixing) lichens (e.g., *Collema*), squamulose lichens, short mosses	flat
California Chaparral	heterocystic cyanobacteria *(Nostoc, Schizothrix)*, lichens, liverworts	flat

needs compared to vascular plants and can withstand the harsh growing conditions found in plant interspaces (Anderson et al. 1982a).

The positive relationship between biological crust cover and available soil surfaces has been amply demonstrated (Rogers 1972; Harper and Marble 1988; West 1990; Eldridge 1993b; Johansen 1993). As harsh environmental conditions limit vascular plant cover, greater cover of crusts in lower elevation sites probably occurs in spite of, not because of, these conditions.

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2.2.2 Soils and Topography

Stable or embedded rocks near or at the soil surface can increase the percent crust cover by perching water and armoring the surface from physical disturbances (Fig. 2.4-D). Shallow soils often support a wide variety of cyanobacteria, lichens, and mosses, regardless of soil texture (Fig. 2.4-E).

Soil texture heavily influences the species composition of biological crust communities. The more stable, fine-textured soils (such as gypsum and silty loams) support greater cover and more varied populations of cyanobacteria, lichens, and mosses (Fig. 2.4-F)

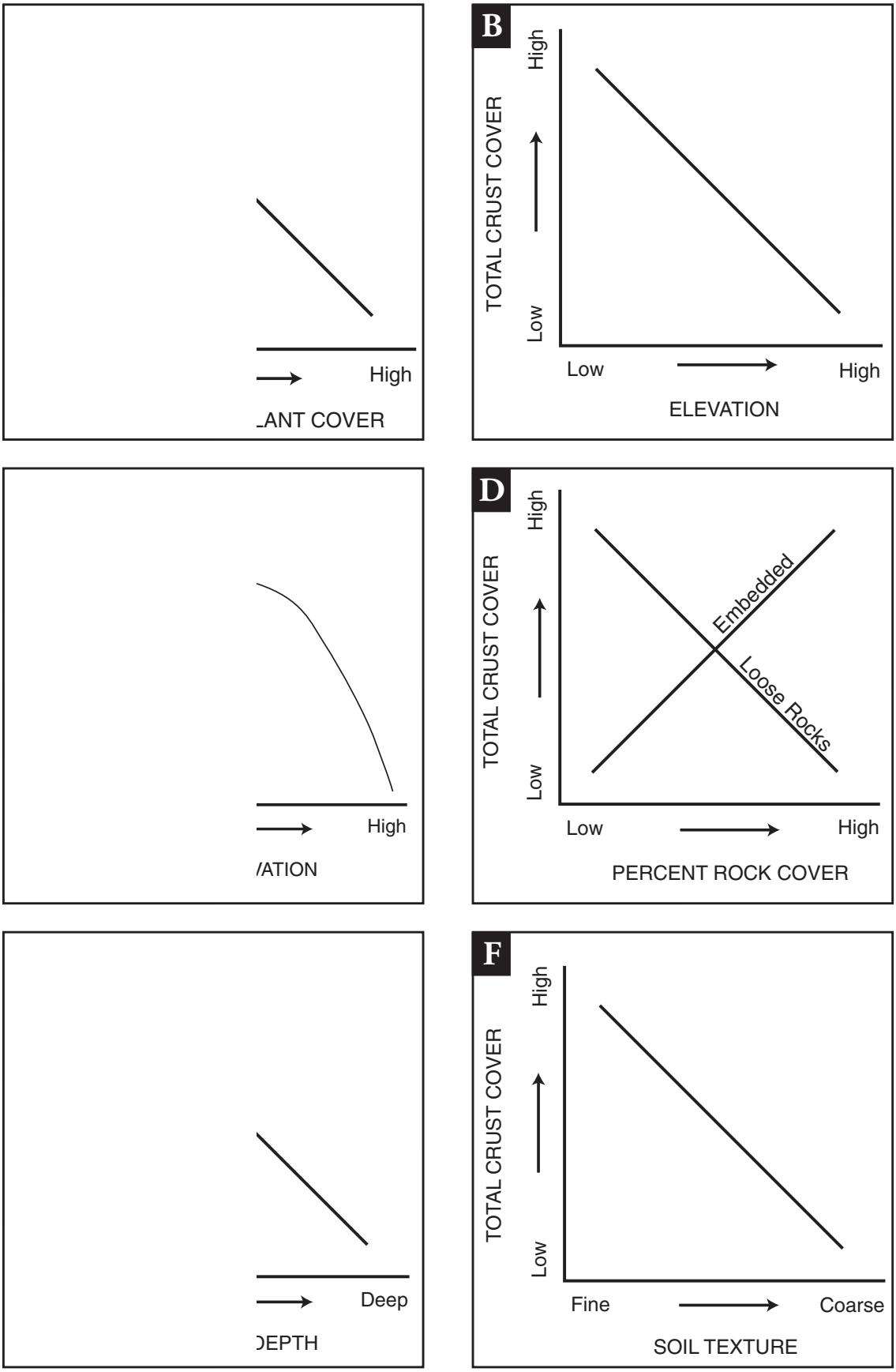

Figure 2.4 *General ecological relationships for biological soil crusts.*

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than less stable, coarse-textured soils (Kleiner and Harper 1977b; Hansen et al. 1999). Coarse-textured soils may have only large filamentous cyanobacteria that are highly mobile (such as *Microcoleus*). However, once coarse-textured soils are sufficiently stabilized by larger cyanobacteria, other crustal organisms can then colonize, including smaller green algal and cyanobacterial taxa (such as *Scytonema* and *Nostoc*). Regardless of soil type, the first lichen to colonize is generally *Collema*, followed by *Placidium* (and *Caloplaca* in the northern Great Basin). In more unstable soils, lichens and mosses may be found only under vascular plants, where some protection from sediment burial is provided, or on north slopes, where greater moisture availability favors growth. Soil surface stability is influenced by texture (percent of sand, clay, silt), depth, and moisture content (wet, moist, dry). Sand and silt are more susceptible to surface disturbance when dry, while clay is highly stable (Fig. 2.5).

In later successional stages on stable surfaces, common lichen species include *Fulgensia bracteata*, *F. desertorum*, *Squamarina lentigera*, *Diploschistes muscorum*, and *Psora* spp. Common moss genera include *Tortula*, *Bryum*, and *Grimmia*. As soil stability increases, rich communities of cyanobacteria, lichens, and mosses become more widespread, covering all surfaces not occupied by vascular plants or rock.

Soil chemistry can also influence crust cover and composition. Calcareous and gypsiferous soils generally support high coverage of species-rich crust with some taxa being excellent indicators of soil chemistry (Table 2.4). Often physical crusts form stable surfaces that perch soil moisture, and given long periods without physical disturbance, will support both biological soil crusts and lichens or mosses normally found on rocks. Other abiotic factors that influence relative cover of microbiotic crusts are slope and aspect. Crustal organisms are only active when moist, and most active when warm. Therefore, north and east slopes generally favor crustal development in lower elevation desert regions. Slope angle does not generally affect crust cover or species richness, except where the slope or soils are unstable (Rosentreter 1986; Kaltenecker et al. 1997; Belnap and Bowker, unpublished data).

2.2.3 Disturbance

Intensity and type of soil surface disturbance, along with time since disturbance, influence the composition of biological crusts (see Chapter 4). The presence, absence, and abundance of early- or late-successional taxa can provide information regarding a site's disturbance history. This information, combined with data on vascular plant community composition, can assist the land manager in understanding a site's history, potential productivity, and ecological integrity.

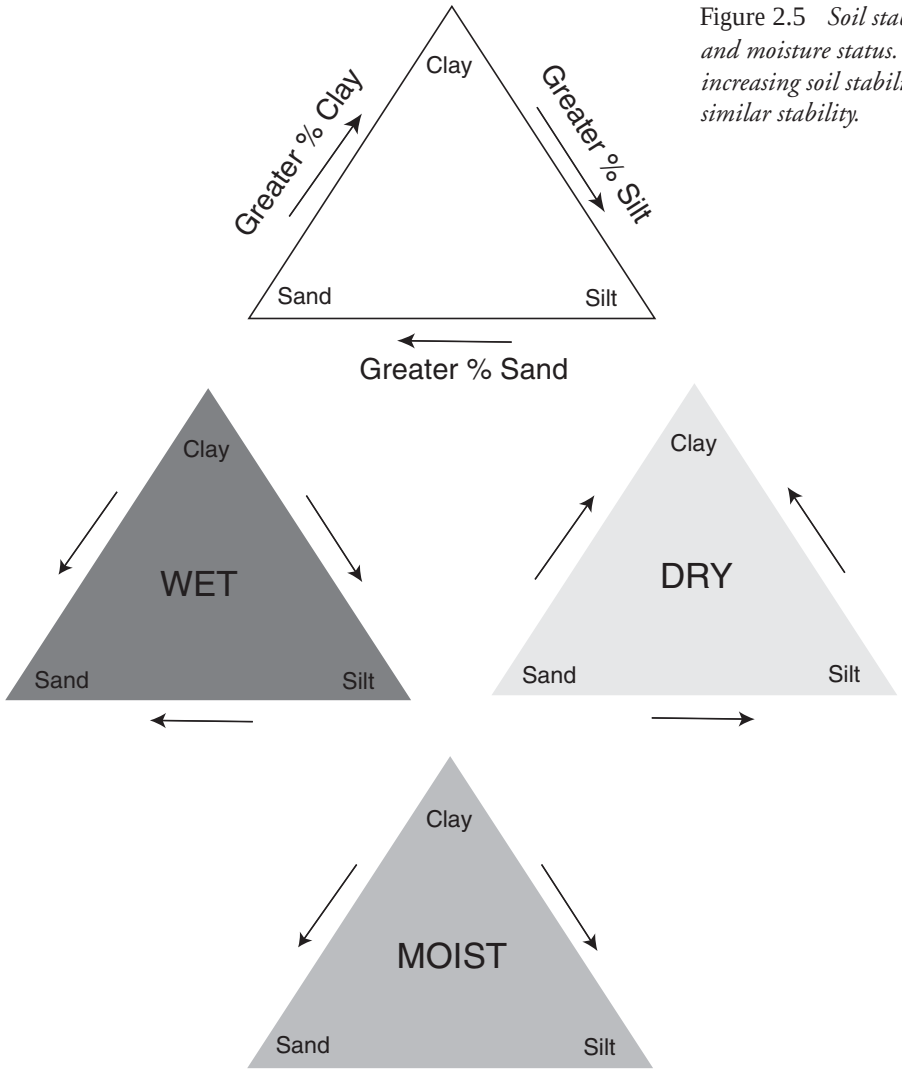

Figure 2.5 *Soil stability relative to texture and moisture status. Arrows indicate increasing soil stability. No arrow indicates similar stability.*

	Soil Texture		
	Sand	Clay	Silt
	High	High	High
	Medium-High	Low	Medium
	Medium	Low	Medium
	Low	High	Medium-Low

Table 2.4 *Soil crust lichens that are calcium carbonate indicators. Adapted from McCune and Rosentreter 1995.*

Low calcium carbonate	High calcium carbonate
Acarospora schleicheri	*Aspicilia fruticulosa*
Arthonia glebosa	*Aspicilia hispida*
Aspicilia reptans	*Buellia elegans*
Aspicilia filiforma	*Caloplaca tominii*
Cladonia borealis	*Collema tenax*
Diploschistes muscorum	*Fulgensia* spp.
Leptochidium albociliatum	*Heppia lutosa*
Megaspora verrucosa	*Phaeorrhiza nimbosa*
Ochrolechia upsaliensis	*Psora cerebriformis*
Placynthiella spp.	*Psora decipiens*
Psora nipponica	*Psora tuckermanii*
Xanthoparmelia wyomingica	*Toninia sedifolia*

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Intense disturbance results in bare soil. Severely, newly, or frequently disturbed soils are generally dominated by large filamentous cyanobacteria (Anderson and Rushforth 1976; Johansen et al. 1981, 1984; Johansen and Rushforth 1985; Harper and Marble 1988). When disturbance is less severe, less frequent, or some time has elapsed since the disturbance, crusts are generally in some mid-successional state, with some lichens and mosses present. Most of these species reproduce asexually, a life-history strategy that increases the probability of establishment (Rosentreter 1994). If disturbance continues, crusts will stay in early-successional stages (i.e., cyanobacteria only).

2.2.4 Timing of Precipitation

Dominance of biological crusts is highly influenced by seasonal precipitation patterns. Ecoregions that receive summer monsoons (e.g., the Sonoran Desert) tend to have a greater diversity of heterocystic cyanobacteria (such as *Lyngbya*, *Calothrix*, *Schizothrix*, and *Nostoc*) and lower lichen abundance. Lichens in these areas generally include the gelatinous genus *Collema* and squamulose genera *Placidium* and *Peltula* (Table 2.3). Large thalloid liverworts are more common in warm deserts than in the cool deserts of North America. In cool deserts, crusts are dominated by non-heterocystic cyanobacteria (such as *Microcoleus vaginatus*) and a diverse lichen flora, including *Acarospora schleicheri*, *Aspicilia* spp., *Candelariella*

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spp., *Collema* spp., *Diploschistes muscorum*, *Endocarpon pusillum*, *Placidium* spp., and *Psora* spp. These lichens physiologically prefer cool-season moisture and are adapted to lower light intensities common during winter months. The Columbia Basin, which receives more moisture and has more winter rain than the Great Basin, has a greater abundance of mosses than lichens (Ponzetti et al. 1998).

Biological soil crusts in regions influenced by fog, such as portions of the California Chaparral, support fruticose lichens that intercept moisture from the air (*Dendrographa* and *Schizopelte*). Biological crusts in many regions are best developed in interspaces between shrubs. In contrast, fog deserts show the best crust development under shrubs, due to the moisture intercepted by plant structure or by rock surfaces.

2.2.5 Vascular Plant Community Structure

The vertical and horizontal vascular plant structure of many arid and semi-arid vegetation communities optimizes growth of biological soil crusts. In cooler regions, greater structural diversity of vascular vegetation generally results in greater compositional diversity of biological crusts. Vascular plants create windbreaks and shade, influencing how much moisture and light reach the soil surface. They also trap leaf litter, keeping the interspaces free of substantial or persistent litter cover (Rosentreter and McCune 1992).

Invasive exotic plants generally decrease the structural diversity of native vascular plant communities by creating monocultures of densely spaced plants and by homogenizing litter distribution. They also lead to decreased biological crust cover and species richness in most ecosystems (Rosentreter 1994; Kaltenecker 1997). In addition, if moisture is retained under a litter layer for long periods while temperatures are warm, lichens can become parasitized by ubiquitous molds (Rosentreter 1984).

2.2.6 Ecological Gradients

Some lichens form natural replacement series along the same ecological gradients that influence vascular plants, although some lichen taxa are not good indicators of site conditions due to broad ecological amplitudes. For example, gelatinous lichens are most common in aridic calcareous sites and mesic non-calcareous sites (Fig. 2.6). Sites with frigid soil temperature regimes (mean annual temperature less than 8°C) lack significant cover of gelatinous lichens. The genus *Leptogium* might be present; however, *Peltigera* and *Massalongia* tend to be more common. Some species display a shift in substrate preference in different ecoregions. For example, *Leptochidium albociliatum* occurs on mosses in the Great Basin, while in the Columbia Basin it is more common and occurs on bare mineral soil (Rosentreter 1986; Ponzetti et al. 1998).

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2.2.7 Microhabitats

Biological soil crusts can also create their own microstructure, which influences species distribution. Mosses create microsites that are very low in nutrients, low in calcium carbonate, and that retain moisture longer than bare mineral soil. This creates favorable sites for lichens that may benefit from the improved moisture regime and do not require many soil nutrients. Common examples include *Leptogium lichenoides*, *Massalongia carnosa*, and *Peltigera* spp. that grow only on mosses and are found in many sagebrush (*Artemisia*) steppe habitats.

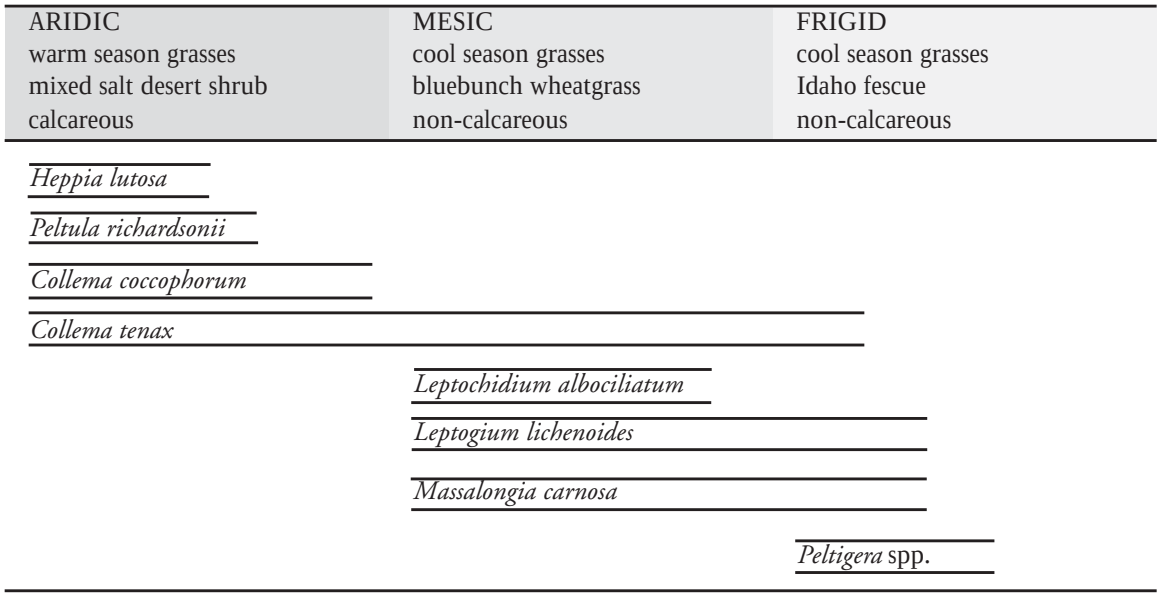
2.3 Unique Crustal Communities in North America

Special geologic features or soils create conditions that promote growth of biological soil crusts. Some of these sites support crusts containing uncommon associations or rare species. These unique crustal communities are not common across the landscape but are at times locally abundant. Some unique crustal communities are discussed below.

2.3.1 Gypsum

Gypsiferous outcrops are comprised of soils that are fine textured and have high concentrations of sulfate and calcium. Vascular plant cover at these sites is generally sparse with limited species diversity. Gypsiferous soils can support well-developed

Figure 2.6 *Gelatinous and other nitrogen-fixing lichens by relative soil temperature and calcareous influence.*



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biological crusts with a high lichen diversity (Anderson and Rushforth 1976; St. Clair et al. 1993), although sites in the hot deserts of the southwestern U.S. lack the species diversity of the cool deserts to the north. Common species include *Diploschistes diacapsis*, *Psora decipiens*, *Collema tenax*, *Placidium squamulosum*, *Buellia elegans*, and *Squamarina lentigera*. Several lichens are restricted to gypsiferous soils, including *Acarospora nodulosa* var. *nodulosa* (St. Clair and Warrick 1987), *Gypsoplaca macrophylla* (Timdal 1990), and *Lecanora gypsicola* (Rajvanshi et al. 1998). Gypsiferous sites are worthy of protection because of their high potential for cover and biological crust diversity. These sites are often threatened by mining activity due to the commercial value of gypsum.

2.3.2 Glades (Lithic and Shallow Soil Sites)

Glades are widespread across North America but are limited both locally and in overall area. Lithic and shallow soil sites are often colonized by biological crusts because these sites are extremely droughty and vascular plant growth is limited. In eastern forests, shallow disturbed or compacted soil (e.g., along roadsides) may be dominated by biological soil crusts, with *Baeomyces rufus* or *B. fungoides* often forming extensive crustal colonies. Pine barrens generally support extensive biological crusts. In western and more northern boreal forest openings, *Cladonia* spp., *Peltigera* spp., and occasionally *Multiclavula* spp. are dominant. These genera are also common on disturbed soil along roadways and cutbanks throughout the non-arid portions of the continent. Some lithic sites in wet climates are leached of soil nutrients and are often dominated by gelatinous lichens such as *Leptogium* or nitrogen-fixing cyanobacteria such as *Nostoc*.

2.3.3 Thermal Springs

Some parts of western North America contain extensive active or dormant thermal (hot) springs. Conditions in these areas are harsh, limiting vascular plant growth. Soil temperatures are often extremely high in summer and warm in winter. Soils containing thermal springs are often infertile, as warm water leaches many minerals, including calcium, magnesium, nitrogen, and phosphate. Toxic heavy metals can be present in the water and thus get deposited on the soil surface. These areas are covered with specialized thermic cyanobacteria when moist. When dry, they support either non-specialized biological crusts or crusts characteristic of gypsum.

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2.3.4 Cold Desert Playas

Small ephemeral pools form in parts of the Pacific Northwest where summers are hot and dry and winters are cool and moist (Rosentreter and McCune 1992). These sites are located on poorly drained basalt or other rock types, often barren of vascular vegetation and usually surrounded by some species of sagebrush (*Artemisia*). Drainage may be impaired by rock type or frozen soils, causing water to pond seasonally in flat, exposed areas. In late winter and early spring these sites experience cool, yet above freezing, temperatures for portions of the day. These conditions allow for slow evaporation of standing water. Such sites are sometimes referred to as playettes, as they are similar to but smaller than large seasonal lakes called playas. Playas support either attached or vagrant forms of *Dermatocarpon miniatum* and *Nostoc*. *Nostoc commune* found in these sites includes the common filamentous form, the colonial-eggs form, and occasionally the long, hair-like unattached form (referred to as var. *flagellaris*). Small playettes covered with fine silts can be colonized by *Nostoc* and by crustose lichens more typically occurring on rocks, such as *Lecanora muralis* (Rosentreter 1986).

2.3.5 Alpine Sod

Biological soil crusts are either dominant or common community components in many alpine and subalpine sites in North America. Alpine and subalpine sites contain some species common to the continent's arid regions. In contrast, a few lichens are characteristic of alpine crusts alone and include *Lecidoma demissum*, *Solorina* spp., *Lepraria neglecta*, *Ochrolechia frigida*, and *Thamnolia* spp. (DeBolt and McCune 1993). A genus that occurs on soil or rock in both alpine and arctic sites is *Stereocaulon*, which fixes nitrogen and is common worldwide in montane and alpine habitats (Lamb and Ward 1974). In the subalpine zone, biological crusts are often associated with areas where snowdrifts occur. Lichens characteristic of snow-patch sites are *Solorina crocea* and *Lepraria neglecta* (McCune 1998). Cyanobacterial crusts are also common in these areas and are generally dominated by *Nostoc* species (Reisiegl 1964).

2.3.6 Arctic Tundra

Alpine and tundra soils are often dominated by fruticose lichens (*Cladina* and *Cetraria*) and graminoids. Some areas are dominated by fruticose lichens that start out as crust communities in the early stages of succession. Tundra areas in North America have poor drainage due to frozen ground and are similar to other portions of the northern hemisphere, including Greenland. In some arctic regions there are also large areas of dry steppe-like vegetation, open

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Dryas heaths, and fell-fields with extensive coverage of biological crusts. Cyanobacterial crusts are commonly extensive and often dominated by *Nostoc* species (Hansen 1997).

2.4 Example: Biological Soil Crusts in Sagebrush Communities

Sagebrush species are common in western North America, particularly in the Great Basin and Columbia Plateau vegetation zones. Some of the same characteristics that influence sagebrush taxa distribution also influence biological crust development. Relative cover of biological crusts in various sagebrush vegetation types is presented in Table 2.5. Biological soil crusts tend to be lacking in sagebrush types that occur on seasonally flooded soils (silver, alkali, and fuzzy sagebrush; Winward 1980), as flooded soils create anaerobic conditions that are not well tolerated by lichens. Heavily saline soils also lack lichen cover, although moss is sometimes present if the salt concentration is not too great. Mountain, subalpine, and xeric big sagebrush types often lack significant biological crust cover due to dense vascular vegetation and accumulating plant litter. Other sagebrush types support higher biological crust cover unless soil surfaces are greatly disturbed or the current vegetation is in an early-successional stage.

Some lichens are good indicators of late-successional stages in sagebrush communities. The dual gradient theory proposed by McCune (1993) for lichen species succession in forested habitats applies well to arid and semi-arid regions in that species respond to time (age) and moisture in similar successional trajectories. Therefore, the length of time since the last major site disturbance or an increase in effective soil moisture will both provide suitable ecological conditions to support specific lichen species. This is why biological soil crust communities in different ecoregions recover at different rates (Table 2.2, Chapter 4).

Late-successional indicator species in sagebrush-steppe include *Acarospora schleicheri*, *Massalongia carnosa*, *Pannaria cyanolepra* (type b), *Trapeliopsis wallrothii*, *Trapeliopsis* sp. nov. (McCune, unpublished), and *Texosporium sancti-jacobi*. Some lichens are only present in late-successional communities because they grow upon other lichens or mosses. For example, *Acarospora schleicheri* grows upon *Diploshistes muscorum*, which in turn parasitizes the lichen genus *Cladonia*. Therefore, *Cladonia* can be considered a keystone organism influencing a site's diversity. *Massalongia carnosa* primarily grows on mosses and is not present until mosses become well established within a site. *Texosporium sancti-jacobi* is restricted to old-growth sagebrush communities and occurs only on decaying organic matter (McCune and Rosentreter 1992). Other lichens that commonly occur on decayed organic matter but are not restricted to old-growth sites include *Buellia papillata*, *B. punctata*, *Caloplaca* spp., *Lecanora* spp., *Megaspora verrucosa*, *Ochrolechia upsaliensis*, *Placynthiella* spp., and *Phaeophyscia decolor*.

Table 2.5 *Relative cover of biological soil crusts in sagebrush (Artemisia) vegetation types.*

HIGH biological crust cover	LOW biological crust cover
Tall Sagebrush	
Wyoming big sagebrush *(A. tridentata* ssp. *wyomingensis)*	subalpine big sagebrush *(A. tridentata* ssp. *spiciformis)*
basin big sagebrush *(A. tridentata* ssp. *tridentata)*	xeric big sagebrush *(A. tridentata* ssp. *xericensis)*
mountain big sagebrush** *(A. tridentata* ssp. *vaseyana)*	mountain big sagebrush** *(A. tridentata* ssp. *vaseyana)*
	silver sagebrush *(A. cana)*
	three-tip sagebrush *(A. tripartita)*
Short Sagebrush	
low sagebrush *(A. arbuscula)*	alkali sagebrush *(A. longilobia)*
black sagebrush *(A. nova)*	fuzzy sagebrush *(A. papposa)*
stiff sagebrush *(A. rigida)*	
Bigelow sagebrush *(A. bigelowii)*	
fringed sage *(A. frigida)*	

**Biological crust cover high or low depending on site characteristics.

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CHAPTER 3

ECOLOGICAL ROLES

In a given ecoregion, ecological roles of biological soil crusts can vary widely in their importance and will depend on crust composition and biomass, as well as characteristics of the specific ecosystem being considered.

3.1 Species Composition and Biomass

The relative importance of biological crusts and their different ecological roles within an ecosystem is highly dependent on relative cover of various crustal components. For example, carbon inputs are higher when mosses and lichens are present than when the crust is dominated by cyanobacteria. Nitrogen inputs are higher with greater cyanobacterial biomass and greater cyanolichen cover. Water infiltration and soil surface stability are related to cyanobacterial biomass as well as moss and lichen cover.

3.2 Carbon Fixation

Biological soil crusts can be an important source of fixed carbon on sparsely vegetated areas common throughout western North America (Beymer and Klopatek 1991). While vascular plants contribute organic matter to soils directly beneath them, large interspaces between plants receive little plant material input. Where biological soil crusts are present, carbon contributed by these organisms helps keep plant interspaces fertile, providing energy sources for soil microbial populations.

Crustal organisms are physiologically active only when wet, and metabolic functions begin almost immediately. Respiration begins less than 3 minutes after wetting, while photosynthesis reaches full activity after 30 minutes or more. Soil oxygen concentrations, a by-product of photosynthesis, reach steady states within 1 to 2 hours of wetting (Garcia-Pichel and Belnap 1996). Rain during hot months can place lichens in a state of carbon deficiency, as the lichens can dry out before photosynthesis has begun. Jeffries et al. (1993a, b) showed cyanobacterial crusts from the Colorado Plateau had positive carbon balances only during prolonged wet periods, such as winter and spring, and that short-term wet-dry cycles, which often occur in low-elevation inland sites during summer, resulted in net carbon loss for both *Microcoleus*- and *Scytonema*-dominated crusts (this would also be expected for *Collema* and other soil lichens). Consequently, timing

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and duration of precipitation may heavily influence carbon budgets in crustal organisms and thus influence the distribution of individual species.

Winter-rain deserts (e.g., Mojave and Great Basin) have a rich soil lichen flora, with the cyanobacterial flora heavily dominated by *Microcoleus*. In contrast, summer-rain deserts (e.g., Sonoran) have only a small subset of the lichens found in winter-rain deserts, while the cyanobacterial flora is a complex community co-dominated by up to 10 species. Different responses to timing and amount of precipitation and temperature may mean species composition will shift in response to predicted climate changes. Since many areas that are currently winter-rain dominated are predicted to receive increased summer rain, effects of climate change may be reflected in different soil crust composition than that currently found in the summer-rain versus the winter-rain deserts.

Soil lichens have several different strategies to optimize carbon gain (Lange et al. 1992, 1994, 1997). While photosynthesis is activated at low-water content for all species, each varies in response to higher water content. Cyanolichens, such as *Collema tenax*, showed dramatic drops in carbon fixation when water content exceeded 60 to 80%. Conversely, green algae generally showed little, if any, depression at high-water content. Water-holding capacity varies between lichens and will also influence time of carbon fixation for a given species.

Table 3.1 *Common nitrogen-fixing lichens and cyanobacteria in cool and hot deserts of the western U.S.*

Cool Deserts	Hot Deserts
Lichens	
Collema coccophorum	*Collema coccophorum*
Collema tenax	*Collema tenax*
Heppia	*Heppia*
Leptochidium albocilitatum	*Peltula*
Leptogium	
Massalongia carnosa	
Pannaria	
Peltigera	
Polychidium	
Cyanobacteria	
Microcoleus vaginatus (non-heterocystic)	*Schizothrix* (heterocystic)
Nostoc (heterocystic)	*Nostoc* (heterocystic)
Scytonema (heterocystic)	*Scytonema* (heterocystic)

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Photosynthetic rates are also dependent on temperature (Rychert et al. 1978; Lange 1980; Nash et al. 1982; Nash and Moser 1982; Lange et al. 1997). Photosynthetic rates increase with increasing temperatures to about 28°C, above which rates decline dramatically. *Collema tenax* is an exception, with no such decline seen up to 36°C.

3.3 Nitrogen Fixation

Nitrogen concentrations are known to be low in desert soils compared to other ecosystems. Total atmospheric input over the past 10,000 years has been conservatively estimated at about 3 kg nitrogen/m^2, with 77% lost through wind erosion, ammonia volatilization, nitrification, and denitrification (Peterjohn and Schlesinger 1990). Extensive surveys in cool deserts have revealed only a few nitrogen-fixing plants (Farnsworth et al. 1976; Wullstein 1989). Since nitrogen can limit net primary productivity in many desert ecosystems (Ettershank et al. 1978; James and Jurinak 1978; Romney et al. 1978; Nobel et al. 1988), maintaining normal nitrogen cycles is critical to soil fertility and prevention of desertification (Dregne 1983).

Cyanobacteria and cyanolichens can be an important source of fixed nitrogen for plants and soils in desert ecosystems (Evans and Ehleringer 1993; Belnap 1995). Many biological soil crusts in western North America are dominated by nitrogen-fixing cyanobacteria and lichens (Table 3.1). These organisms are capable of both light and dark nitrogen fixation (Rychert and Skujins 1974; Pearson et al. 1981; Paerl 1990; Belnap 1994). Nitrogen fixation is highly dependent on past and present water and light regimes, as well as species composition (Rychert et al. 1978; Belnap 1994). Fixation rates are highest after photosynthesis has replenished lichen carbon stores. For most lichen species, nitrogen-fixation rates increase with temperature to 25°C, given sufficient moisture. Since nitrogen-fixation rates depend on the cover of specific crust species, timing, extent, and type of past disturbance are also critical factors (Belnap 1995, 1996). Nitrogen-fixation rates in biological soil crusts have been estimated at 2 to 365 kg/ha annually (Mayland et al. 1966; MacGregor and Johnson 1971; Rychert and Skujins 1974; Eskew and Ting 1978; Jeffries et al. 1992), with recent studies indicating that higher rates are probably more accurate (Belnap, unpublished data). Still, rates are expected to vary greatly, depending on the species present and environmental conditions.

Five to 88% of nitrogen fixed by *Nostoc* has been shown to leak into the surrounding substrate (Magee and Burris 1954; Silvester et al. 1996; Belnap et al. 1997). Nitrogen released from crustal

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Figure 3.1 *Disturbance plots on the Colorado Plateau showing the difference in soil surface color between undisturbed (dark) and disturbed (light) plots. Note that the undisturbed plots have greater surface roughness than the disturbed plots.*

organisms is readily taken up by surrounding vascular plants, fungi, and bacteria (Mayland and MacIntosh 1966; Mayland et al. 1966; Stewart 1967; Jones and Stewart 1969). Vascular plants growing in biologically crusted soils show higher tissue concentrations of nitrogen than plants grown in uncrusted soils (Harper and Pendleton 1993; Belnap 1994, 1995; Belnap and Harper 1995). As with carbon, crusts contribute nitrogen to soils both under plants and in plant interspaces, thereby counteracting the tendency of these nutrients to concentrate around perennial plants.

3.4 Albedo

Soil albedo is a measure of the energy reflected off the soil surface. Dark surfaces absorb more energy, are warmer than light surfaces, and thus have lower albedo. Because soils with well-developed biological crusts are dark, they can be up to 23°F warmer than adjacent crusted surfaces (Fig. 3.1; Belnap 1995; Belnap, unpublished data). Disturbance of biological crusts increases albedo and therefore decreases soil temperatures. This affects many ecosystem processes. Metabolic processes, for example, including photosynthesis and nitrogen fixation, decrease at lower temperatures (see Sections 3.2 and 3.3; Nash 1996). Lower soil temperatures decrease microbial activity, plant nutrient uptake rates, and soil water evaporation rates; delay seed germination time; and decrease seedling growth rates. Timing of these events is often critical in deserts, and modifications can reduce species fitness and seedling establishment, which in turn may eventually affect plant community structure (Bush and Van Auken 1991). Changes in albedo can also affect animal populations. For instance, foraging times are often partitioned among ants, arthropods, and small mammals on the basis of soil surface temperature (Doyen and Tschinkel 1974; Wallwork 1982; Crawford

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1991). In addition, many small desert animals are weak burrowers, and soil surface microclimates are of great importance to their survival (Larmuth 1978). Consequently, altering surface temperatures can affect desert ecosystems at numerous levels.

3.5 Effects on Vascular Plants

3.5.1 Seed Germination

Biological crusts can affect vascular plant germination. While small cracks and crannies on the soil surface are generally sufficient for small-seeded plants to lodge and germinate, most large-seeded plants need soil or plant litter cover to germinate. In deserts where plant litter is often limited in interspaces, large native seeds generally have self-burial mechanisms (such as hygroscopic awns) or are cached by rodents. Many exotic species, however, lack self-burial mechanisms. Because biological crusts stabilize soils, germination of such seeds can be inhibited in sites with well-developed crusts and low plant litter, as was recently demonstrated for the annual exotic grass, cheatgrass (*Bromus tectorum*), in both the field and laboratory (Larsen 1995; Kaltenecker et al. 1999a; Belnap, unpublished data). Though crusts can reduce germination of some seeds, seedling germination *per se* has not been shown to limit species density in desert plant communities. Rather, studies worldwide show vascular plant cover and structure are most often controlled by water and/or nutrient availability rather than other site factors (Mabbutt and Fanning 1987; Tongway and Ludwig 1990; Dunkerley and Brown 1995).

3.5.2 Plant Establishment and Cover

Biological soil crusts have not been shown to present a barrier to seedling root penetration once seeds germinate (Belnap, unpublished data; Pendleton and Meyer, unpublished data). This is in contrast to physical crusts, which often inhibit root penetration. Areas

Figure 3.2 *Sandberg bluegrass* (Poa secunda) *growing in well-developed biological soil crusts in the northern Great Basin.*

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that have been lightly trampled (to keep crusts from developing) over a 5-year period that included both wet and dry years show no additional plant establishment (Belnap, unpublished data; Fig. 3.1). Many authors have shown that seedling establishment of both forbs and grasses is either not affected or is increased by the presence of biological soil crusts, on both coarse- and fine-textured soils (Fig. 3.2; St. Clair et al. 1984; Harper and St. Clair 1985; Eckert et al. 1986; Harper and Marble 1988; Lesica and Shelley 1992; Belnap 1993).

Numerous authors have reported that biological crusts either do not compete with vascular plants (Kleiner and Harper 1972, 1977a, b; Anderson et al. 1982b; Jeffries and Klopatek 1987; Beymer and Klopatek 1992) or that vascular plant cover is enhanced by the presence of a biological crust (Dadlich et al. 1969; Graetz and Tongway 1986; Rosentreter 1986; Mucher et al. 1988; Carleton 1990; Ladyman and Muldavin 1994; Ladyman et al. 1994). This suggests that the presence of plants can aid the survival of crustal components, perhaps because of microclimate conditions associated with clumped perennial vegetation (such as decreased soil surface temperatures, increased surface moisture due to shading, and decreased wind speed on the soil surface). A few authors have speculated that there is a negative relationship between cover of biological crusts and vascular plants (Savory 1988 reviewed in West 1990). However, this view is not supported by the numerous studies that have directly addressed this issue. Rather, it appears more likely that biological crusts simply cover soils unoccupied by vascular plants.

3.5.3 Nutrient Levels in Vascular Plants

Plants growing in biologically-crusted soil often show higher concentrations and/or greater total accumulation of various essential nutrients than do plants growing in adjacent, uncrusted soils (Belnap and Harper 1995; Harper and Belnap in press). In one study, leaf tissue nitrogen was 9% higher in the perennial shrub *Coleogyne*, 31% higher in the perennial forb *Streptanthella*, and 13% higher in the annual grass *Festuca* (*Vulpia*), for plants growing in biologically-crusted soil compared to plants in adjacent uncrusted soil. Dry weight of *Festuca* plants in the crusted soil was twice that of plants in the uncrusted soil (Belnap 1995; Belnap and Harper 1995). Nitrogen concentrations in leaf tissue of the biennial *Mentzelia multiflora* was higher in plants growing in a biologically-crusted area relative to plants from an adjacent sand dune that lacked a crust. In greenhouse experiments, nitrogen levels in *Sorghum halepense* were higher when the plant was in pots with cyanobacteria than when in pots without cyanobacteria. Dry weight of plants in pots with cyanobacteria were up to four times greater than in pots without cyanobacteria (Harper

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and Pendleton 1993). Other authors have obtained similar results with other species (Shields and Durrell 1964; Brotherson and Rushforth 1983; Pendleton and Warren 1995).

Several mechanisms may explain this enhanced effect on vascular plant growth and nutrient status. Material blowing across biological soil crusts can become trapped, either accumulating within low pockets in the microtopography or sticking by exudate to cyanobacterial sheaths. These sheaths are phototropic, and if not buried too deeply, will push through loose soil and organic matter, further trapping or entangling soil in the process (Fryberger et al. 1988; Campbell et al. 1989; Gillette and Dobrowolski 1993). Danin et al. (1989) proposed a positive feedback loop in which crusts trapping fine particles create nutrient-rich microsites, increasing germination and growth of vascular plants, which in turn reduces erosion potential and increases accumulation of washed or wind-blown soil.

In addition, cyanobacterial sheath material is often coated with negatively charged clay particles. These clay particles are more nutrient rich than sand (Black 1968), as they bind positively charged macronutrients and prevent them from leaching through the soil profile (Belnap and Gardner 1993). Lange (1974) demonstrated that compounds in the gelatinous sheath material of several cyanobacteria taxa were able to chelate iron, copper, molybdenum, zinc, cobalt, and manganese. Four of the five genera shown to possess this ability (*Anabaena*, *Anacystis*, *Lyngbya*, and *Nostoc*) are commonly represented in biological crusts of western North American deserts (Shields and Durrell 1964). It is also possible that the nutrient differences result from thermal effects, as crusted soils are darker and warmer than uncrusted soils; nutrient uptake by vascular plants would occur at a higher rate.

Herbivores and other consumers may benefit directly from the enhanced nutrient status of plants grown in healthy, biologically-crusted soils (Belnap and Harper 1995). Indirect effects include positive correlations between soil mycorrhizae and microarthropod populations with the presence of well-developed biological soil crusts (Harper and Pendleton 1993; Belnap, unpublished data).

3.6 Water Relations

The effect of biological soil crusts on soil-water relations is highly site dependent. Level of crustal development (e.g., cover and relative composition of cyanobacteria, lichen, moss), climatic regimes, the amount of surface roughness, time since destructive disturbance, soil texture, and soil structure can all heavily influence hydrologic cycles at a given site. Soil texture is especially important and can

override any effect of biological soil crusts. For instance, soils high in shrink-swell clays have relatively low infiltration rates, regardless of biological crust presence or absence.

Research conducted under a variety of soil and climate conditions around the world shows variable and interactive effects of biological crusts and soil properties. Biological crusts influence soil hydrology because they alter soil surfaces. Aggregate stability, soil structure, organic matter, and rough microtopography are all attributes associated with superior hydrologic properties, and biological soil crusts enhance these attributes in soil (Booth 1941; Fletcher and Martin 1948; Shields and Durrell 1964) on both micro- and macro-scales (Belnap and Gardner 1993; Belnap 1994).

Infiltration rates are controlled by the interaction of water-residence time on a soil surface and the permeability of that surface.

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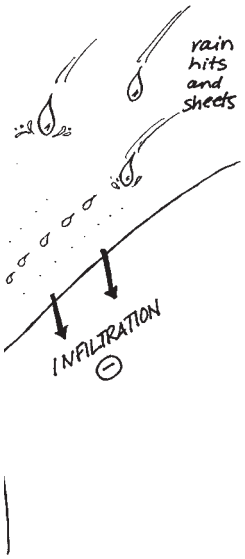

Figure 3.3 *Soil-water relationships with biological soil crusts. In the cool deserts (Colorado Plateau, Great Basin), roughened soil surfaces created by biological crusts act to impede overland water flow, resulting in increased infiltration. When biological soil crusts are removed, or with flat crusts in the hot deserts (Sonoran, Mojave, Chihuahuan), water runs over the soil surface unimpeded and infiltration is reduced.*

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Biological crusts can produce a rough surface microtopography (less than 100 mm vertically) that acts as detention structures for water (Danin and Barbour 1982). This is especially pronounced in cool deserts (e.g., the Colorado Plateau), where frost-heaving is common and crusts are highly pedicelled. In these regions, biological crusts generally increase water infiltration (Fig. 3.3; Loope and Gifford 1972). In warm deserts, where frost-heaving is not present and biological soil crusts are flat, infiltration rates depend more on soil type and climatic regimes.

While greater surface roughness can increase water pooling and residence time, the presence of mucilaginous cyanobacteria in soil crusts can also decrease soil permeability. These cyanobacterial components of biological soil crusts rapidly swell up to 13 times their dry volume (Shields and Durrell 1964; Campbell 1977), potentially closing flow pathways through the soil surface. Scanning electron microscopy shows sufficient openings in sandy loam soils for water flow (Belnap and Gardner 1993), but concentration of silt and clay particles in the crust, in combination with swelling, may restrict infiltration even in sandy soils when they are wet (Verrecchia et al. 1995). Some authors speculate that the hydrophobic nature of some crustal components contributes to soil surface sealing (Bond 1964; Dulieu et al. 1977; Walker 1979; Rutin 1983; Jungerius and van de Meulen 1988); however, others have shown crustal organisms at some sites are highly hydrophilic (Kidron et al. 1999).

Overall, infiltration rates appear to be increased in regions where crusts are pinnacled and decreased in regions where crusts are flat. This has been reported for sandy soils in Arizona (Brotherson and Rushforth 1983), Australia (Bond 1964; Rogers 1977; Stanley 1983; Graetz and Tongway 1986; Eldridge 1993a, b), and Israel (Yair 1990). In New South Wales, Australia, infiltration rates increased on a transect through a sandy-loam soil as grazing decreased and biological soil crust cover increased. However, compared with adjacent ungrazed soils with a continuous cover of lichens and mosses, the lightly grazed areas showed greater infiltration (Eldridge 1993b). Infiltration studies conducted on sandy soils in Oklahoma and Kansas (Booth 1941) and silt-loams and clayey silt loams in Arizona (Faust 1970, 1971) failed to find any influence of biological soil crusts on infiltration rates.

The influence of biological soil crusts on effective hydraulic conductivity (the rate at which water moves through the soil profile under field conditions) is also variable. Lichen-dominated crusts in Utah showed decreased hydraulic conductivity (Loope and Gifford 1972). Lichen and algal crusts in Australia were associated with high conductivity (Greene et al. 1990). Three-year-old algal crusts in Utah and non-disturbed crusts in Nevada showed no discernible influence on conductivity (Williams 1993; Dobrowolski 1994).

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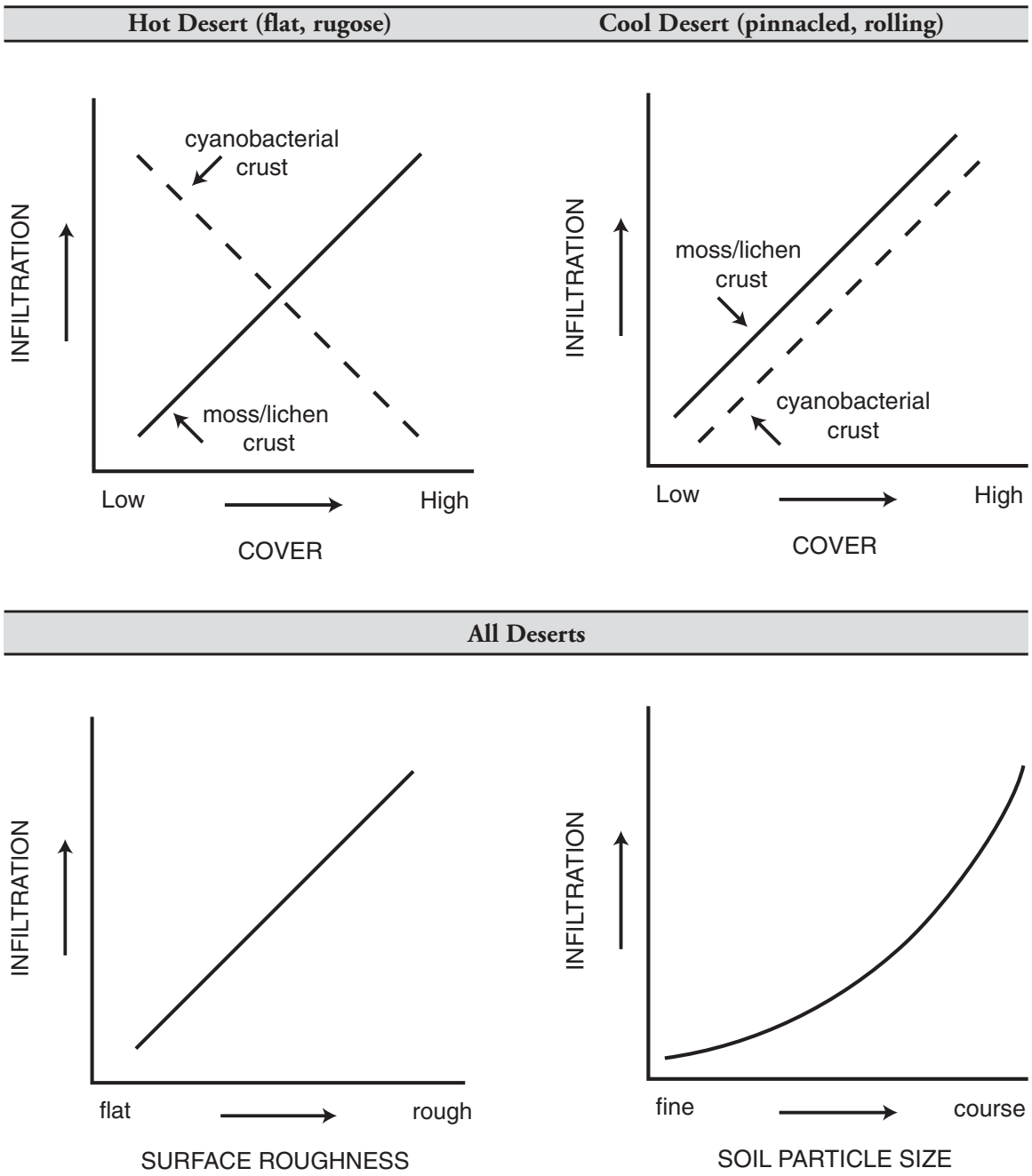
Biological soil crusts have varied effects on soil moisture at any given time. However, research results have been variable and again appear to depend on soil type and crust composition. The crust's ability to seal the soil surface and reduce evaporation because of its associated high clay and silt concentrations has been repeatedly proposed (Danin 1978; Brotherson and Rushforth 1983; Williams et al. 1995a). While some studies show soil moisture is greater under well-developed crusts (Harper and Marble 1988; Meyer and Garcia-Moya 1989; Verrecchia et al. 1995; Belnap et al. 1996), other studies have found decreased soil moisture under crusted surfaces (Harper and Marble 1988).

Though overall infiltration of precipitation is critical for plant growth, the location of water entering the soil can also be critical in maintaining plant community structure. Recent work has shown that the pattern of water infiltration and runoff is important in maintaining vegetative community structure, especially in hyper-arid zones where rainfall is too low to support homogenous distribution of vegetation. Instead of being distributed across the landscape, plants are concentrated in bands that occur perpendicular to the water flow. These bands or vegetation clumps capture water, nutrients, and fine soil particles. The bigger the bands, the more effective they are in resource capture; however, their overall size is limited by rainfall and nutrients. Biological soil crusts often cover interband soils. When these interband areas are disrupted, water infiltration can increase between vegetated areas; thus, less water is available for the vegetation, often deep-rooted, woody perennials (Eldridge et al. 2000). This decrease in water availability may lead to changes in plant community structure by enabling establishment of shallow-rooted species in the interband areas or by die-off of the perennial shrubs. Over time, changes in hydrology and plant community structure result in modification of site potential and ecological function. A similar situation applies to exotic plant invasions and their effects on site function. In the Great Basin, invasive exotic annual grasses modify the native community's patchy structure to a more homogenous structure (Kaltenecker 1997). The resultant increases in plant and litter density in interspaces previously occupied by biological crusts affect moisture infiltration, which may further facilitate changes in community structure because less moisture becomes available for deeply-rooted perennial plants.

As can be seen above, the impact of biological soil crusts on hydrologic cycles can be highly variable and can result from a combination of site, soil, and crust factors (Fig. 3.4). However, lack of standardized data collection methods and descriptions of soil, biological crust, and climatic characteristics at study sites makes comparison of research results difficult. These shortcomings have

Figure 3.4 *Biological soil crust and soil characteristics that influence infiltration.*



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undoubtedly contributed to much of the seemingly contradictory published information.

3.7 Soil Stabilization

Biological soil crusts are unambiguously effective in reducing wind and water erosion of soil surfaces (Belnap and Gillette 1997, 1998; McKenna-Neumann et al.1996). Wind can be a major erosive force in deserts, as sparse vegetation leaves large patches of soil unprotected by plant litter or vegetative cover (Goudie 1978). Interspace soils are most often stabilized by rocks or biological soil crusts. Biological crusts play an important role both in preventing soil loss and facilitating soil accretion. The degree to which different types of crusts protect the soil surface from both wind and water erosion is hierarchical in the following manner: bare soil < cyanobacterial/algal crust < lichen crust < moss crust (Tchoupopnou 1989; Kinnell et al. 1990; Eldridge and Greene 1994; Belnap and Gillette 1998). Polysaccharides exuded by cyanobacteria and green algae, in combination with lichen and moss rhizines, entrap and bind soil particles together, increasing the size of soil aggregates (Fig. 3.5). As soil aggregates enlarge, they become heavier, have a greater surface area, and are more difficult for wind or water to move. Biological soil crusts keep otherwise loose sandy soils in place on steep slopes; they also stabilize pockets of very shallow soil (Bond and Harris 1964; Marathe 1972; Gayel and Shtina 1974; Danin and Yaalon 1980; Schulten 1985; Graetz and Tongway 1986; Campbell et al. 1989; Danin et al. 1989; Belnap and Gardner 1993). Rough microtopography creates a still-air boundary layer that protects the soil surface from wind erosion. Detention dams pool and slow overland water flow, giving sediment time to settle out, reducing sediment loss (Fig. 3.3; Brotherson and Rushforth 1983; Alexander and Calvo 1990).

Fig. 3.5 *The sheath of* Microcoleus vaginatus *contains sticky polysaccharides that entrap soil particles and bind them together.*

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CHAPTER 4

RESPONSE TO NATURAL IMPACTS AND HUMAN ACTIONS

4.1 Evolutionary History of Natural Impacts

Euro-American settlement of western North America in the 19th and 20th centuries changed the type, timing, and intensity of natural disturbance. The following is a discussion of the nature of two processes—grazing and fire—in presettlement ecosystems.

4.1.1 Grazing Characteristics

Soil and plant characteristics of low- and mid-elevation arid and semi-arid ecosystems in North America west of the Rocky Mountains indicate that these ecosytems evolved with low levels of soil surface disturbance. This is suggested by these ecosystems' dependence on nitrogen provided by the biological soil crusts (Evans and Ehleringer 1993; Evans and Belnap 1999) and by dominant bunchgrasses' lack of adaptation (such as tillering, secondary compounds, or high tissue silica content) to grazing (Mack and Thompson 1982; Martin 1975; Stebbins 1981). Large mammal numbers would have been low due to limited surface water and sparse vegetation. Limited water availability would have restricted use of lower elevations to winter seasons, as is seen today (West 1988; Parmenter and Van Devender 1995). Dung beetles, present globally in other systems with large mammal herds, are also lacking in western North America (Fig. 4.1; Mack and Thompson 1982). Shallow soils can also limit distributions of burrowing vertebrates and invertebrates, further reducing soil surface disturbance. Current natural

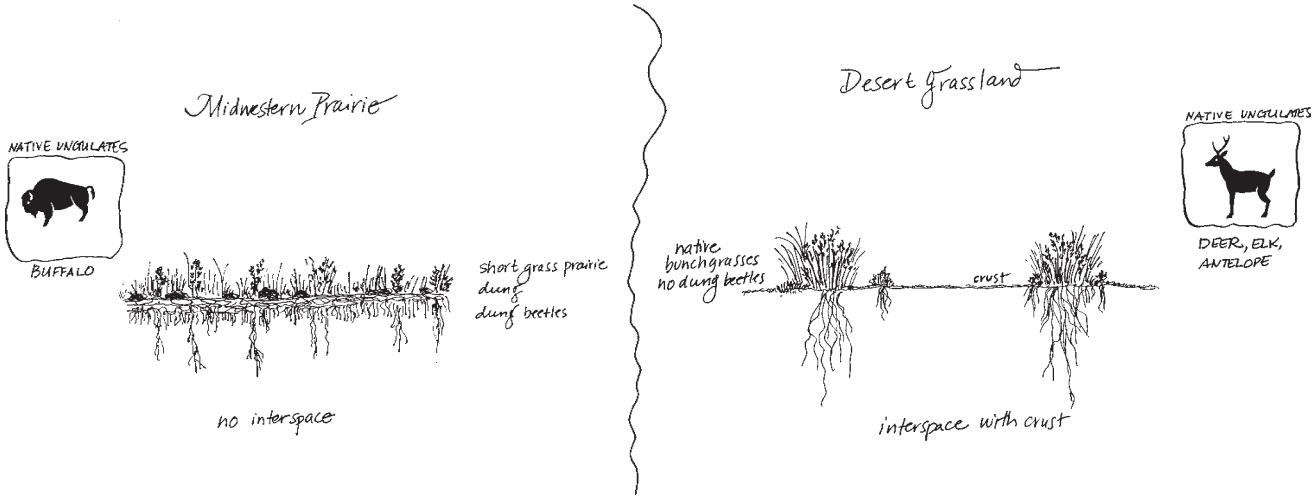

Figure 4.1 *Comparison of community structure in ecosystems that evolved with (midwestern prairie) and without (desert grassland) large herds of grazing mammals.*

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disturbance by large mammals and burrowing fauna in western North American deserts is greatest in the Sonoran and Chihuahuan Deserts, moderate in the Mojave Desert and Great Basin, and low in the Colorado Plateau. Because of their evolutionary history, these regions appear to be more negatively affected by soil surface disturbances than regions like the Great Plains that evolved with higher levels of surface disturbance (see section 4.2).

4.1.2 Fire

In arid and semi-arid native communities, plants have patchy distributions that result in discontinuous fuel and mosaics of various fire intensities (Whisenant 1990). Biological soil crusts provide little fuel to carry a fire through interspaces, thereby acting as "refugia" to slow the spread of fire and decrease its intensity (Rosentreter 1986). Unburned islands of vascular vegetation and biological soil crust provide propagules for reestablishment in burned areas (Fig. 4.2). Johansen et al. (1993) observed that the crust's structural matrix was left intact following low-intensity fire, indicating that a lightly burned crust still functions to maintain stability against erosive forces for both vascular plants and biological soil crusts during the recovery period.

Fire is a natural determinant of the sagebrush-steppe potential vegetation types. Historical fire patterns helped create mosaics of successional stages in both vascular plant and biological soil crust communities. More productive sites generally have fire-return intervals of less than 30 years (Burkhardt and Tisdale 1976; Arno and Gruell 1983; Fisher et al. 1987). Although this time period might constrain biological soil crust recovery, higher precipitation enhances regrowth (see section 4.3.3; McCune 1993). Fifty to 100 years has often been cited as the average return interval in shrub-steppe regions (Wright et al. 1979; Peters and Bunting 1994) and is adequate to restore biological soil crust components. However, there is no direct evidence for fire being a cyclic disturbance in lower elevation shrub-steppe. Here, shrub die-off from insect, disease, and winter kill is common and is probably responsible for most shrub turnover (McArthur et al. 1990). Historic fires were probably small, low intensity, patchy, and uncommon because of sparse and discontinous vegetation. Fire was not historically a common disturbance in most salt-desert shrub types (West 1994), except for the more productive types supporting Great Basin wildrye (*Elymus cinereus*). Likewise, sparsity of vegetation in the southwestern deserts resulted in long fire-return intervals and low-intensity fires (Allen 1998).

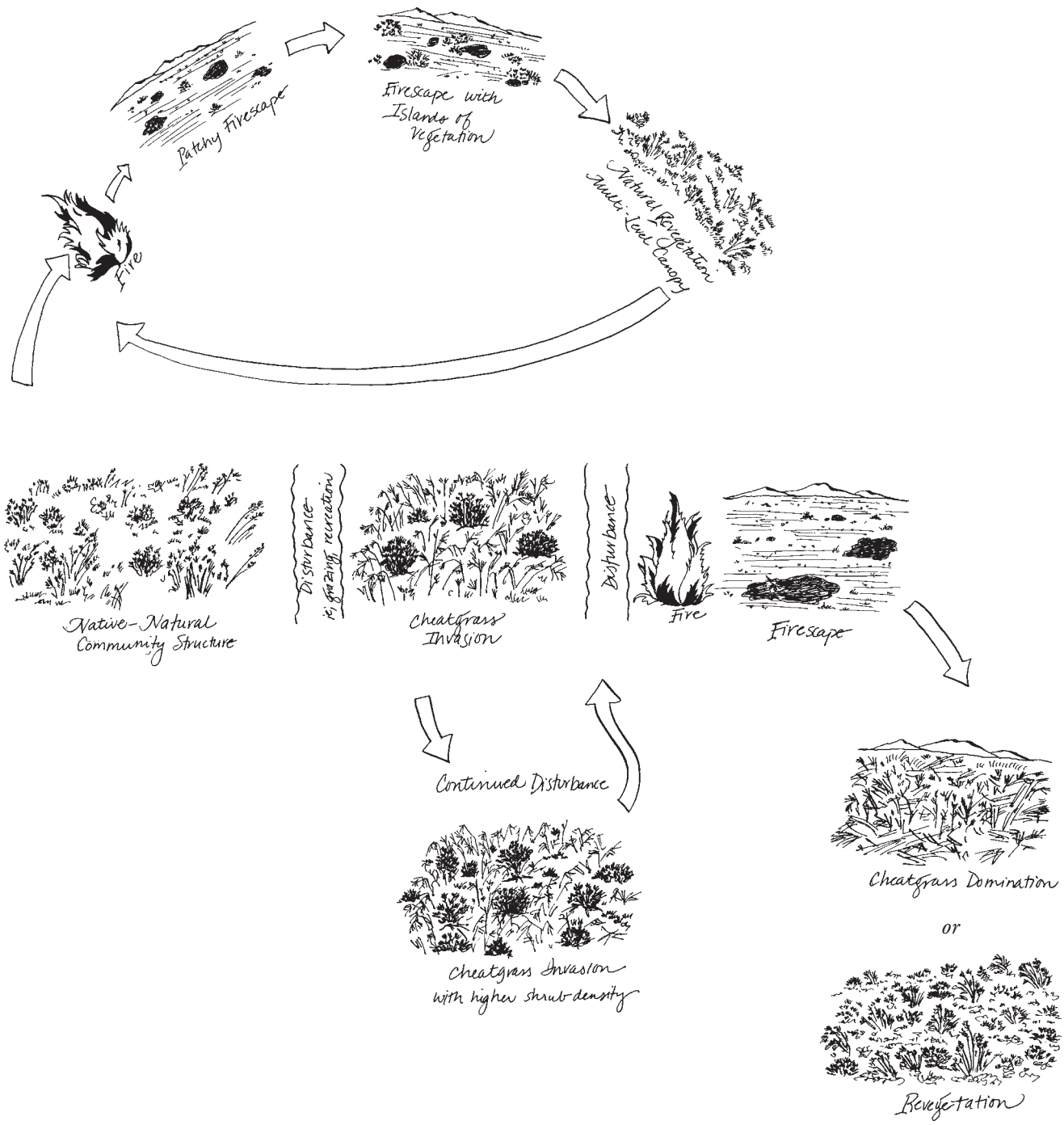

Figure 4.2 *Natural and altered fire cycles in sagebrush communities of the Great Basin. Fire at natural frequencies (50-100 year intervals or longer) occurred in a mosaic of intensities over the landscape due to discontinuity of fuel. This allowed natural regeneration of both the vascular plant and biological soil crust communities. Invasion of exotic species such as cheatgrass into these communities resulted in continuous fine fuels and larger, more intensive fires. Cheatgrass will often dominate the community following fire. Revegetation with perennial species can help reestablish a more natural community structure.*

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4.2 Disturbance Effects

Disturbance can directly and indirectly affect many aspects of the structure and function of biological crust communities, including cover, species composition, and carbon and nitrogen fixation. The impact of a given disturbance depends on its severity, frequency, timing, and type, as well as the climatic conditions during and after it.

Methods of assessing impacts of, and recovery from, disturbance have been highly variable. Generally, measurements have been limited to visual estimates of crust cover. However, Belnap (1993) showed visual assessment can only accurately assess moss and lichen cover, and cannot be used to measure the degree of recovery of cyanobacterial biomass, soil stability, and/or physiological functioning of crustal organisms. In addition, some studies have only considered total crust cover but have not delimited the relative cover of cyanobacteria, mosses, and lichens. The relationship between total crust cover and disturbance impacts can be weak, as cyanobacterial cover generally increases, while moss and lichen cover decreases, after disturbance. This often makes total crust cover a poor measure of the dynamics of soil crust recovery. Differentiating between crustal components is also important because alteration of species composition can heavily influence the crust's ecological functioning (Eldridge 1998). Comparing recovery rates from different studies can be problematic, as factors known to control recovery rates (such as site stability and precipitation following disturbance) are often not reported. More importantly, disturbance severity is seldom quantified. Studies generally report disturbance levels as "light," "moderate," or "heavy" without any definition of these categories; thus, what is "moderate" in one study may be considered "heavy" in another. As studies cover a large range of climatic zones, soil types, and levels of disturbance, and as there has been no standard for measuring crust recovery, it is not surprising that in the literature recovery rates have ranged widely (2 to more than 3,800 years), and either appear to show no pattern or often appear contradictory (Anderson et al.1982a; Callison et al. 1985; Jeffries and Klopatek 1987; Cole 1990; Belnap 1995, 1996; Belnap and Warren 1998).

4.2.1 Disturbance Severity, Size, Frequency, and Timing

The impact of a disturbance is affected by its severity, size, frequency, and timing. While most compressional disturbances (such as from vehicles and trampling by people or animals) result in similar types of impacts, severity can vary widely depending on disturbance source. For instance, vehicles and trampling exert compressional and shear forces; however, these forces are much greater for vehicles than trampling. In addition, vehicles often turn soils over and bury crustal

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organisms, while trampling tends to only compress the surface. Vehicle tracks often channel water off-site and thus slow or prevent recovery (Webb and Wilshire 1983). Intensifying physical impacts (such as high-intensity, short-duration grazing) is deleterious to biological soil crust cover and its species richness (Johansen 1993). Disturbance that removes or kills crustal organisms results in greater impact and slower recovery than disturbance that leaves crushed crust material in place. As lichens and mosses are less tolerant of disturbance than cyanobacteria, frequent disturbance can maintain the biological soil crust at a low-successional stage (e.g., dominated by cyanobacteria; Fig. 4.3, Harper and Marble 1988).

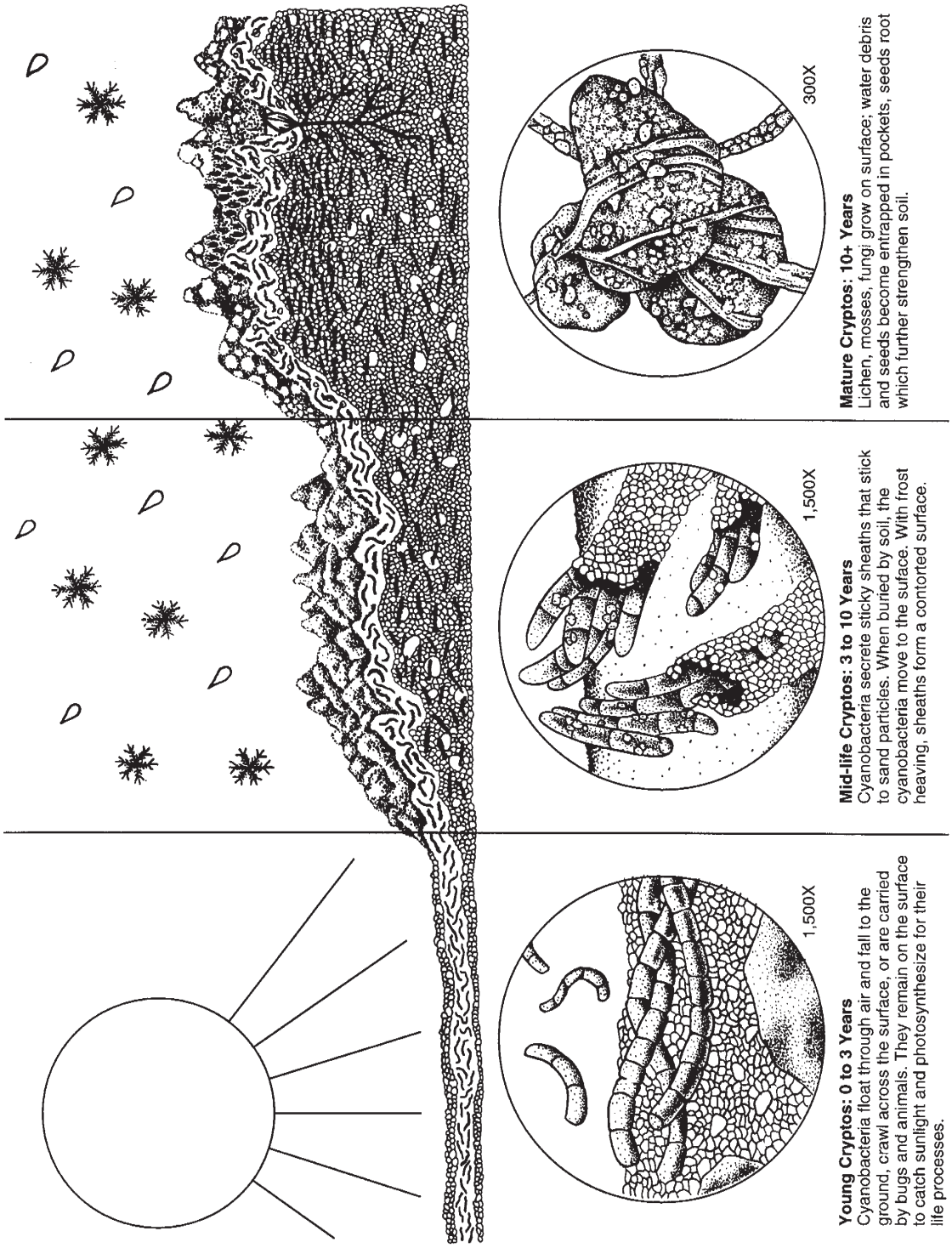
Disturbance timing can affect the degree to which the cover and species richness of a biological crust is reduced. Soils have different intrinsic soil strengths that vary with moisture content (see Fig. 2.5). Soils with little tendency to form aggregates, such as sands, are more susceptible to compressional stresses when dry. Fine-textured soils or those with inorganic crusts are more vulnerable to compressional disturbance when wet (Webb and Wilshire 1983). Crust components are brittle when dry, and the connections they make between soil particles are easily crushed. Thus, compressional disturbances can severely affect the crust's ability to stabilize soils, especially in dry sandy and silty soils. On silty soils of the Great Basin, early wet season (winter) use by livestock has been shown to have less impact on crust cover and species composition than late winter or spring use. As crustal species are only metabolically active when wet and are brittle when dry, disturbance in dry seasons is generally more destructive, and organisms are less able to recover, than when disturbed in wet seasons (Harper and Marble 1988; Marble and Harper 1989). Crusts on clay soils can be an exception, as they are often more vulnerable when wet (Fig. 2.5).

4.2.2 Disturbance Effects on Species Composition

Disturbance generally results in loss of species diversity, biomass, and surface cover of biological crust components. The more severe the disturbance, the greater the loss. Thus, after severe disturbance, the resulting crust community is generally greatly simplified from multiple species of cyanobacteria, lichens, and mosses to a community often dominated by one or a few species of cyanobacteria.

4.2.2.1 Air Pollution: A few studies have addressed the impact of air pollutants on soil lichens in desert environments. No differences have been found in species composition near pollution sources when compared to control sites. It is reasoned that lichens with thalli closely appressed to the soil surface, a condition common

Figure 4.3 *Successional sequence for biological soil crusts. This example is for* Microcoleus vaginatus*-dominated crusts on the Colorado Plateau. Sequences in other ecoregions are similar but may involve different taxa. (Illustration by Gloria Brown)*



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to most desert soil crust lichens, are less susceptible to damage by air pollutants than lichens whose tissues are more exposed to air. In addition, most desert soils are very alkaline, and thus thought to buffer acidity from pollutants (Sheridan 1979; Nash and Sommerfeld 1981).

4.2.2.2 Oil Spills, Insecticides, and Herbicides: No known studies have directly addressed the effects of oil, oil dispersants, or insecticides on species composition of intact soil crusts. However, there has been a great deal of work on individual cyanobacteria, green algae, and mosses isolated from soil crusts. These experiments have shown that crustal species are differentially affected, depending on the compound and the species tested. Thus, exposure to these agents could potentially alter species composition of crusts (Metting 1981).

One study addressed herbicide effects on intact biological soil crusts. Direct application of two glyphosate herbicides (Roundup® and Accord®) on moss-dominated biological soil crusts had no short-term negative impact on bryophyte cover (Youtie et al. 1999). In fact, bryophyte cover decreased significantly in control plots due to litter buildup from exotic annual grasses that had invaded the site (see 4.2.2.3 below), while cover stayed the same or increased slightly in treated plots. However, repeated treatments are often required to effectively control weedy species. There is little information on the effects of repeated application or long-term effects of glyphosate and other herbicides. Therefore, caution should be used when applying these chemicals to remnant native areas supporting biological soil crusts (Youtie et al. 1989).

4.2.2.3 Annual Plant Invasion: Invasion of exotic annual plants into perennial plant communities can pose a long-term threat to biological soil crusts, as the crust-dominated interspace between perennial plants is often heavily invaded. Surveys in invaded communities show rich perennial moss/lichen communities are quickly replaced with only a few species of annual mosses and cyanobacteria (Kaltenecker 1997; Belnap and Phillips in press). The mechanism by which this shift occurs is not known, but probably results from a decrease in available soil surfaces (via increased cover of live plants and litter; Fig. 4.2, 4.4), higher cover of plant material shading the soil surface, and/or increased fire frequency (Kaltenecker 1997; Kaltenecker et al. 1999a; Youtie et al. 1999).

4.2.2.4 Fire: Biological crusts are generally killed by hot ground fires, resulting in loss of biomass and visible cover (Johansen et al. 1993). Frequent fires prevent recovery of lichens and

Figure 4.4 *Changes in the vascular plant community structure due to cheatgrass invasion.*

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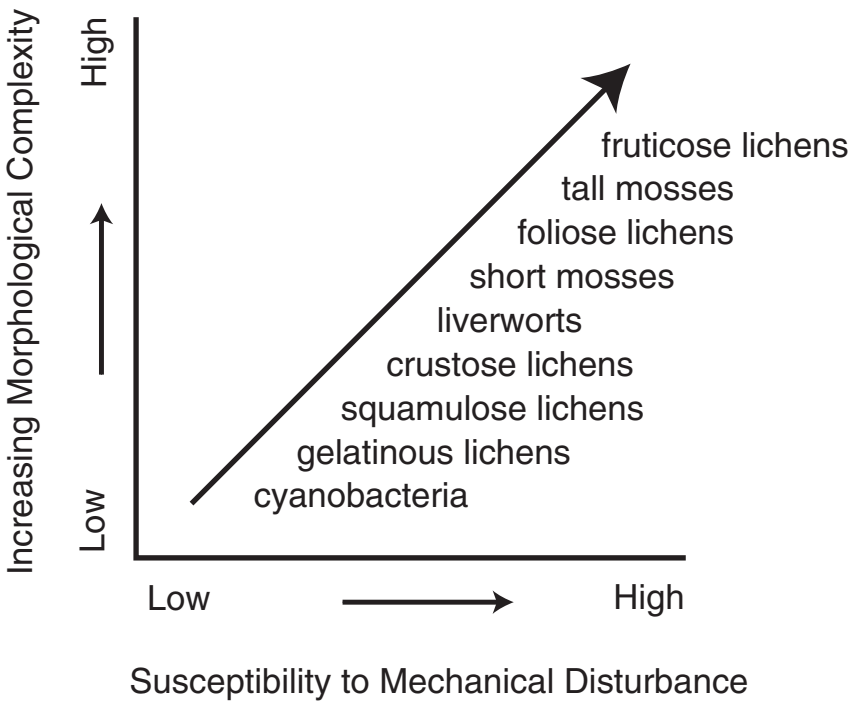
mosses, leaving only a few species of cyanobacteria (Whisenant 1990; Eldridge and Bradstock 1994). Damage to, and recovery of, biological crusts depend on the pre-fire composition and structure of the vascular plant community and on fuel distribution, fire intensity, and fire frequency. Historic fire regimes in semi-arid and arid landscapes generally left small-scale patches of unburned areas between perennial plants, and/or larger-scale patches of unburned shrubs across the landscape (Fig. 4.2). This resulted in a mosaic of successional stages of plants and biological crusts, with propagules readily available to replenish burned sites. Historic fires were also relatively infrequent, leaving time for later-successional crustal organisms to recolonize (Whisenant 1990; Peters and Bunting 1994). Many semi-arid areas are now invaded by annual weeds, and unnaturally frequent, large fires that preclude crustal species' recolonization or succession are common.

Figure 4.5 *Susceptibility of biological crusts to mechanical disturbance based on dominant morphological group.*



4.2.2.5 Mechanical Disturbance: Mechanical disturbance results from activities such as vehicle traffic (military and recreational), trampling by livestock and people, and land-clearing (such as mining). Such uses are increasing exponentially in arid and semi-arid areas of the world. Effects of mechanical disturbance are especially noticeable at sites with highly erodible soils and large topographic relief (Harper and Marble 1988).

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Over 30 studies on four continents document that livestock grazing, vehicle use (both recreational and military), and human trampling dramatically reduce lichen/moss cover and species richness of crusts. Resistance to disturbance generally decreases as the organisms become more morphologically complex (Fig. 4.5; Harper and Marble 1988; West 1990; Johansen 1993; Eldridge and Greene 1994; Ladyman and Muldavin 1996). Cyanobacteria, the most resistant to disturbance, are highly mobile and can recolonize disturbed surfaces rapidly. Lichens use a combination of adaptive thallus structures and pigments (Blum 1973; Galun et al.1982), water storage capacities, tolerance of frequent and/or prolonged inundation, and/or an ability to fix atmospheric nitrogen to increase resistance to disturbance. For example, Rogers and Lange (1971) showed that lichens *Collema coccophorum* and *Heppia lutosa* (*H. despreauxii*) were the least affected by sheep trampling around a watering point compared to other taxa. These lichens are able to fix atmospheric nitrogen and to store greater amounts of water than stratified green lichens (Galun et al. 1982). In a comparison of species inside and outside a grazing exclosure, vagrant foliose lichens *Chondropsis semiviridis* and *Xanthoparmelia convoluta*, crustose lichens *Diploschistes scruposus* and *Caloplaca* spp., and the squamulose lichens *Peltula imbricata* were associated with ungrazed sites (Table 4.1; Crisp 1975; Eldridge and Koen 1998). The gelatinous lichen *Collema coccophorum* was the most tolerant of livestock trampling (Rogers and Lange 1971; Eldridge 1996).

Most soil surface disturbance compacts soils. Compaction influences soil water and nutrient-holding capacity, which can lead to changes in soil crust community species composition. These subtle compositional changes often occur before cover changes are apparent (Eldridge 1996).

4.2.2.6 Burial: Crust disruption often destabilizes underlying soils, leaving adjacent crusts vulnerable to burial by wind- and water-moved sediments. When soils are moist, the large filamentous cyanobacteria can respond to burial by moving up to 5 mm every 24 hours. When dry, these organisms are not able to move. Burial kills non-mobile photosynthetic components of the crust, including mosses, lichens, green algae, and smaller cyano-bacteria (Campbell 1979). Therefore, burial generally results in a greatly simplified crustal community.

4.2.3 Disturbance Effects on Nutrient Inputs and Retention

4.2.3.1 Carbon Fixation: Cyanobacterial crusts near coal-fired power plants have greater chlorophyll *a* per unit soil surface area

Table 4.1 *Percent frequency of biological soil crust organisms on loamy and sandy soils inside and outside the exclosure at Koonamore Vegetation Reserve, South Australia, in May 1972. Adapted from Crisp (1975).*

		LOAMY SOIL		SANDY SOIL		
Species	Morphological Group	Exclosed	Grazed	Exclosed	Grazed	*p*
Lichens						
Acarospora smaragdula	crustose	2.4	0.5	7.6	2.2	n.s.
Aspicilia calcarea	crustose	39.4	20.6	26	26.2	*
Aspicilia calcarea	fruticose	13.6	1.1	18.2	2.4	*
Chondropsis semiviridis	foliose	0.08	0	0.1	0	n.s.
Collema coccophorum	gelatinous	81.4	63.6	21	0	*
Diploschistes scruposus	crustose	0.6	0	2.4	35.6	n.s.
Fulgensia subbracteata	crustose	20	5	25.2	14.2	*
Psora decipiens	squamulose	38.7	15.1	33.8	24.6	*
Psora crystallifera	squamulose	11.4	0.7	13.8	2	*
Toninia sedifolia	squamulose	13.1	3.8	13.8	7.6	*
Xanthoparmelia convulata	foliose	0.04	0	0.1	0	n.s.
Liverworts						
Riccia lamellosa	liverwort	4.2	0.4	8.2	1.2	*

** Indicates significant effect of exclosure at p<0.10; n.s. = effect of excosure was not significant.*

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than crusts away from the plant, implying higher levels of carbon fixation. This is partially a result of fertilization by nitrogen and sulfur compounds from effluents (Sheridan 1979; Belnap 1991). Photosynthesis-inhibiting herbicides show significant impact on *Nostoc* growth and nitrogen fixation (Gadkari 1988). In general, herbicides inhibit growth and reproduction in culture (Metting 1981). However, effects appear to be more pronounced in the laboratory than the field, and may be transitory (Prasad et al. 1984).

Alteration in crust species composition will affect total carbon fixation, as lichens and mosses fix more carbon per unit soil surface area than cyanobacteria (Phillips and Belnap 1998). Because much of the carbon fixed by crustal organisms is released into the surrounding soils (Lewin 1956), crust cover reduction is expected to reduce soil carbon available for microbial populations that are often carbon limited. This, in turn, may affect decomposition rates of plant litter, and thus, levels of nutrients available to vascular plants (Paul and Clark 1996).

Table 4.2 *Reduction of nitrogenase activity for new and older disturbances on silty soils of the Dugway Proving Ground, Utah. All disturbance types resulted in material left on site except "Scalp," which removed the top 1 cm of crust.*

Age of Disturbance	Type of Disturbance	Percent Reduction in Nitrogenase Activity
New	Vehicle	68
New	Bike	79
New	Foot	62
6 months	Vehicle	100
9 months	Tank	83
9 months	Scalp	95
9 months	Rake	81

4.2.3.2 Nitrogen Inputs: Power plant effluents have been shown to decrease nitrogen fixation in *Collema* and *Microcoleus/Nostoc/Scytonema*-dominated crusts (Sheridan 1979; Belnap 1991). Atmospheric nitrogen deposition may offset reduced nitrogen inputs from crusts; alternatively, anthropogenic nitrogen deposition may aggravate nitrogen loss through increased ammonia volatilization and denitrification. In addition, biological soil crusts release ammonia in the soils, while anthropogenic nitrogen deposition contains large amounts of nitrate (Garcia-Pichel, unpublished data). Microbial and vascular plant species differentially use ammonia and nitrate; thus, deposition of additional nitrates may alter the dynamics of both soil and plant communities (Binkley et al. 1997).

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Free-living or lichenized *Nostoc* show stimulation of nitrogen fixation at low concentrations of, or short exposure to, arsenic, nickel, lead, palladium, and zinc. However, longer-term exposure to cadmium, lead, and zinc inhibits fixation (Henriksson and DaSilva 1978). Exposure to crude oil and oil dispersants decreases nitrogen fixation in *Nostoc* (Marowitch et al. 1988). Nitrogen fixation is significantly inhibited in *Nostoc* by many insecticides, herbicides, and phenolic compounds tested (Bhunia et al. 1991; Megharaj et al. 1988).

Mechanical disturbance can result in large decreases in soil nitrogen through a combination of reduced input and elevated losses (Peterjohn and Schlesinger 1990; Evans and Belnap 1999). In all soils tested, disturbance by vehicles, human foot traffic, mountain bikes, and raking immediately reduces nitrogen input from crusts (25 to 40% on silty soils; 76 to 89% on sandy soils). Over time, nitrogenase activity can drop by 80 to 100% relative to controls, due to subsequent death of buried material (Table 4.2; Belnap et al. 1994; Belnap 1995,1996).

Species composition changes also affect nitrogen inputs, as cyanolichens (such as *Collema*) fix an order of magnitude more nitrogen than the equivalent soil surface area of cyanobacteria. Thus, the shift from a lichen crust to a cyanobacterial crust can result in less nitrogen entering the ecosystem, as has been shown in multiple studies. Jeffries et al. (1992) showed that heavy grazing reduced nitrogen fixation in sandy soils by 95%. In silty loam soil, Terry and Burns (1987) showed a 64% reduction of nitrogen fixation in burned areas, 85 to 94% reduction in grazed areas, and 99% reduction in a tilled area. *Collema* cover was reduced 50 to 80% in grazed areas relative to adjacent ungrazed areas (Brotherson et al. 1983; Johansen and St. Clair 1986). Expected nitrogen inputs would be reduced accordingly. Evans and Belnap (1999) showed nitrogen fixation in an area released from grazing 25 years was still 2.5 times less than an adjacent, never-grazed area due to reduction in *Collema* cover.

Decreased nitrogen inputs from crusts can have long-term impacts on soil nitrogen levels. Jeffries (1989) found 50% less nitrogen in grazed soils compared to adjacent ungrazed soils. Evans and Belnap (1999) found a 42% decrease in soil nitrogen and 34% decrease in plant tissue nitrogen when comparing a previously grazed (released 30 years previous to the study) site to an adjacent ungrazed area. In the same area, stable nitrogen isotopes showed that both soil and plants in the grazed area contained less newly fixed nitrogen than the ungrazed area, and nitrogen mineralization potential decreased almost 80% (Rimer and Evans 1997). This has large implications for ecosystems that are dependent on biological crusts for nitrogen inputs, such as those on the Colorado Plateau (Evans and Ehleringer 1993).

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4.2.4 Disturbance and Vascular Plants

Crusts can affect vascular plant germination, survival, and nutrition. Lichen-moss crusts in areas with frost heaving (as in cool deserts) increase perennial vascular plant seed entrapment, germination, establishment, survival, biomass, and nutritional status (Belnap and Harper 1995). In these deserts, disturbance that flattens frost-heaved surfaces and/or eliminates mosses and lichens can have a negative effect on some or all of these characteristics. However, germination and survival of some exotic annual grasses can be enhanced with biological crust disturbance.

In hot deserts, seed entrapment, biomass, and fecundity of annual plants is generally increased when smooth cyanobacterial crusts are disturbed (Prasse 1999), although there are some exceptions (Gutterman 1994). Disturbance of smooth cyanobacterial crusts enhances germination of some annual species, while decreasing germination of others (Zaady et al. 1997). Rugose crusts in hot deserts have received little study, and no work has addressed the effects of disturbance on seed entrapment. Effects on germination in rugose crusts appear to be species dependent. In contrast to smooth crusts, disturbance to hot desert rugose crusts lessens survival and biomass of perennial plants (McIlvanie 1942; Crisp 1975).

Biological soil crusts have been shown to influence availability of many plant-essential nutrients. Crust loss can result in less plant-available magnesium, potassium, iron, calcium, phosphorus, manganese, and sulfur (Harper and Belnap in press). The spatial distribution of nutrients is also affected by disturbance, as disturbance will alter the relative distribution of biological crust components (i.e., lichens, mosses, cyanobacteria) across the landscape (Klopatek 1992).

4.2.5 Disturbance and Surface Albedo

Trampling of dark-crusted surfaces exposes underlying, lighter soils, thus increasing albedo (reflectance) by up to 50% at most wavelengths measured (Fig. 3.1). This increased albedo represents an energy loss from the soil surface of approximately 40 watts/m^2 and can reduce soil temperatures by up to 14°C (Belnap 1995). Such changes in reflectance are especially apparent using satellite imagery, as can be seen in the Negev Desert, along the U.S.-Mexico border, and in Australia. Much of this difference is attributed to loss of biological soil crusts (Graetz and Tongway 1986). Large-scale changes in surface albedo may contribute to changes in regional climate patterns (Sagan et al. 1979).

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4.2.6 Disturbance and Soil Hydrology

The effect of biological soil crust disturbance on soil hydrology is very site specific. Water infiltration, runoff, and resultant soil moisture are influenced by soil surface roughness, soil texture, microtopography, surface albedo and temperature, vegetative cover (both vascular and non-vascular), and climatic conditions. All these factors can be altered when biological crusts are disturbed. In general, disturbance flattens pinnacled and rolling crusts, thus decreasing water infiltration and increasing runoff (Fig. 3.3). In hot deserts, disturbance to smooth and rugose lichen- or cyanobacterial-crusted surfaces can increase overall infiltration rates (Greene et al. 1990; Eldridge et al. 2000). However, this increase in infiltration may negatively affect nearby vascular plants that depend on interspace runoff for survival (see Section 3.6). Soil structure alteration as a result of soil compaction can also reduce infiltration rates. Available soil moisture results from a complex interaction of many soil and plant characteristics, including infiltration, soil moisture-holding capacity, albedo, plant root density, etc. Only two studies have addressed the combined effects of crusts on available soil moisture, with disparate results. One study found increased soil moisture under intact crusts, while the other found soil moisture increased under disturbed crusts (reviewed in Harper and Marble 1988).

4.2.7 Disturbance Relative to Water and Wind Erosion

Compressional disturbance damages soil-stabilizing cyanobacterial sheath material both at and below the soil surface. The damage below the surface is irreparable, as living cyanobacteria are not present to regenerate sheath material. As greater than 75% of photosynthetic biomass and productivity is from organisms living in the top 3 mm of soils, disturbance that results in even small soil losses can dramatically reduce site fertility and further reduce soil surface stability (Garcia-Pichel and Belnap 1996).

4.2.7.1 Water Erosion: Globally, all studies show crust cover loss significantly increases water erosion of both coarse- and fine-textured soils. Continuous tracks have a greater impact than non-connected disturbances (such as hoof prints) because of increased water flow volume and velocity along the tracks (Webb and Wilshire 1983). Crushing of cyanobacterial connections between particles results in smaller, isolated soil aggregates that are then more easily moved by water. In addition, surfaces flattened by compressional disturbances are less able to reduce water velocity, thereby allowing

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movement of larger soil particles and reducing opportunities for sediment to settle out.

4.2.7.2 Wind Erosion: All studies of wind erosion indicate that disturbed soils are more susceptible to wind erosion than undisturbed soils when dry (Fig. 4.6). When crusts are crushed or absent, soil particle movement is initiated at lower wind speeds, as resistance to wind erosion increases with better soil crust development. Well-developed crusts (with lichens and mosses) on both silt and sandy soils have 2 to 130 times greater resistance to soil erosion than less well-developed crusts or bare soil (Fig. 4.7; Williams et al. 1995b; McKenna-Neuman 1996; Belnap and Gillette 1997, 1998; Leys and Eldridge 1998). Vehicle tires result in greater damage than hooves on a given soil type (Belnap and Gillette 1998).

Decreased resistance of soils to wind erosion is directly associated with increased sediment movement. All experimental disturbances applied to crusts show increased sediment production—up to 35 times that of adjacent undisturbed crusts (Leys and Eldridge 1998; Williams et al. 1995b). Nearby soil crusts are often buried by blowing sediment, resulting in death of photosynthetic organisms.

4.3 Factors Influencing Natural Recovery Rates

Recovery rates are dependent on many factors, including disturbance type, severity, and extent; vascular plant community structure; adjoining substrate condition; inoculation material availability; and climate during and after disturbance. Comparing recovery rates reported in the literature is highly problematic, as studies range over a wide array of climatic zones, soil types, and levels of disturbance, and these factors are seldom quantified. Thus, most studies can only be used to define the general range of recovery rates. Some studies do report climate, soil, and/or disturbance data such that comparisons are possible (Anderson et al. 1982a; Jeffries and Klopatek 1987; Callison et al. 1985; Cole 1990; Belnap 1995, 1996; Eldridge 1996; Belnap and Warren 1998).

Examination of these studies indicates that general recovery times can be predicted for soil crusts in different environments. Most recovery time calculations for crust cover assume a linear recovery rate. On the Colorado Plateau, scalped plots were reassessed 2 to 5 and 10 to 14 years after disturbance. After 2 to 5 years, cyanobacterial cover was predicted to recover in 45 to 110 years, whereas it recovered within 14 to 34 years. Thus, linear assumptions greatly overestimated recovery time. Lack of moss recovery prevented useful estimates at two of the three sites at the earlier sampling time. At one site, early estimates were 400 years to recovery, while later estimates were 42

Figure 4.6 *Resistance of sandy loam soils to wind erosion following disturbance to a well-developed biological soil crust in four time classes. Threshold friction velocity is the force required to detach soil particles from the surface. Time classes indicate the length of time since disturbance to the control. Following determination of threshold friction velocities for controls, treatments were applied as follows: Foot = one pass wearing lug-soled boots; Tire, 1 Pass = one pass of a four-wheel drive vehicle with knobbed tires; Tire, 2 Pass = two passes of a four-wheel drive vehicle with knobbed tires. Within each time sequence, controls were significantly more resistant to wind erosion than treated surfaces. Adapted from Belnap and Gillette (1997).*

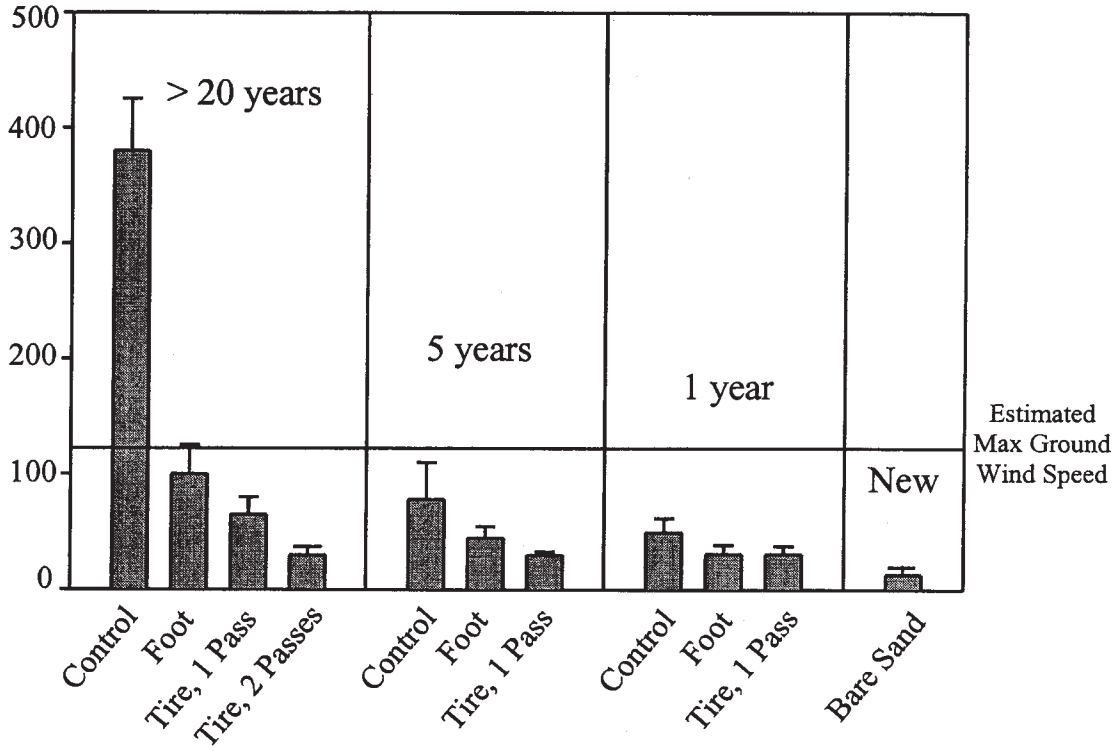
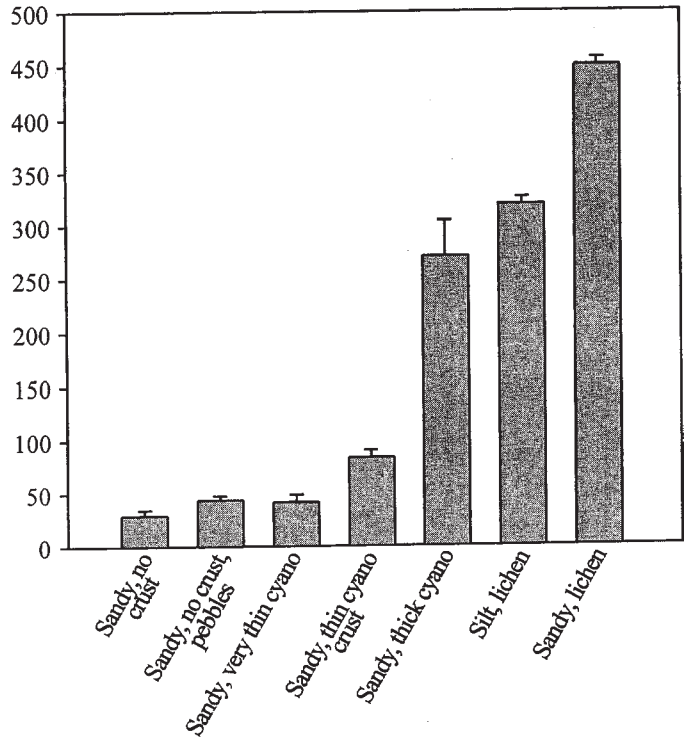


Figure 4.7 *Resistance of soil surfaces to wind erosion. Resistance increases with surface protection and development of the biological soil crust. The greatest amount of resistance is demonstrated by soils with well-developed biological crusts characterized by a diverse lichen flora. Adapted from Belnap and Gillette (1998).*



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years. As with cyanobacteria, linear extrapolations overestimated recovery time. In contrast, *Collema* recovery after 3 years was estimated at 85 years; after 14 years, the estimate for full recovery was 50 years, a fairly close match. *Collema* recovery at a second site was highly variable: after 2 years, recovery time was estimated at 487 years; after 11 years, estimates were site dependent, ranging from 40 to 766 years. Original estimates were therefore both under and over estimated, depending on individual site characteristics. Sites with more shade and less sandy soils were quicker to recover than original estimates predicted, while more exposed sites with sandier soils were less able to recover than originally estimated (Belnap, unpublished data).

4.3.1 Sequence of Species Appearance

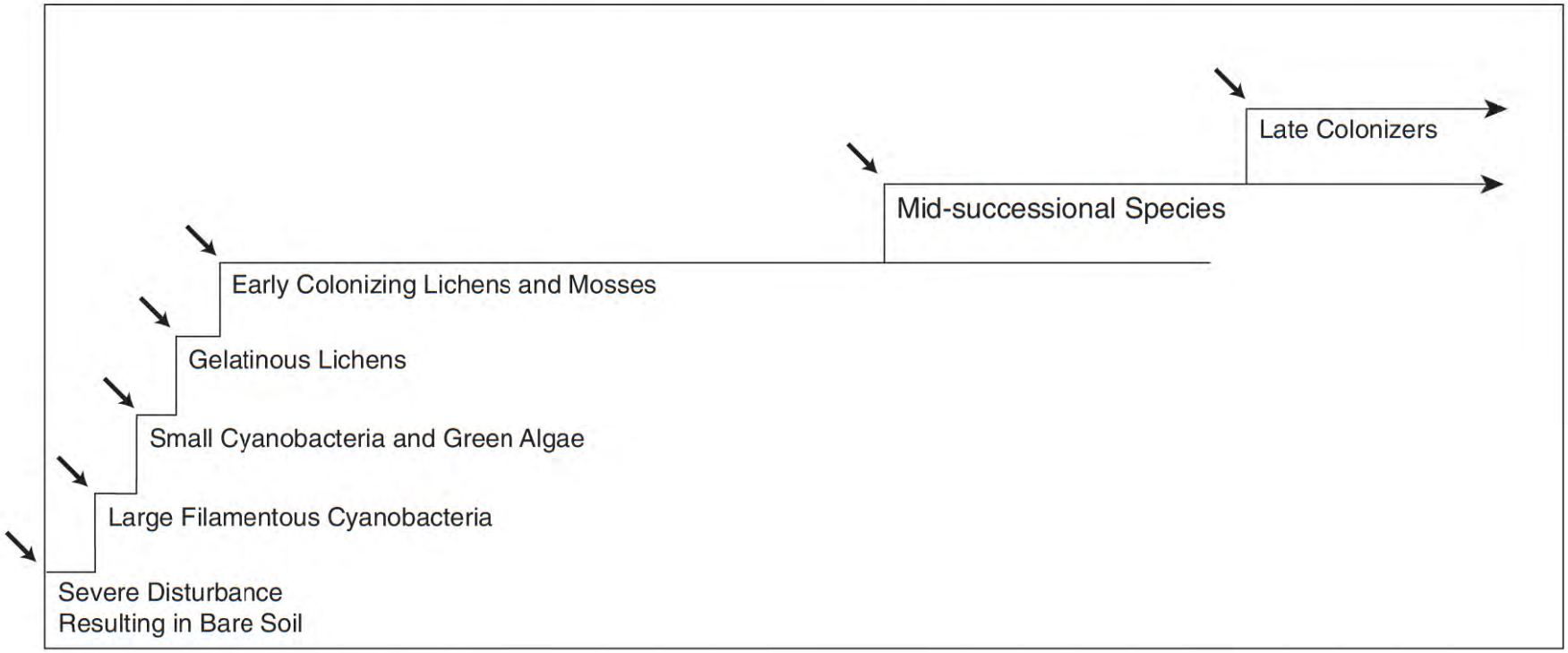
Cyanobacteria and green algae are generally the first photosynthetic species to appear on disturbed soils, probably because of their mobility across soil surfaces and their ability to colonize from the air (Schlichting 1969). Large filamentous cyanobacteria such as *Microcoleus* generally appear first (Fig. 4.3, 4.8), especially on unstable sandy soils (Ashley and Rushforth 1984; Belnap 1995). This species is then followed by smaller cyanobacteria and green algae. Occasionally, desert soils are slightly acidic, and here green algae can be the first to appear (Johansen 1993).

Lichens and mosses require stable soil surfaces for growth. This can be provided by a physical crust or by large, filamentous cyanobacteria. Once soils are stabilized, gelatinous nitrogen-fixing lichens (e.g., *Collema* spp.) are generally the first lichens to appear in disturbed areas, followed by other early-successional lichens and mosses (Table 4.3; Johansen et al. 1984; Belnap 1993). Early-colonizing lichens often disperse phytobiont-containing tissue (e.g., isidia, soredia, or algal-covered spores), as opposed to bare spores, thus precluding the need to find phytobionts on-site.

4.3.2 Soil Texture

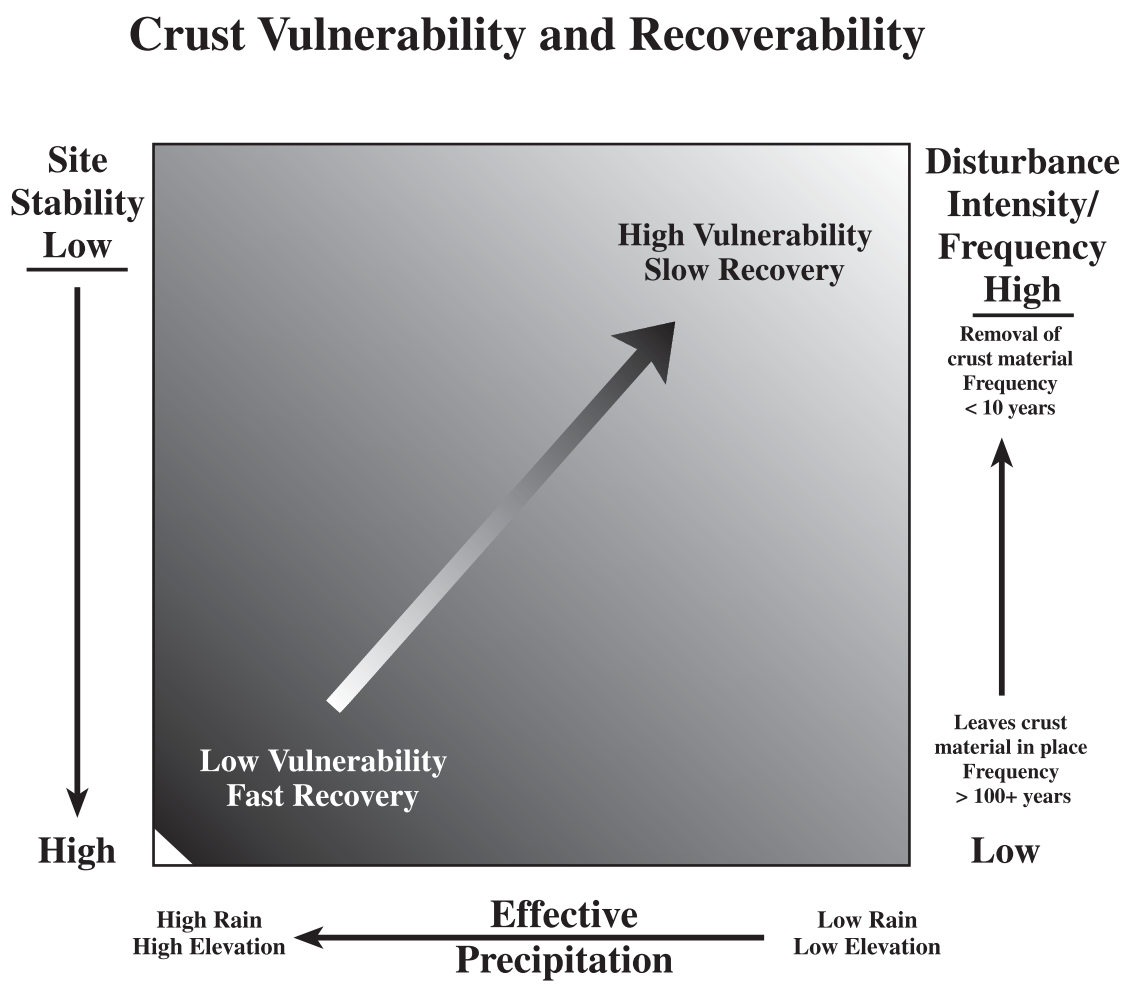
Soil texture influences crust recovery rates. Recovery of all crust components is faster in fine-textured soils than in coarse-textured soils, as fine-textured soils are often stabilized by chemical and rain crusts and retain soil surface moisture longer (Fig. 4.9; as reviewed in Harper and Marble 1988; Johansen 1993; Ladyman and Muldavin 1996). Recovery of the site's wind resistance is also more rapid in fine-textured soils, probably due to crust formation after rainfall. While silty and sandy soils show a similar reduction in wind resistance to vehicle disturbance (83% and 74%, respectively), silty soils show a 50% recovery of wind resistance after a single large rain

Figure 4.8 *Generalized recovery sequence for biological soil crusts. Successional stages are illustrated as steps on the diagram. Disturbance input (indicated by arrows) will cause the crust to revert to an earlier successional state, with severe disturbance resulting in complete destruction of the crust. Recovery time is dependent on environmental conditions, including effective precipitation (see Chapter 2). Note that recovery times, for mid- and late- successional species in areas with lower effective precipitation are unknown, as recovery times are so long no estimates are possible.*



Geographic Region (elevation, average annual precipitation)	**Estimated Years to Recovery**			
	Gelatinous Lichens	Early Colonizers	Mid Successional	Late Successional
Lower Mojave (<1500 m, 100 mm)	1,200 →	3,800	unknown	unknown
High Mojave (1500 m, 200 mm)	200 →	800	unknown	unknown
Colorado Plateau (1500 m, 200 mm)	50 →	500	unknown	unknown
Northern Great Basin (1000 m, 350 mm)	20 →	25 →	60 →	125

Figure 4.9 *Biological soil crust vulnerability and recoverability based on site stability, effective precipitation, and disturbance regime. Vulnerability decreases and recovery rates increase with increased site stability and effective precipitation, and infrequent disturbance.*



Factors Determining Site Stability

	Low Stability		High Stability
Soil Texture	Coarse	→	Fine
Rock/Gravel Cover	Unstable	→	Stable
Soil Depth	Deep	→	Shallow
Plant Spacing	Sparse	→	Dense

Table 4.3 *Characteristics of early-colonizing lichens.*

Species	Phytobiont	Reproductive Units
Caloplaca tominii	green algae	soredia
Cetraria islandica	green algae	isidia-like cilia
Cladonia chlorophea group	green algae	soredia
Collema spp.	cyanobacteria	isidia
Cornicularia normoerica	cyanobacteria	finger-like lobes
Endocarpon pusillum	cyanobacteria	algal-covered spores
Leprocaulon microscopum	green algae	soredia
Leptogium corniculatum	cyanobacteria	isidia
Peltigera didactyla	cyanobacteria / green algae	isidia
Peltigera rufescens	cyanobacteria	spores, unspecialized thallus fragmentation
Placidium squamulosum	green algae / cyanobacteria	algal-covered spores

event, while very sandy soils can take up to 10 years for similar recovery (Belnap and Gillette 1997; Belnap and Herrick, unpublished data).

4.3.3 Climate Regimes

Crustal organisms are metabolically active only when wet; thus, recovery is faster in regions and microsites with greater effective precipitation (Fig. 4.8, 4.9; Johansen et al. 1993; Harper and Marble 1988). Crusts on north and east slopes, as well as at higher elevations, will recover more quickly than crusts on south and west slopes and at lower elevations. However, as discussed in Sections 2.2.1, 2.2.5, and 2.2.6, there are thresholds along ecological gradients where adequate precipitation results in development of a more diverse and dense vascular flora in lieu of the biological crust.

4.3.4 Disturbance Type, Frequency, Severity, and Size

No work has addressed recovery rates of lichens or cyanobacteria from air pollution. In general, crusts are highly susceptible to hot fires; thus, recovery will depend on the size and intensity of fires. As noted previously in “Disturbance Effects” (Section 4.2), most compressional disturbances have similar types of impacts. However, severity of mechanical disturbance can vary widely with disturbance type. Thus, on similar soils, vehicle tracks generally have longer recovery times than disturbances that do not churn the soil or make continuous tracks (Wilshire 1983; Belnap 1996).

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Repeated disturbance will generally keep crusts at an early-successional stage (e.g., cyanobacteria-dominated) by preventing lichen or moss colonization (Fig. 4.8; Belnap 1996).

Disturbance severity often controls recovery rates. In western North America, site recovery within a given soil and climate type is faster where disturbances are not severe enough to remove crustal material than it is at sites where crusts were removed. When crusts are completely removed, recovery can be excessively slow, especially in areas with low effective precipitation and/or sandy soils (Fig. 4.9; Eldridge 1996). In contrast, crusts crushed in place with vehicles, foot traffic, and horses recover much faster, especially on fine-textured soils.

Because recolonization of disturbed areas occurs mostly from adjacent, less-disturbed areas, the size and shape of disturbance can affect recovery rates. This is especially true for lichens. Desert soil lichens colonize only infrequently through spores; thus, recovery of lichen cover is mostly dependent on material washing or blowing in from adjoining areas (Eldridge and Ferris 1999). The rate of lichen recovery is much slower in areas with higher internal surface areas relative to perimeter area (Belnap, unpublished data).

4.3.5 Condition of Adjoining Substrate

In general, crust recovery is slower if soils adjacent to disturbed areas are destabilized. Detached sediment can both bury adjacent crusts, killing many crustal organisms, and/or provide material for sandblasting nearby surfaces, thus increasing wind erosion (Belnap 1995; McKenna-Neumann et al. 1996; Leys and Eldridge 1998).

4.3.6 Vascular Plant Community Structure

Crusts recover more quickly under shrub canopies than in adjacent plant interspaces. This is probably due to greater soil moisture and fertility under shrub canopies. In the Mojave Desert lichen recovery (after complete removal 50 years previously) was 36% under shrub canopies, compared with 4% in the shrub interspaces (Belnap and Warren 1998). A similar pattern was seen in plots established on the Colorado Plateau, where lichen recovery was 2 to 3 times faster under shrubs than adjacent interspaces (Belnap, unpublished data).

The growth of biological soil crusts and vascular plants can be an interactive process (Danin et al. 1989). Eldridge and Greene (1994) present a conceptual model in which crust development at sites is strongly linked to restoration of vital soil processes. As primary colonizers of recovering sites, biological soil crusts enhance microsite fertility and provide safe sites for seeds. In turn, established vascular

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plants help stabilize soils, provide shade, and reduce wind speeds at the soil surface, providing conditions conducive to further development and diversification of the biological soil crusts (Wood et al.1982; Danin et al. 1989).

4.3.7 Nitrogen and Carbon Fixation

Overall, nitrogen and carbon fixation rates in biological soil crusts are dependent on its species composition, biomass, and physical structure. Thus, recovery is dependent on recovery rates of specific crustal components. Recovery of nitrogen fixation is dependent on recovery rates of cyanobacteria and cyanolichens. Nitrogen fixation in crusts can require anaerobic microzones in the soils, which may be dependent on buildup of cyanobacterial biomass (Belnap 1996). Carbon fixation increases when lichens and mosses colonize (Phillips and Belnap 1998). As recovery is faster with higher available moisture, both nitrogen and carbon fixation rates are expected to recover faster in cool deserts than in hot deserts, other factors being equal.

Lichen cover may not fully recover after disturbance. On the Colorado Plateau, soils previously occupied by cyanolichens were often occupied by mosses after release from grazing (Belnap, unpublished data). As long as cyanolichen recovery does not occur, reduced nitrogen inputs are expected, and soil and plant nitrogen levels may remain lower (Evans and Belnap 1999).

4.3.8 Surface Albedo

Restoration of normal surface albedos and temperatures will depend on the restoration of pre-disturbance cover of cyanobacteria, lichens, and mosses. While cyanobacteria do form a darkish matrix in which other components are embedded, mosses and lichens are much darker and can contribute 40% or more of the cover in an undisturbed crust (Belnap 1993). Consequently, surface albedo recovery will be controlled by factors that control lichen and moss recovery.

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CHAPTER 5

MANAGEMENT TECHNIQUES TO MAINTAIN OR IMPROVE EXISTING BIOLOGICAL SOIL CRUSTS

While total protection from disturbance is often the easiest way to maintain or improve biological soil crusts, this is not often possible or desirable. There are many factors to consider in the management of soil communities, including disturbance type, intensity, timing, frequency, duration, or extent. Research is needed to determine realistic biological soil crust objectives by soil type in most potential vegetation types, but initial estimates can be determined by using "healthy" reference areas as described by the National Research Council (1994). Protection of relic sites as rangeland reference areas is important, as these sites provide baseline comparisons for ecological potential and future scientific research.

5.1 Fire

Proactive management is needed to prevent unnaturally large and/or frequent fires in areas where fuel build-up or annual grass invasions have occurred. Such management actions may include altering grazing regimes to prevent annual plant invasions, prescribing fire to prevent fuel build-up, and/or restricting off-road vehicle use.

5.1.1 Prescribed Fire

Used cautiously, prescribed fire can be a useful tool in some situations for renewing community vigor. However, the site's ecology and evolutionary history need to be understood, as burning can result in conversion of some sites to exotic vegetation. Thus, even though a community evolved with fire, fire may no longer be desirable because of exotic plant invasions. Prescribed fire is not recommended for such sites unless post-fire restoration treatments are planned. Prescribed fire may be useful on more productive sites with low potential for exotic plant invasion to reduce high woody vegetation densities resulting from overgrazing. Other impacts (such as recreational or domestic livestock use) should be limited following treatment to allow full site recovery.

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5.1.2 Post-fire Management

Once a site has burned, evaluation is needed to determine whether recovery will occur naturally or if revegetation is needed. Many burned sites, particularly those in the Great Basin and Intermountain regions, require revegetation to stop exotic plant invasion, and most techniques require some soil surface disturbance (Fig. 5.1). This may not appear consistent with recovery of biological crusts. However, failure to treat sites can result in irreversible dominance by annual species (such as cheatgrass), which prevents the return of well-developed biological soil crusts (Fig. 4.2, 4.5, 5.2; Kaltenecker 1997, Kaltenecker et al. 1999a). Once revegetated, protection from grazing and recreational use is often necessary for recovery of the biological soil crust and the vascular plant community. Recovery in these areas can be further facilitated by use of minimal-till or no-till drills or other seeding methods that minimize soil surface and compressional impacts. Emphasis should be placed on restoring the native plant community using local ecotypes, if available.

In the western U.S., revegetation of salt-desert shrub and lower-precipitation Wyoming big sagebrush communities presents some unique problems. West (1994) presents evidence that cheatgrass will remain and potentially increase in these types, as revegetation is difficult because of arid conditions and unpredictability of wet years. He suggests that without livestock consumption of cheatgrass, susceptibility to fire could increase. However, the effective use of livestock in long-term control of cheatgrass has not been demonstrated. In addition, such grazing would occur well into the growing season and thus to the potential detriment of biological crusts and native vascular plants.

Figure 5.1 *Soil surface disturbance associated with post-fire revegetation projects. This site was drill-seeded with a rangeland drill.*

Figure 5.2 *Biological crust development in a successful seeding in the northern Great Basin (above) and lack of development in an exotic annual grass community (below). Note the difference in plant density and the accumulation of litter on the soil surface that limits biological crust development in the exotic community.*

5.2 Livestock Grazing

Managing for healthy biological soil crusts requires that grazing occur when crusts are less vulnerable to shear and compressional forces. Timing for this is highly dependent on soil type and climatic regimes (see Chapter 4). Crusts on all soil types are least vulnerable to disturbance when soils are frozen or snow covered. Biological crusts on sandy soils are less susceptible to disturbance when moist or wet; on clay soils, when crusts are dry (Fig. 2.5; Marble and Harper 1989; Memmott et al. 1998). In general, light to moderate stocking in early- to mid-wet season is recommended. On low- to mid-elevation sites, winter use is advantageous to most vascular plants, including riparian communities, and substantially reduces supplemental feed costs associated with livestock production. Winter grazing also most closely replicates the grazing strategy of native herbivores, who use more productive, higher-elevation sites during summer and lower-elevation sites in winter (Fig. 5.3; Miller et al. 1994; Burkhardt 1996). It is important to remove livestock well

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before wet season's end to allow regrowth of crustal organisms before extended drought. Use when soil surfaces are very wet and muddy should also be avoided to prevent burying the crust (Kaltenecker and Wicklow-Howard 1994; Kaltenecker et al. 1999b). Implementation of rest-rotation strategies that minimize frequency of surface disturbance during dry seasons and maximize periods between disturbances will reduce impacts to biological soil crusts.

Dispersal of livestock throughout useable portions of pastures should also be emphasized. Disturbance of sensitive sites should be avoided or minimized when they are a small proportion of the overall pasture or landscape. Ways to disperse livestock include the following:

- Locating water and salt (or other supplements) on sites with low potential for biological soil crust development and in areas that discourage livestock from loitering. In many areas, sites with high rock cover are good options. Livestock trailing preferences need to be considered when evaluating locations.

- Using brush barriers or fence segments to divert trailing. Sites with high potential for biological soil crust development are often not preferred by livestock for forage; however, these same sites may be open and easy to walk across. Because of lack of forage, minimal barriers are usually sufficient to discourage access.

Figure 5.3 *Native grazers in the western U.S., such as pronghorn antelope and muledeer, tend to use higher, more productive sites during summer and move to lower elevation sites for winter forage. They may also move through areas, rather than staying in one area. This type of seasonality and intensity minimizes impacts to biological crusts by concentrating use when crusts are frozen or moist.*

Fig. 5.4 *Vehicular disturbance to biological soil crusts. Recreational disturbances are concentrated in open interspaces, where crusts are most abundant and vulnerable. The tracks in the top photo are approximately 10 years old.*

Stocking levels and season of use should be ascertained on an annual basis, jointly by managers and users, with optimal coverage of both vascular plants and biological soil crusts as the management goal (Kaltenecker and Wicklow-Howard 1994; Kaltenecker et al. 1999b). Optimal coverage should be based on site capability and rangeland health indicators of site stability and nutrient cycling. Livestock exclusion from reference areas and sites with highly erodible soils or low vascular plant cover is appropriate to protect biological crusts and site stability.

5.3 Recreational Use Management

Many recreational activities have impacts similar to those of livestock use. Therefore, principles relating to management of livestock disturbance intensity, timing, frequency, duration, or extent apply to recreational impacts as well. However, there are also major differences. People are often harder to control than livestock. People can carry food and water; thus, access to these essentials does not limit their activities. People tend to go where they want, even in the presence of barriers such as fences. People also have a greater affinity for open vegetation, as it is easier to walk or drive through; however, these same open sites are generally dependent on biological soil crusts for stability (Fig. 5.4). Education, legal restriction and/or use stipulations, and compliance activities may require proportionately

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higher management priorities and time requirements than for the control of livestock.

Concentration of recreational use is generally desirable. Designated campsite use reduces the impact of haphazard placement of sites by individuals. Trails minimize the amount of biological soil crust that is disrupted by trampling. Education can be used to teach people how to camp in areas without designated campsites (e.g., on hardened surfaces, such as rocks, or in areas with minimal crust potential) and how to travel cross-country in areas that lack trails (e.g., in washes, on rock, on fallen logs).

Recommended management practices include the following:

- Restrict road locations to less sensitive areas. Road drainage (culverts, water bars) should be designed so that erosion or sediment fill of adjacent off-site areas is minimized.

- Promote extensive, low-density uses, such as hiking and backpacking, during late fall and winter periods. Restrict access during dry seasons.

- Permit high-density, high-impact uses, such as Christmas tree and firewood cutting areas, for short durations during late fall and winter, preferably when soils are frozen. Areas should be rotated based on a total allowable disturbance threshold with long recovery periods (greater than 10 years minimum on moderate- to high-resiliency sites, such as in sagebrush communities [greater than 230 mm average annual rainfall] in the northern Great Basin) before redesignation for use. Exclude low-resiliency sites.

- Provide designated trails, and restrict use to trails in high-density recreational areas.

- Provide interpretive sites and literature on recognition and value of protecting biological soil crusts at major access points in areas of extensive or unique crust formation.

- Require an analysis of impacts to biological soil crusts and appropriate stipulations on all use applications, such as rights-of-way, oil and gas and other exploration permits, permits to drill, etc.

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CHAPTER 6

MONITORING BIOLOGICAL SOIL CRUSTS

Monitoring is the collection and analysis of repeated observations so that trends can be assessed. Typically, monitoring is used to evaluate landscape condition changes over time, often in relation to defined management goals. A monitoring program's objectives will determine the position in the landscape at which measurements will be made and the period over which data will be collected and assessed. Monitoring is often designed so that measurements can be made by more than one observer, and the level of acceptable change is usually determined before monitoring commences.

Monitoring studies often differ from traditional research studies in that they are not designed to infer the cause of any observed changes. Monitoring studies usually lack replication and often have no controls. Plot sizes and measurement protocols may be similar in both monitoring and research studies, but the management objectives are often widely different. The following is a discussion of field-based monitoring strategies and procedures for biological crusts. Key attributes for each strategy are summarized in Table 6.1.

6.1 Monitoring Methods

During the past century, rangeland managers have grappled with methods to assess the health and trend of landscapes (Tueller 1988). Techniques have concentrated primarily on vascular plant attributes, such as cover, frequency, presence/absence, abundance, and biomass of various species, particularly perennial plants (Stoddart et al. 1975; Friedel and Bastin 1988; Friedel et al. 1988; Holechek et al. 1989; Milton et al. 1998). Recently, there has been more emphasis on soil surfaces, and monitoring techniques to assess soil surface condition have been developed (Tongway 1994; Pellant 1996; Whisenant and Tongway 1996; de Soyza et. al. 1997).

While many scientists acknowledge the close links between biological soil crusts and rangeland condition (Klopatek 1992), crusts and their component organisms have rarely been recorded during field-based assessment (West 1990). Early efforts to classify soil surfaces and include biological soil crusts were developed in the semi-arid woodlands of eastern Australia (Tongway and Smith 1989). This assessment showed differences in the stability, erosion, and nutrient status of soil surfaces, and provided a reliable estimate of potential productivity of the surface independent of vascular

Table 6.1 *Attributes of biological crust monitoring strategies. See the text for detailed discussion of each method.*

Recording Method: Individual Taxa vs. Morphological Groups	
Individual taxa	• Allows documentation of biodiversity. • More sensitive to change over time.
Morphological groups	• Quicker, easier identification. • Good evaluation of ecological function. • Less variability. • Less sampling time and intensity to get reliable estimates.
Sampling Methods	
Quadrats (using point or cover class estimates)	• Useful if clumps are <2 cm diameter or groups/taxa are highly interspersed. • Use if information on spatial relationships is not desired. • Provides cover estimate.
Line-point Intercept	• Useful if clumps are <2 cm diameter or groups/taxa are highly interspersed. • Provides information on spatial relationships. • Provides cover estimate.
Line Intercept	• Best if clumps are >2 cm diameter and groups/taxa are not highly interspersed. • Provides information on spatial relationships. • Provides actual measure of cover.

vegetation. The method used four classes for soil surfaces: Class 1 = stable, productive surfaces with high biological crust cover and species diversity; Class 2 = slightly unstable, moderately productive surfaces with broken biological crust cover and moderate species diversity; Class 3 = moderately unstable and unproductive surfaces with low biological crust cover and species diversity; and Class 4 = very unstable and unproductive surfaces where biological crusts are absent (Mucher et al. 1988).

This system was later refined and extended to other landscape types (Tongway and Hindley 1995) and other soil characteristics, such as the degree of cracking, surface coherence, microtopography, and biological crust cover. U.S. workers (Pellant 1996; USDI 1997) have also included biological crust cover as a component of federal land monitoring programs. In eastern Australia, the Department of Land and Water Conservation has been collecting data (including biological crust cover) on the condition and trend of rangelands since the mid-1980s (Green 1992). Monitoring staff in Canyonlands

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National Park in southeastern Utah have been collecting cover estimates for biological crusts since 1987 (Belnap, unpublished data).

6.1.1 Sampling Design and Procedures

Biological crusts are typically measured using standard or slightly modified rangeland assessment techniques. These are generally based on measurement of plant and soil attributes within permanent sampling units (quadrats), stratified within relevant vegetation or soil zones (Ludwig and Tongway 1992). Stratification may be necessary where the landscape is composed of a number of homogeneous land units. On degraded sites, nearby reference areas should be measured in order to determine the site's potential for biological crust development. Biological crusts are likely to be most pronounced in areas protected from trampling, such as under shrubs or adjacent to obstacles such as fallen trees and rocks. Shallow, rocky soils often provide "refugia" for crustal organisms that have been destroyed by livestock on more productive soils. However, reference areas should be as identical as possible to their paired disturbed sites with regards to soil characteristics (texture, chemistry, depth), placement on the landscape, and vegetation production potential.

6.1.2 Using Morphological Groups for Monitoring

Biological crust organisms are rarely recorded during routine rangeland monitoring despite increased acceptance over the past decade of their importance in ecosystem processes (Harper and Marble 1988; West 1990; Eldridge and Greene 1994; Ladyman and Muldavin 1996). West (1990) contends that this is due to difficulties in identifying the organisms *in situ*, lack of a standardized sampling procedure with often undue emphasis on laboratory culturing, lack of conspicuousness of some organisms (particularly when the soils are dry), and their patchiness in time and space. As identification is problematic, monitoring can be a daunting task to all but the most experienced (Eldridge and Rosentreter 1999).

However, strong relationships exist between form (morphology) of biological crust organisms and their ecological functioning in relation to landscape processes and disturbance (Eldridge and Rosentreter 1999). Morphology determines how crust organisms function ecologically (relative to erosion and water retention) and their tolerance to, and recovery from, physical disturbance. Morphological groups have been proposed as surrogates for species in biological crust monitoring (see Table 1.1; Kaltenecker 1997; Ponzetti et al. 1998; Eldridge and Rosentreter 1999).

Morphological groups are biologically and ecologically efficient and convey to non-specialists a better image of the

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organismal form and its likely impact on soils and landscapes. These relationships hold true in different regions and continents and eliminate the need for complex, often confusing changes in nomenclature. Other advantages of morphological groups for rangeland monitoring include ease of identification, which is independent of sexual reproductive structures, and the ability to monitor sites more quickly with less specialized staff (Eldridge and Rosentreter 1999). Cover and abundance measures of morphological groups can be obtained more rapidly than measuring each individual species. This allows use of the same size plot for varied sites and assessment of more sites per unit time.

Although morphological groups are appropriate for broad-scale or regional monitoring, their use may not allow the detection of individual species, particularly rare or uncommon taxa. Specific goals of individual studies (i.e., determination of total diversity vs. functional diversity vs. site stability) need to be determined prior to initiation of monitoring. This will determine whether morphological groups can be used or whether monitoring needs to occur at the generic/species level. In all cases, crustal organisms are best detected or identified when moist. When sampling during dry weather, the soil surface to be measured can be moistened with water mist prior to reading to make the organisms more visible.

6.1.3 Quadrat Methods

In communities where biological crusts are patchy, lichen and moss cover is sparse, and/or large areas are being assessed, crust monitoring is often done using quadrats. These can be located either randomly or along a line transect. Quadrats can be used to estimate both biological crust and vascular plant cover (Anderson et al.1982a, b; Brotherson et al. 1983), using either point-intercept or cover classes (Fig. 6.1, 6.2). While cover of the various strata within the community (i.e., biological crusts, herbaceous plants, and shrubs) can be determined, horizontal spatial relationships between groups of organisms cannot be defined using quadrat methods. Where biological crust cover is relatively dense or where personnel turnover is high, microplot sampling effectively estimates cover (McCune and Lesica 1992). Reduced quadrat size is also useful if a goal of the study is to observe greater detail in biological crust composition in relation to environmental variation within the site. For example, Rogers and Lange (1971) used 15 x 20-cm quadrats to examine changes in crust floristics related to stock watering points in semi-arid and subtropical Australia. Other Australian studies have employed 0.5 m^2 subplots within larger plots to assess cover and frequency of crustal organisms (Eldridge and Bradstock 1994; Eldridge 1996; Eldridge and Tozer

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1996; Eldridge 1999). U.S. workers have adapted a 20 x 50-cm quadrat and cover classes traditionally used for vascular vegetation monitoring (see Daubenmire 1959) for estimating biological crust cover (Rosentreter 1986; Ponzetti et al. 1998).

Destructive sampling might be necessary if detailed documentation of biological crust species composition is desired. Eldridge and Semple (unpublished data) removed small cores (4 cm^2) from an area of high biological crust cover and diversity and used a dissecting microscope to record cover and abundance of crustal organisms. Use of a short-focus telescope is a similar, non-destructive method (Pickard and Seppelt 1984), but is less accurate.

Within a quadrat, cover and frequency are relatively quick to assess, can be recorded by taxa or morphological groups, and are often good indicators of the ecological and hydrological status of the landscape (Eldridge and Koen 1998). Frequency is determined as the number of times that an organism or group is recorded within a given number of sampling units (expressed as a percentage). This measure describes the abundance and distribution of species and is useful to detect changes in community composition over time. It is one of the easiest and fastest methods available for monitoring changes in vegetation (USDI 1996). Frequency methods are used extensively by federal land management agencies for monitoring changes in landscape condition or trend in relation to vascular plants, and can easily incorporate biological soil crusts.

6.1.4 Line-intercept Methods

Line-intercept has been used in the northern Great Basin in studies that characterized both the crust and vascular plant

Figure 6.1 *Quadrat frame used for point-cover estimation. This frame is 25 x 25 cm in size. Hits are determined by dropping a pin vertically from each intercept within the frame.*

Figure 6.2 *Data form for point-intercept using a quadrat method (left) and example of data collection (right).*

Date:			**Personnel:**						**total = 20/stake**	
Plot	**Stake**	**Cyano**	**Collema**	**Moss**	**Litter**	**Bare**	**Placidium**	**Psora**		

Date: 5-4-01 **Personnel:** JHK, RR **total = 20/stake**

Plot	Stake	Cyano	Collema	Moss	Litter	Bare	Placidium	Psora		
1	1	III	~~IIII~~	I	II	~~IIII~~	II	II		
1	2	~~IIII~~ I	III	II	~~IIII~~	IIII				

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communities (Kaltenecker 1997; Kaltenecker et al. 1999a, b; Kaltenecker, unpublished data). Using line-intercept (see Canfield 1944 for a description of the original methodology developed for vascular plant communities), taxa or morphological groups (Eldridge and Rosentreter 1999) are recorded every centimeter along a number of 10-m or 20-m line transects (Fig. 6.3, 6.4), with cover and floristics of the biological crust and vascular plant communities calculated as a percentage of the total line transect length (Rogers 1994). Each line forms a single, independent sampling unit.

Line-intercept is a rapid and efficient method of sampling when the vegetation community is strongly patterned and is therefore useful in many arid and semi-arid ecosystems. Line-intercept is easiest

Figure 6.3 *Use of line-intercept for measuring biological crust cover along with other community attributes (vascular plant cover, litter, bare mineral soil, rock). Note the placement of the transect line close to the soil surface. Cover of each entity is measured along the top edge of the tape. A misting of water makes crustal organisms more visible and therefore easier to measure.*

when organisms have a definitive boundary, and can be difficult to apply in sites with dense or intermingling vegetation. An advantage of line-intercept over quadrat methods is the ability to derive linear spatial relationships between organisms from the data.

Lines should be long enough to include most of the variability in both the vascular vegetation and biological crust. Optimum line length should be determined from pilot sampling. It is imperative that the line is placed in exactly the same location each time to prevent sampling error associated with repeated measure. Permanent markers, such as steel stakes or nails, may be located along the line to ensure correct placement. If vascular vegetation is measured at the same time, a longer transect might be required with intensive sampling of the biological crust along a shorter portion of the line (USDI 1997).

Figure 6.4 *Line intercept data form (this page) and example of data collection (next page).*

Site Name:				Date:			
Treatment:		Transect #:		Reader:		Recorder:	
Cover Type	From (cm mark)	To (cm mark)	Under (Cover Type)	Cover Type	From (cm mark)	To (cm mark)	Under (Cover Type)

Site Name: Kuna Butte				Date: 4-18-01			
Treatment: unburned		Transect #: 1		Reader: JHK		Recorder: EM	
Cover Type	From (cm mark)	To (cm mark)	Under (Cover Type)	Cover Type	From (cm mark)	To (cm mark)	Under (Cover Type)
Artrw	0	40					
tall moss	0	36	Artrw				
short moss	36	40	Artrw				
short moss	40	52					
crustose	52	55					
squamulose	55	62					
short moss	62	70					
Agsp	70	85					
short moss	70	74	Agsp				
short moss	83	85	Agsp				

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6.1.5 Line-point Intercept Methods

The line-point intercept method is similar to line-intercept, but uses random or predefined points along a line rather than intercepts, and records only the entity or entities (if recording over- and understory) associated precisely with that point. Cover and floristics of the biological crust and vascular plant communities are then calculated as a percentage of the total number of points. Line-point intercept is useful for estimating cover in communities where the crust and vascular vegetation are not strongly patterned. As with line-intercept, linear spatial relationships can be assessed using this method.

6.1.6 The Issues of Scale

Size and shape of the sampling unit depends upon the vegetation type and spatial distribution. Ultimately, the size and number of quadrats will depend on a compromise between statistical considerations (see Section 6.1.8) and what is logistically possible. Generally, in sparsely vegetated landscapes, larger linear quadrats are useful in decreasing variability because of cover heterogeneity. Circular quadrats are often preferred to square because they reduce edge effects. The nature of the impact being investigated will also influence the monitoring method(s) used. For example, studies focusing on species composition will require microplot sampling, while compressional impacts (off-road vehicles, grazing) on biological soil crusts may be best examined by using repeated photo-points, remote sensing, or aerial photography interpretation on large plots of up to several hectares in area.

6.1.7 Voucher Specimens

Representative specimens of each crustal organism should be collected as vouchers for each site. Voucher specimens should include all the variation within a morphological group. A site's biodiversity can later be assessed by identification of voucher specimens by an expert and application of diversity indices.

Voucher specimens require specialized preparation to preserve them for long-term storage (Rosentreter et al. 1988). This often includes removal of excess soil, stabilization of the underlying substrate, and fixation of the specimen onto a stiff card to protect it from breakage. A collection of local or regionally occurring crustal organisms stored in a herbarium is useful for future identification of taxa and for describing a study area's floristics. This enables other researchers and land managers to evaluate differences in biological crust composition between regions.

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6.1.8 Statistical Considerations

Statistical considerations are important when designing any sampling procedure. It is important that the size and number of sampling units, their placement in relation to landscape heterogeneity, and their replication (if significance testing is required) do not compromise any future data analyses. The most efficient design is usually the one that yields the highest statistical precision (smallest standard error and narrowest confidence interval around the mean) for a given amount of effort or money. It is therefore crucial that a biometrician or a statistician with an ecological background be consulted prior to establishment of a monitoring program.

While the value of statistical analysis regarding changes in biological soil crust cover or floristics cannot be undervalued, rigorous statistical examination might not always be necessary or even desirable for a monitoring program (Eldridge and Rosentreter 1999). The danger, however, is that subsequent personnel may wish to look for statistically significant results using a monitoring protocol that was not established to allow rigorous examination. Monitoring sites are frequently unreplicated or pseudo-replicated, and analyses may therefore result in erroneous conclusions (Hurlbert 1984).

A pilot study may be necessary to determine optimal quadrat size, the shape or number to be used, or the transect length that will enable the operator to reduce Type I error (erroneously rejecting a true null hypothesis). For any site-by-time combination, a species-area curve (McCune 1992) can be calculated to give the optimal sampling intensity needed to estimate parameters for a given proportion of the population. For example, in semi-arid eastern Australia, Eldridge and Tozer (1995) found that between six and eight 0.5-m^2 quadrats were needed to adequately describe the biological crust in a woodland community, while only three quadrats were required to describe the crust in a grassland.

Species-area curves are likely to vary in relation to landscape heterogeneity, and the observers must ensure that all site measurements are made from a homogeneous sample. For example, in the patterned semi-arid woodlands in eastern Australia, where groves of trees located on the contour are separated by treeless inter-groves, the biological crust cover varies markedly between the two zones (Eldridge 1999; Tozer and Eldridge, unpublished data). Monitoring should occur within, rather than across, geomorphic zones; otherwise, species-area curves are meaningless and will fail to reveal the optimal number of units necessary to detect differences.

Despite the importance of statistical considerations, the sampling intensity may depend entirely on sampling efficiency. This is particularly important in studies where cores or samples are

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collected for laboratory identification and analysis. As a broad generality, one day of collecting and recording crustal organisms in the field can generate up to 10 days of processing and identification in the laboratory. Sampling intensity, therefore, is often a compromise between what is statistically necessary and what is logistically feasible.

6.2 Other Monitoring Methods

As discussed in Chapter 4, changes in biological crust biomass and function often cannot be assessed by visible cover change (Belnap 1993). Obviously, monitoring of cover changes is the easiest and most practical method. However, if resources are available, additional methods should be used to more accurately track biological crust responses to disturbance or management change. The methods described below are examples of monitoring that provides information about biological crusts from a functional perspective.

Determination of cholorophyll *a* using spectrophotometric or high pressure liquid chromatography (HPLC) analysis is an efficient and reliable measure for monitoring changes in photosynthetic biomass, even when visible cover is difficult to detect (Belnap 1993). In areas dominated by cyanobacteria and cyanolichens, monitoring nitrogenase activity is an effective way to determine functional changes in the biological crust (Belnap et al. 1994; Belnap 1996). Both methods require destructive sampling, but can provide valuable information regarding stages in biological crust development.

The slake test is a simple method of determining soil surface stability under wet conditions. Small soil surface fragments (6 to 8 mm diameter) are immersed in rain-quality water, observed over a period of several minutes, and rated according to cohesion of fragments after soaking (Table 6.2). Biological crusts will maintain cohesion when soaked, while physical or chemical crusts will tend to slake or disperse (see Tongway and Hindley 1995 for detailed methods regarding this test). More complicated methods of determining stability include the use of wind tunnels and simulated rainfall.

6.3 Impacts of Monitoring

Care should be taken to establish rigorous protocols when sampling within quadrats and along lines. Because crustal organisms are susceptible to damage by humans, inadvertent trampling within the sampling units may create biased results. Studies on biological soil crusts require that voucher specimens be collected to provide a

Table 6.2 *Classification of results from the slake test. Adapted from Tongway (1995).*

Class	Stability Rating	Observed Behavior of Soil Fragment
1	Very unstable	Fragment collapses completely in <5 seconds into a shapeless mass. A myriad of air bubbles is often present.
2	Unstable	Fragment substantially collapses over about 5-10 seconds with only a thin surface crust remaining; >50% of the sub-crust material slumps to an amorphous mass.
3	Moderately stable	Surface crust remains intact; slumping of sub-crust material is <50%.
4	Stable	Entire fragment remains intact after 5 minutes. This level of stability can remain for many hours.

permanent record of the species found in an area. Removal of voucher specimens or destructive sampling modifies the community and should occur away from permanent plots.

CHAPTER 7

INTERNET RESOURCES FOR BIOLOGICAL SOIL CRUSTS

The Internet has a number of valuable resources for information on biological soil crusts or the organisms that comprise crusts (lichens, algae, etc.). Below we have listed several of the most useful web pages currently available.

Web Address	Author or Organization	Description
www.soilcrust.org	U.S. Geological Survey (Jayne Belnap) Bureau of Land Management National Park Service	Biological soil crust information, based in Canyonlands National Park. This web page contains a near exhaustive bibliography for all things crust-like and a recent version of this reference.
www.id.blm.gov/iso/soils/index.html	Bureau of Land Management, Idaho State Office	This site contains an introduction to soil biological communities, including soil crusts and subsurface micro-and macro-organisms.
www.ucmp.berkeley.edu/fungi/lichens/lichens.html	University of California, Berkeley, Museum of Paleontology	Introduction to lichens.
www.unomaha.edu/~abls/resources.html	American Bryological and Lichenological Society (ABLS)	Checklists and floras; links to institutions and individuals that are resources for information on nonvascular plants and lichens.
mgd.nasce.org/hyperSQL/lichenland	Department of Botany and Plant Pathology, Oregon State Univ.	One of the best introductions to lichens, complete with great color photos.
ucs.orst.edu/~mccuneb/	Bruce McCune Oregon State University	Bruce McCune is a leading ecologist in North America and specializes in lichen and moss ecology and taxonomy.

Web Address	Author or Organization	Description
www.ndsu.nodak.edu/instruct/esslinge/chcklst/chcklst7.htm		
	Theadore Esslinger Department of Botany North Dakota State University	*Cumulative Checklist for the Lichen-forming, Lichenicolous and Allied Fungi of the Continental United States and Canada.*
www.fs.fed.us/land/ecosysmgmt/ecoreg1_home.html		
	USDA Forest Service Robert G. Bailey	Descriptions of Bailey's ecoregions of the U.S., including maps.
www.accessexcellence.org/BF/bf05/johansen/web.html		
	California Academy of Sciences Jeffrey Johansen	Text of a talk presented to high school teachers for the California Academy of Sciences. A layman's introduction to biological crust, focusing on algal and cyanobacterial components and research on inoculation to speed recovery following disturbance.
www.biblio.bio.purdue.edu/www-cyanosite		
	Department of Biology, Purdue University; Foundation for Microbiology	Web server for cyanobacterial research; includes a link to CyBib, a bibliographic database containing references on cyanobacteria.

GLOSSARY

adnate: Pressed closely against a surface.

aggregate stability: The degree to which a group of soil particles cohere so as to behave mechanically as one unit.

albedo: A measure of the energy reflected off a surface. Dark surfaces have a lower albedo than light surfaces; therefore, light surfaces absorb less energy than dark surfaces.

ammonia volatilization: The vaporization of ammonia into the atmosphere.

anaerobic: The absence of oxygen. Also refers to organisms able to live or grow in the absence of free oxygen.

appressed: Pressed closely against a surface.

autotroph: An organism whose growth and reproduction are independent of external sources of organic compounds. Carbon compounds are created by autotrophic organisms via the reduction of carbon dioxide (CO_2), with light energy driving the process.

bacteria: Members of a group of diverse and ubiquitous prokaryotic, single-celled organisms.

bryophytes: Tiny plants lacking vascular tissues. This group includes mosses and liverworts.

calcareous: Substrates rich in calcium carbonate, such as limestone or dolomite. Also refers to soils derived from or containing these substances.

cosmopolitan: Found worldwide.

crustose lichens: Lichens that form a crust-like growth form that is closely applied to the substrate.

cyanobacteria: "Blue-green" algae; prokaryotic, photosynthetic organisms that generally have a blue-green tint and lack chloroplasts.

cyanolichen: Lichen that contains a cyanobacterium as its phytobiont.

denitrification: The formation of gaseous nitrogen or gaseous nitrogen oxides from nitrate or nitrite by microorganisms.

desertification: Land degradation in arid, semi-arid, and dry subhumid regions of the world resulting from climatic and other natural stresses coupled with human activities. Processes that lead to desertification include soil loss through wind and water erosion; changes in soil quality due to salinization, waterlogging, and nutrient depletion; loss of vegetative biomass and cover; and compositional and structural changes in plant communities due to exotic plant invasion (Mouat et al. 1995).

foliose lichens: Lichens that are leaf-like in growth form, flattened with definite upper and lower surfaces, and usually loosely attached to the substrate.

fruticose lichens: Lichens with three-dimensional growth forms that are ropey or branching and do not have definite upper and lower surfaces.

gelatinous lichens: Lichens that are non-stratified (algal and fungal layers are not distinct) and that have a jelly-like appearance when moistened. All gelatinous lichens have cyanobacteria as their phytobiont.

gemmae: Structures produced by liverworts that function in vegetative reproduction.

green algae: Photosynthetic unicellular and multicellular organisms that lack true tissue differentiation.

heterocysts: Specialized cells occurring in some filamentous cyanobacteria that are the sites of nitrogen fixation.

heterotrophs: Organisms that require organic compounds for growth and reproduction.

***hydraulic conductivity (K_e)*:** The rate at which water moves through the soil profile under field conditions.
***hyphae*:** Fungal filaments.
***infiltration*:** The downward entry of water into the soil.
***interspace*:** The spaces in a plant community between shrubs or trees.
***lichen*:** A symbiotic relationship between a fungus and an algae or cyanobacterium.
***lithic*:** Pertaining to rock; rocky.
***liverwort*:** A small, non-vascular plant.
***microfungi*:** Fungi that occur free-living in the soil or in association with roots of vascular plants (mycorrhizae).
***mucilaginous*:** Having a sheath composed of sticky polysaccharides surrounding cyanobacterial, algal, or fungal filaments.
***mycorrhizae*:** A stable, symbiotic association between a fungus and the root of a plant.
***nitrification*:** The process in which ammonia is oxidized to nitrite and nitrite to nitrate.
***nitrogen fixation*:** The conversion of elemental nitrogen (N_2) to organic combinations or to forms readily usable in biological processes.
***nitrogenase*:** The enzyme that catalyzes biological nitrogen fixation.
***permeability*:** The ease with which gases, liquids, or plant roots penetrate or pass through the soil.
***photosynthesis*:** The process in which light energy is absorbed by specialized pigments of a cell and converted to chemical energy. The ultimate result of photosynthesis is the fixation of CO_2 and the production of carbon compounds (sugars).
***phytobiont*:** The photosynthetic partner in the lichen symbiosis, i.e., the algal or cyanobacterial component of a lichen.
***poikilohydric*:** Organisms that are capable of becoming physiologically dormant under dry conditions.
***prokaryotic*:** Cells that lack a nucleus.
***propagules*:** Material that results from either sexual or asexual reproduction by crustal organisms and disperses into areas where the biological soil crust has been removed by disturbance. This material "germinates" and grows to establish a new crust.
***resilience*:** The ability to recover following disturbance.
***resistance*:** The ability to withstand disturbance.
***respiration*:** The biological process whereby organisms oxidize carbon compounds to CO_2 and water as a source of energy.
***rhizines*:** Root-like structures of lichens and mosses that function to attach the organism to the substrate.
***saline soil*:** A soil containing sufficient soluble salts to impair its productivity.
***sessile*:** Attached to a surface without a stalk but not imbedded in the surface.
***squamulose lichens*:** Lichens that occur as discrete flakes or scales that are often round or ear-shaped. Squamulose lichens may be convex or concave and often have lobed margins.
***symbiosis*:** An obligatory, interactive association between two organisms, producing a stable condition in which they live together in close physical proximity to their mutual advantage.
***thallus*:** The vegetative body of a lichen or liverwort.
***xerothermic*:** Dry, hot conditions.

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13. ABSTRACT (Maximum 200 words)

This technical reference presents a review of current scientific knowledge on the ecology of biological soil crusts, then integrates this information into a discussion on monitoring and management of arid and semiarid lands in the western United States. The document begins with a discussion on the composition, structure, and distribution of biological crusts relative to environmental factors such as climate and soil characteristics. This information is then synthesized into guidelines on development of monitoring strategies as well as site-specific management prescriptions regarding livestock, recreation, and other multiple-use activities. The material is presented from a practical and applied management perspective and is summerized in numerous tables and figures.

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FATE AND TRANSPORT EVALUATION OF POTENTIAL LEACHING RISKS FROM CADMIUM TELLURIDE PHOTOVOLTAICS

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Abstract—Fate and transport analysis has been performed to evaluate potential exposures to cadmium (Cd) from cadmium telluride (CdTe) photovoltaics (PV) for rainwater leaching from broken modules in a commercial building scenario. Leaching from broken modules is modeled using the worst-case scenario of total release of Cd, and residential screening levels are used to evaluate potential health impacts to on-site workers and off-site residents. A rooftop installation was considered rather than a ground-mount installation because rainwater runoff is concentrated via building downspouts in a rooftop installation rather than being dispersed across large areas in a ground-mount installation. Fate and transport of Cd from leachate to soil are modeled using equilibrium soil/soil-water partitioning. Subsequent migration to ambient air as windblown dust is evaluated with a screening Gaussian plume dispersion model, and migration to groundwater is evaluated with a dilution-attenuation factor approach. Exposure point concentrations in soil, air, and groundwater are one to six orders of magnitude below conservative (residential soil, residential air, drinking water) human health screening levels in both a California and southern Germany (Baden-Württemberg) exposure scenario. Potential exposures to Cd from rainwater leaching of broken modules in a commercial building scenario are highly unlikely to pose a potential health risk to on-site workers or off-site residents. Environ. Toxicol. Chem. 2012;31:1670–1675. © 2012 SETAC

Keywords—Cadmium telluride Leaching Risk assessment Fate and transport Cadmium telluride photovoltaics

INTRODUCTION

Solar energy is an important technology for climate change mitigation and development of a low carbon economy because it offers the highest global technical potential for electricity generation among renewable energy sources [1]. In particular, cadmium telluride (CdTe) thin film photovoltaic (PV) modules have the lowest life cycle carbon footprint and fastest energy payback time of current PV technologies [2]. Although CdTe has been shown to be significantly less toxic than elemental cadmium (Cd) on an acute basis [3], the primary health and safety concern for CdTe PV is the potential introduction of Cd compounds into the environment. When considered on a life cycle basis from raw material acquisition through product end-of-life, CdTe PV has been found to produce environmental Cd emissions to air that are no higher than those from conventional silicon PV technologies [4,5]. Moreover, because Cd is an unavoidable by-product of Zn mining, large-scale deployment of CdTe PV sequesters waste Cd that would otherwise be disposed of [6]. Prefunded end-of-life takeback and recycling programs also significantly reduce the overall environmental impact of CdTe PV modules [7].

Under normal operation, CdTe PV modules do not pose a threat to human health or the environment, because during the manufacturing process, the CdTe semiconductor layer is bound under high temperature to one sheet of glass, coated with an industrial laminate material, and then encapsulated between a second sheet of glass. However, some stakeholders have raised concerns about the potential exposure to CdTe from leaching of broken modules, defined as modules with cracked glass or broken pieces. Breakage results from extreme weather or human factors. Although rare, breakage followed by precipitation may potentially result in leaching of CdTe from modules and subsequent exposure to Cd compounds in soil, air, or groundwater. This analysis uses fate and transport modeling to estimate potential exposures to Cd compounds resulting from leaching and then evaluates the potential health effects associated with these exposures.

Fate and transport scenarios were evaluated for two geographic locations, southern Germany and California. Germany is among the world's leading PV markets, having accounted for nearly half of global demand in 2010 [8]. This analysis focuses on the higher solar irradiance region of southern Germany (Federal State of Baden-Württemberg). California is a leading PV market in the United States, and in 2011, the California state legislature adopted a renewable portfolio standard of 33% by 2020 (http://www.cpuc.ca.gov/PUC/energy/Renewables/index.htm).

In the present analysis, a commercial building scenario was chosen rather than a residential building scenario because the larger PV array size for commercial buildings increases the probability that module breakage may occur in a given year. However, both nonresidential (on-site) and residential (off-site) exposure scenarios were considered and evaluated using residential screening values. A rooftop installation was considered rather than a ground-mount installation because rainwater runoff can be concentrated via building downspouts in a rooftop installation (impact via concentrated stream) rather than being dispersed across large areas in a ground-mount installation. The evaluation considers the worst-case scenario in which the total mass of Cd in each broken module is released.

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MATERIALS AND METHODS

The present analysis considers broken CdTe PV modules located on the rooftop of a commercial building. Potential receptors considered for analysis include on-site commercial/industrial workers and off-site residents. Under this exposure scenario, potential exposure to Cd is considered for commercial/industrial workers via inhalation of, dermal contact with, and ingestion of Cd leached into soil, as well as exposure to groundwater potentially impacted by leachate. Also under this exposure scenario, potential exposure to Cd is considered for off-site residents via inhalation of windblown dust from affected soil and exposure to groundwater potentially impacted by leachate.

To characterize these potential exposure scenarios, exposure point concentrations of Cd in soil, air, and groundwater are estimated using a fate and transport analysis. The estimated exposure point concentrations are the relevant concentrations to which on-site workers or off-site residents may potentially be exposed. The exposure point concentration for soil is only relevant to the on-site worker who may potentially have incidental contact with on-site surface soil during the workday. The exposure point concentration for air is relevant to both the on-site worker and off-site resident who may potentially inhale affected ambient air. The exposure point concentration for groundwater is relevant to both the on-site worker and off-site resident who may potentially use groundwater as drinking water.

To evaluate potential human health impacts, estimated exposure point concentrations are compared to human health screening levels. Nonresidential screening levels are applicable to the on-site worker, whereas residential screening levels are applicable to the off-site resident. In this evaluation, the residential screening levels are used in comparison with estimated exposure point concentrations to be protective of both on-site workers and off-site residents. Specifically, for California, residential screening levels for soil (1.7 mg/kg) and air (1.4×10^{-3} μg/m^3) are used instead of commercial/industrial screening levels of 7.5 mg/kg and 6.8×10^{-3} μg/m^3, respectively. For Germany, a residential screening level for soil (2 mg/kg) is used instead of a commercial/industrial screening level of 60 mg/kg.

The fate and transport methodology used to estimate migration of Cd from the emission point (broken module) to the exposure point (soil, air, or groundwater) is summarized in Figure 1 and described with Equations 1 to 5 below. The concentration of Cd in leachate resulting from rainwater that falls upon and runs off broken modules is estimated based on a worst-case mass balance approach, where all the mass of Cd in each broken module is assumed to be transferred from the module into the volume of rainfall that falls upon the module during the exposure period. The subsequent concentration of Cd in rainwater runoff from the overall module array is calculated using a weighted average between impacted runoff from broken modules and nonimpacted runoff from unbroken modules. It should be noted that the assumption of total release of Cd from a broken module was adopted for the purpose of conducting screening level risk assessment, but is unlikely in the light of low experimentally measured emissions from broken or burnt modules [4].

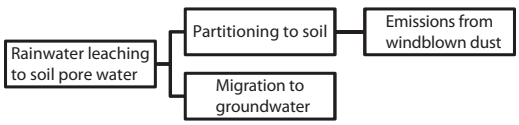

Fig. 1. Fate and transport schematic of migration from emission point (rainwater leaching from broken module) to exposure point in soil, air, and groundwater.

It is assumed that the rooftop runoff is conveyed via downspouts and discharged onto the ground surface over an area of 1 m^2 per downspout. Chemical concentrations in vadose (unsaturated) zone soil pore water at these discharge locations are assumed to be equal to the concentrations in the rooftop runoff discharge. The vadose zone soil pore water throughout the rest of the site is assumed to be nonimpacted. For the commercial building scenario, a roof with dimensions of 50×50 m is assumed to be completely covered by CdTe PV modules of dimensions 0.6×1.2 m each. Twenty-five downspouts are assumed for the building, based on the roof area being 25 times larger than a standard residential building (10×10 m) [9], where the latter would have one downspout.

The vadose zone soil pore water concentration in each 1 m^2 downspout ground surface area is estimated with the worst-case mass balance approach in Equation 1, where the numerator represents the total annual release of Cd and the denominator represents the total annual column of rainfall.

$$\mathrm{CV} = \frac{N \times M \times \mathrm{CF} \times B}{P \times A} \tag{1}$$

where CV is the Cd concentration in vadose soil pore water (mg/L); N is the number of modules (unitless); M is the mass of Cd per module (g); CF is the conversion factor (mg/g); B is the module breakage rate (year^{-1}); P is the annual average precipitation (L/m^2-year), which is annual precipitation (m/year) falling over 1 m^2 converted to units of L from m^3; and A is the area of roof-top array (m^2).

The potential transport of Cd to soil is evaluated in accordance with the equilibrium-partitioning approach described in the U.S. Environmental Protection Agency (U.S. EPA) soil screening guidance [10,11]. It is assumed that the surface soil where rainwater runoff is discharged is instantaneously impacted with Cd, at the concentration predicted by equilibrium partitioning between the water and soil matrices, as expressed by the soil/soil-water partitioning coefficient (K_d) value for Cd (Eqn. 2).

$$\mathrm{CS_{eq}} = \mathrm{CV} \times \left(K_\mathrm{d} + \frac{\theta_\mathrm{w}}{\rho_\mathrm{b}}\right) \tag{2}$$

where $\mathrm{CS_{eq}}$ is the equilibrium concentration of Cd in impacted soil (mg/kg); CV is the concentration of Cd in vadose zone soil pore water (mg/L); K_d is the soil/soil-water partitioning coefficient (L/kg); θ_w is the soil water-filled porosity (unitless); and ρ_b is the soil dry bulk density (kg/L).

For this scenario, it is assumed that the entire area of the site evaluated here is uncovered by concrete or asphalt and is open bare soil to allow the runoff water to penetrate into site soils. In actuality, commercial sites are often completely covered by concrete or asphalt. On-site commercial/industrial workers are assumed on average to be exposed to site soils across the entire portion of the site that is not occupied by the building. Exposure point concentrations of chemicals in soil are therefore calculated as site-wide average concentrations, incorporating areas of impacted soils (at the worst-case concentrations predicted by equilibrium partitioning) and nonimpacted soils (Eqn. 3). The exposure area (SA-A; Fig. 2) is assumed to be the same as that for a residential building [9], even though a commercial building property would likely be larger, therefore with larger

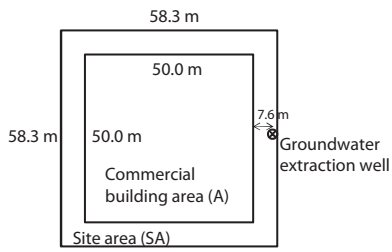

Fig. 2. Site schematic.

nonimpacted areas. This assumption accounts for the potential of at least part of the site to be covered.

$$CS = CS_{eq} \times \frac{IA}{(SA - A)} \quad (3)$$

where CS is the exposure point concentration of Cd in soil (mg/kg); CS_{eq} is the equilibrium concentration of Cd in impacted soil (mg/kg); IA is the impacted area (m^2); SA is the site area (m^2); and A is the area of building (m^2).

The potential transport of Cd from impacted soil to ambient air is estimated (Eqn. 4) using the U.S. EPA-recommended default windblown dust emissions flux for wind erosion (1.38×10^{-7} g/s-m^2) [11]. As noted above, the uncovered portion of the site is assumed to be bare earth for the purpose of this analysis, whereas commercial sites are frequently landscaped or covered by concrete or asphalt. It is assumed that Cd is present in this windblown dust at the soil concentration predicted by equilibrium partitioning (Eqn. 2). The U.S. EPA screening Gaussian plume dispersion model SCREEN3 [12] is used in conjunction with the emissions flux to estimate worst-case concentrations of dust and thus Cd in ambient air. The maximum hourly dust concentration from SCREEN3 was adjusted with a persistence factor of 0.08 [13] to derive the annual worst-case concentrations of dust.

$$CA = CS_{eq} \times CD \times CF_1 \times CF_2 \quad (4)$$

where CA is the exposure point concentration of Cd in air (μg/m^3); $CS_{eq}$is the equilibrium Cd concentration in soil (mg/kg); CD is the worst case dust concentration in air (mg/m^3); CF_1 is the conversion factor (kg/mg); and CF_2 is the conversion factor (μg/mg).

The potential transport of Cd to groundwater is evaluated in accordance with the dilution-attenuation factor (DAF) approach described in the U.S. EPA soil screening guidance [10,11]. It is assumed that vadose zone soil water, from the ground surface to the groundwater table, contains Cd at the module array-runoff concentration discussed above in Equation 1 (i.e., it is assumed the soil column does not adsorb any Cd). The potential concentration of Cd in groundwater at the hypothetical point of usage, which is assumed by the model to be a groundwater extraction well located 25 ft from the edge of the impacted area, is calculated by applying an upper bound (95th percentile) DAF [14] to the vadose soil water concentration (Eqn. 5). Note that for DAF values, higher percentiles represent numerically lower values, indicating less dilution-attenuation, and therefore higher groundwater concentrations.

$$CW = \frac{CV}{DAF} \times CF \quad (5)$$

where CW is the exposure point concentration of Cd in groundwater (μg/L); CV is the concentration of Cd in vadose zone soil pore water (mg/L); DAF is the dilution-attenuation factor (unitless); and CF is the conversion factor (μg/mg).

The specific fate and transport modeling parameters used in Equations 1 to 5 are summarized in Table 1. The parameters are the same for the two geographies evaluated, with the exception of higher average annual precipitation (37.32 inches/year; http://www2.lubw.baden-wuerttemberg.de/public/abt5/klimaatlas_bw/klima/aenderungen/ba-wue/niederschlag/index.html) for Baden-Württemberg, relative to California (21.44 inches/year; http://www.nationalatlas.gov/printable/precipitation.html). In addition, the German dry soil bulk density (1.4 kg/L; average between settlement and grassland areas [15]) is slightly lower than that used for California (1.5 kg/L [11]).

It should also be noted that the German Federal Environment Ministry does not provide a default value for the soil/soil-water partitioning coefficient data (K_d) for cadmium, due to low mobility in groundwater [16]. In this evaluation, the K_d value used for the California exposure scenario is applied to the southern Germany exposure scenario.

RESULTS

Exposure point concentrations of Cd in soil, air, and groundwater derived in Equations 3 to 5, respectively, are summarized in Table 2, and compared to human health screening levels for each of these media. For the California case, the screening levels in soil, air, and groundwater are from the California Human Health Screening Levels, U.S. EPA Region 9 Regional Screening Levels, and U.S. National Primary Drinking Water Regulations, respectively. Residential soil and indoor air screening values are used, both of which are more protective than the commercial building soil and outdoor air exposure scenarios considered here.

In the southern Germany case, the soil screening level is from the residential trigger value in Annex 2 of the Federal Soil Protection and Contaminated Sites Ordinance (http://www.umweltbundesamt.de/boden-und-altlasten/altlast/web1/berichte/pdf/bbodschv-engl.pdf). The standard residential trigger value in soil is 20 mg/kg, whereas for the special case of gardens in which children stay and food plants are grown, a residential trigger value of 2 mg/kg applies. Table 2 presents the latter more protective soil screening value, which is similar to the California Human Health Screening Levels value used for California. The German air screening level is based on World Health Organization air quality guidelines for Europe [17] and is slightly higher in magnitude than the California air screening level. The groundwater screening level is from the German regulation on drinking water (http://www.umweltbundesamt.de/wasser-e/themen/trinkwasser/gesetze.htm) and is the same as the U.S. drinking water standard.

In the California and southern Germany cases, exposure point concentrations in soil, air, and groundwater are one to six orders of magnitude below human health screening levels, indicating that it is highly unlikely that exposures to these media would pose potential health risks to on-site workers or off-site residents. In particular, air concentrations are below screening levels by five to six orders of magnitude, indicating exposure to ambient air is a de minimis exposure pathway.

For reference, the average background Cd concentration in California surface soils is 0.36 mg/kg [18], whereas average background surface soil Cd concentrations in Baden-Württemberg range from 0.2 to 0.3 mg/kg [19]. Therefore, modeled impacts to soil are over an order of magnitude below both human health screening levels and regional background levels.

Table 1. Fate and transport modeling parameters used in conjunction with Equations 1 to 5 for California (CA) and Baden-Württemberg (B-W) exposure scenarios[a]

Equation 1 parameters[b]	Equation 2 parameters[c]	Equation 3 parameters[d]	Equation 4 parameters[e]	Equation 5 parameters[f]
N: 3472	CV (CA/B-W): 0.00612/0.00352 mg/L	CS_{eq} (CA/B-W): 0.460/0.265 mg/kg	CS_{eq} (CA/B-W): 0.460/0.265 mg/kg	CV (CA/B-W): 0.00612/0.00352 mg/L
M: 6 g/module	K_d: 75 L/kg	IA: 25 m^2	CD: 5.5×10^{-6}	DAF: 7.82
CF: 1000 mg/g	θ_w: 0.3	SA: 3400 m^2	CF_1: 0.000001 kg/mg	CF: 1000 μg/mg
B: 0.04% $year^{-1}$	ρ_b (CA/B-W): 1.5/1.4 kg/L	A: 2500 m^2	CF_2: 1000 μg/mg	
P (CA/B-W)[g]: 545/947 L/m^2-year				
A: 2500 m^2				

[a] When two values are provided for a given parameter, first value is for CA and second value is for B-W.
[b] Parameters in Equation 1 are N (number of modules), M (mass of Cd per module), CF (conversion factor), B (module breakage rate), P (annual average precipitation), and A (area of building).
[c] Parameters in Equation 2 are CV (concentration of Cd in vadose zone soil pore water), K_d (soil/soil-water partitioning coefficient), θ_w (soil water-filled porosity), and ρ_b (soil dry bulk density).
[d] Parameters in Equation 3 are CS_{eq} (equilibrium concentration of Cd in impacted soil), IA (impacted area), SA (site area), and A (area of building).
[e] Parameters in Equation 4 are CS_{eq} (equilibrium Cd concentration in soil), CD (worst case dust concentration in air), CF_1 (conversion factor), and CF_2 (conversion factor).
[f] Parameters in Equation 5 are CV (concentration of Cd in vadose zone soil pore water), DAF (dilution-attenuation factor), and CF (conversion factor).
[g] Precipitation parameter (P) is based on annual average precipitation of 21.44 and 37.32 inches for California and Baden-Württemberg respectively.

For further perspective on soil impacts, Cd is commonly found in agricultural fertilizers. California is among the top users of agricultural fertilizer in the United States and analysis of metals in fertilizer samples has been performed by the California Department of Food and Agriculture, with median Cd concentrations of 89 mg/kg in phosphate fertilizer and 37 mg/kg in nitrogen/phosphorus/potassium (NPK) fertilizer [20]. Similarly, average Cd concentrations in phosphate and NPK fertilizer in Germany are 60 and 18 mg/kg, respectively (http://www.bfr.bund.de/cm/343/cadmiumaustrag_ueber_duengemittel.pdf). These values are over three orders of magnitude higher than the estimated exposure point concentration in soil in California and southern Germany (Table 2).

For reference, average background Cd (total suspended particulate) concentrations in California ambient air monitoring stations ranged from 0.0008 to 0.001 μg/m^3 in 2008 (http://www.epa.gov/air/data/geosel.html). Similarly, average background Cd concentrations in Europe range from 0.0001 to 0.0004 μg/m^3 in rural areas and 0.0002 to 0.0025 μg/m^3 in urban areas [21]. Therefore, modeled impacts to air are five orders of magnitude below both health screening levels and background levels.

For reference, the average background Cd concentration in groundwater from 1984 to 2004 in California Air Force bases ranged from <0.004 mg/L (50th percentile) to 0.006 mg/L (95th percentile; http://www.dtsc.ca.gov/assessingrisk/upload/metals_handout.pdf). In Baden-Württemberg, average background Cd concentrations in groundwater range from 0.00052 to 0.0039 mg/L [22]. Therefore, modeled impacts to groundwater in California and southern Germany are below both human health screening levels and background levels.

In addition to soil, air, and groundwater, another route of potential concern is direct discharge of rooftop runoff to stormwater catch basins. In combined sewer systems, stormwater and wastewater are collected together and treated at a publicly owned treatment works (POTW). The worst-case rooftop runoff Cd concentration (assuming total release of Cd from broken modules) is equivalent to the estimated Cd concentration in vadose soil pore water (CV; 0.004–0.006 mg/L; Table 1). Because this concentration is approximately consistent with drinking water standards, impacts to POTW's from rooftop runoff are expected to be minimal.

DISCUSSION

The fate and transport analysis conducted here represents a worst-case scenario of total Cd release from broken modules. An implicit assumption for this scenario is that a broken module would remain undetected and in the field over the exposure duration. This is a screening level assumption that would likely not occur given routine inspections of modules or power output monitoring. For example, the latter may include diagnostic comparison of actual to expected performance or comparison of co-located arrays to identify low performance areas and modules that are nonfunctioning potentially due to breakage.

Another implicit assumption is that emissions of CdTe from rainwater leaching of broken modules can be modeled as emissions of Cd, a "read-across" approach. This is a screening

Table 2. Estimated exposure point concentration (EPC) and corresponding human health screening level in soil, air, and groundwater.

	Soil EPC (mg/kg)	Soil screening level (mg/kg)	Air EPC (μg/m^3)	Air screening level (μg/m^3)	Ground-water EPC (mg/L)	Ground-water screening level (mg/L)
California[a]	1.28×10^{-2}	1.7	2.53×10^{-9}	1.4×10^{-3}	7.83×10^{-4}	5×10^{-3}
Baden-Württemberg[b]	7.35×10^{-3}	2	1.46×10^{-9}	5×10^{-3}	4.50×10^{-4}	5×10^{-3}

[a] California screening levels are from the California Human Health Screening Levels (http://www.calepa.ca.gov/brownfields/documents/2005/CHHSLsGuide.pdf) for soil, USEPA Region 9 (http://www.epa.gov/region9/superfund/prg/) for air, and U.S. National Primary Drinking Water Regulations (http://water.epa.gov/drink/contaminants/index.cfm) for groundwater.
[b] German screening levels are from Annex 2 of the Federal Soil Protection and Contaminated Sites Ordinance (http://www.umweltbundesamt.de/boden-und-altlasten/altlast/web1/berichte/pdf/bbodschv-engl.pdf) for soil, World Health Organization air quality guidelines for Europe [17] for air, and German regulation on drinking water (http://www.umweltbundesamt.de/wasser-e/themen/trinkwasser/gesetze.htm) for groundwater.

level assumption because CdTe is relatively insoluble [3,23]. For example, transformation and dissolution testing is designed to determine the rate and extent to which sparingly soluble metal compounds can produce soluble available ionic species in aqueous media under a set of standard laboratory conditions representative of those generally occurring in the environment. Based on long-term transformation and dissolution testing of CdTe, a 1 mg/L loading showed a concentration of 15 μg of Cd per L after 28 d, indicating approximately 1.5% solubility [24]. This is also consistent with the very low solubility product ($K_{sp} = 9.5 \times 10^{-35}$) for CdTe [25]. In addition to low solubility, CdTe can be contrasted with elemental Cd and other Cd compounds based on limited bioavailability and low acute toxicity, which result in an overall margin of safety of two orders of magnitude likely inherent to CdTe screening assessments developed using the read-across approach from Cd [25].

Because of the low solubility of CdTe, aggressive extraction methods are required to leach CdTe from a module. Such methods are used, for example, in the recycling process for CdTe modules. They involve crushing the module into mm-scale pieces and agitating it in an acidic solution [7]. These extraction methods in no way mimic actual broken or cracked module exposure to rainwater. Therefore, the assumption of total Cd release from broken modules is highly unlikely.

In addition to this worst-case assumption, other upper bound assumptions are used in the analysis. Migration from vadose zone soil pore water to soil is modeled with equilibrium partitioning, which represents the theoretical maximum concentration possible in the solid phase, for a given concentration in soil pore water. Subsequent migration from soil to air is modeled using the SCREEN3 U.S. EPA Gaussian plume dispersion model to estimate worst-case concentrations of windblown dust.

The approach used to estimate groundwater impacts is also upperbound because it does not account for the loss of chemical mass from the pore water during soil-water partitioning, instead assuming that the pore water is instantaneously in equilibrium with the solid soil phase. Accordingly, no mass in pore water is lost to the solid soil phase during partitioning, when in actuality some of this mass partitions into the solid soil phase, with a subsequent reduction in the concentration of Cd in the pore water with depth, until equilibrium is reached. Accounting for the loss of chemical mass from the pore water to the solid phase would lower chemical concentrations in soil water that are assumed to penetrate to groundwater and so reduce predicted groundwater exposures. In addition, the DAF assumes that there is an infinite source of mass available for release. Conserving mass would likely reduce the average long-term groundwater concentration estimated using the DAF approach and so result in lower groundwater exposures. Moreover, the dilution-attenuation factor used was a 95th percentile DAF where the higher percentiles represent numerically lower DAF values, indicating less dilution-attenuation and therefore higher groundwater concentrations. All of these factors contribute to the likelihood that impacts to groundwater are overestimated. Also as described earlier, under German groundwater assessment methodology, a default soil/soil-water partitioning coefficient data (K_d) is not provided, due to low mobility of Cd in groundwater [16] implying that using the DAF approach will result in an overestimate of groundwater concentration.

The soil/soil-water partitioning coefficient used in Equation 2 is pH-dependent. In the absence of site-specific soil pH, the default recommended soil pH of 6.8 was used in this analysis, corresponding to a Cd soil/soil-water partitioning coefficient of 75 L/kg. The latter coefficient ranges from 17 L/kg at soil pH of 5 to 4,300 L/kg at soil pH of 8 [11]. The equilibrium concentration of Cd in impacted soil is proportional to the soil/soil-water partitioning coefficient (Eqn. 2). Therefore, under acidic soils, the exposure point concentration in soil may be up to a factor of 4.4 lower than the concentration estimated in Table 2. For alkaline soils, the exposure point concentration in soil may be up to a factor of 57 higher than the concentration estimated in Table 2. However, because the soil exposure point concentrations in Table 2 are over two orders of magnitude below screening levels, potential health risks from exposure to soil are highly unlikely under varying soil pH.

The number of building downspouts (25) is based on the commercial building roof area being 25 times larger than a standard residential building with one downspout. The number of downspouts affects the impacted soil area (parameter IA in Eqn. 3), with each downspout discharging onto 1 m^2 of ground surface area. With additional downspouts, the soil exposure point concentration estimated with Equation 3 would increase proportionally. However, because the soil exposure point concentrations in Table 2 are over two orders of magnitude below screening levels, potential health risks from exposure to soil are highly unlikely under variations in the number of building downspouts.

Another screening level assumption is the module breakage rate. Product return statistics have been obtained in the 2011 fourth quarter from First Solar's warranty manager evaluating global warranty trends (J. Sokol, First Solar, Perrysburg, Ohio, USA, personal communication), including five years of actual performance data with extrapolations to later years of product life, based on an observed decline in breakage rate after the installation and initial operating period. Module breakage is rare, occurring in approximately 1% of modules over the 25-year warranty operating life, including the shipping and installation period. Of these breakages, over one-third occurs during shipping and installation and are removed for takeback and recycling. In addition, a proportion of broken modules have only chipped glass that does not affect the CdTe semiconductor layer. These two considerations considerably reduce the relevant breakage rate for modules that may be subject to leaching by rainfall. Nevertheless in this analysis, a conservative breakage rate of 1% over a 25-year life (0.04%/year) is applied.

The screening level approach used in this evaluation considers each exposure medium (soil, air, groundwater) separately. If an exposure point concentration for a chemical exceeds a screening level, the chemical is of potential concern to human health and requires further risk assessment. Conversely, if a screening level is not exceeded, it is highly unlikely that the chemical may pose a potential health risk in that exposure media. In addition to screening health risks for each exposure medium, cumulative risks across exposure media were considered using the exposure point concentrations in Table 2 in conjunction with U.S. EPA exposure assessment methodology [26,27] and the inhalation unit risk and oral reference dose for Cd (http://www.epa.gov/iris/subst/0141.htm). Across the exposure media of soil, air, and groundwater, cumulative risks and hazards are below one in one million and the hazard index of 1, respectively, as expected given that the media-specific exposure point concentrations are orders of magnitude below human health screening levels.

Overall, a worst case leaching scenario with screening level fate and transport modeling yields impacts to soil, air, and groundwater that are one to five orders of magnitude below human health screening levels in a California and southern

Germany exposure scenario. Potential exposures to Cd from rainwater leaching of broken modules in a commercial building scenario are highly unlikely to pose a potential health risk to on-site workers or off-site residents.

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EXHIBIT 6

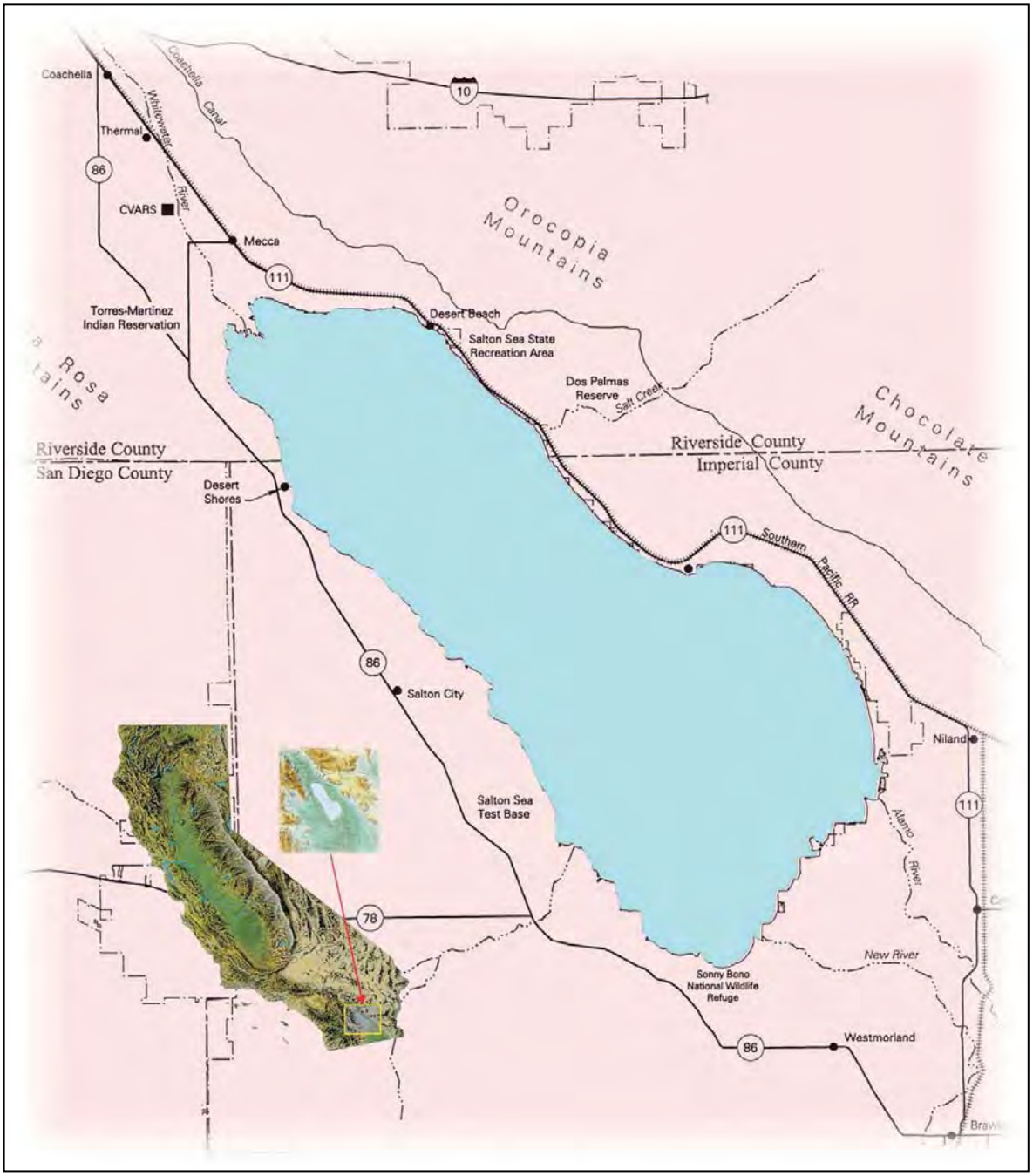
SALTON SEA RESTORATION

Final Preferred Project Report

Salton Sea Authority

July 2004

Document prepared by Tetra Tech, Inc.



Salton Sea Location Map

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EXECUTIVE SUMMARY

The Salton Sea is located in a closed basin in Riverside and Imperial Counties in southern California, south of Indio and north of El Centro. The Sea is more than 220 feet below sea level and has no natural outlet. The Salton Sea Basin is part of the Lower Colorado River Delta system and historically lakes have existed in this basin as the course of the Colorado River has shifted. The current body of water formed in 1905 when a levee break along the Colorado River caused flows from the Colorado River to enter the basin for about 18 months. Since 1905, the Sea has fluctuated in size with varying inflow, and it recently has had a surface area of 365 square miles.

A balance between inflowing water and evaporation has sustained the Sea in the past. However, with no outlet, any salts that are dissolved in the inflow are trapped, although some do precipitate. Salt concentrations are rising and are currently about 44,000 milligrams per liter (mg/L), or about 25 percent higher than ocean water. Salinity will continue to rise under current conditions. As a result of recently approved water transfers, the inflow to the Sea is expected to be less than it has been in the past. A reduction in inflow will cause the Sea to shrink and cause salinity to rise faster than it would have without a reduction in inflow.

The Salton Sea Reclamation Act of 1998 directed that studies be conducted to evaluate the feasibility of possible actions to allow continued uses at the Sea. Following the passage of the Act, a study was initiated to develop alternative measures to address rising salinity and other problems at the Sea.

In April 2003, the Salton Sea Authority (Authority) Board of Directors (Board) endorsed moving forward with an Integrated Water Management Plan for the Salton Sea. Recognizing that inflows to the Sea are likely to be reduced in the near future, the Plan evolved from recent concepts for a smaller Sea as well as earlier work by the Authority and the Bureau of Reclamation (Reclamation). The Authority subsequently commissioned the engineering feasibility studies and further analysis of the Integrated Plan documented in this report.

During 2003, the Quantification Settlement Agreement (QSA) was also in the process of being approved and legislation was developed to acknowledge the linkage between water transfers and the health of the Salton Sea. The QSA will allow for transfers of Colorado River Water out of the Imperial Valley. Such transfers are expected to substantially reduce the inflow to the Salton Sea. In association with the approval of the QSA, three bills were signed into law in September 2003 that specify a State-led program to develop a preferred restoration alternative by December 2006. The package of legislation also provides a mechanism to generate up to $300 million for Salton Sea restoration through the sale of transferred Colorado River water. The State is now in the process of implementing the planning requirements for this suite of legislative bills dealing with Salton Sea restoration.

Overview of Report

This report documents a two-step process that has led to the identification of a preferred project for Salton Sea restoration. It provides the background for this process by discussing how the Sea could respond to inflow reductions, and by providing an overview of restoration options. The report then presents the first step of the process, which is a logic-tree evaluation that illustrates how features of restoration options can be eliminated through a series of queries. For example, one query is "Would pump-in/pump-out systems work?" referring to the practicality of systems such as pipelines that would exchange Salton Sea water with ocean water. This first step of the process documents the logic that has been used to eliminate unreasonable options and to identify the most feasible restoration strategy. In the second step in the process, alternatives are formulated from this strategy and ranked with respect to the program objectives. This step leads to a preferred conceptual alternative. Finally, this report concludes with a complete discussion of the preferred alternative concept, including its features, cost analyses, water surface elevations, performance factors, program phasing, and implementation.

Program Objectives

On November 12, 1998, Congress enacted Public Law 105-372, The Salton Sea Reclamation Act of 1998. This Act authorized the Secretary of the Interior to complete studies of options that:

1. Permit the continued use of the Salton Sea as a reservoir for irrigation drainage,
2. Reduce and stabilize the overall salinity of the Salton Sea,
3. Stabilize the surface elevation of the Salton Sea,
4. Reclaim, in the long term, healthy fish and wildlife resources and their habitats, and
5. Enhance the potential for recreational uses and economic development of the Salton Sea.

Key program objectives have been developed to complement and provide more specifics to these goals that were included in the Reclamation Act and to incorporate work done by the Authority and Reclamation since 1998. These objectives reflect the current needs of the restoration effort with respect to the present understanding of the future volumes of water that will flow into the Sea. The current program objectives are as follows:

- Preserve the Sea as a repository for agricultural runoff
- Provide a large marine lake with stable elevation
- Improve water quality: salinity

- Improve water quality: nutrients/other constituents
- Maintain and improve habitat
- Achieve water quality and habitat objectives in a timely manner
- Respond to inflow changes
- Increase recreational and economic potential
- Address air quality concerns
- Provide high safety rating/low risk of failure
- Overcome institutional barriers/public acceptance
- Achieve reasonable cost/high probability of financing

Inflows to the Sea

With implementation of the QSA, the average inflow to the Sea is expected to decrease over about 15 to 20 years from over 1,300,000 acre-feet/year to an expected inflow of about 930,000 acre-feet/year. While the water transfer agreements contain predictable transfer schedules, there is an option for transferring up to 1.6 million acre feet of additional water if the water is not needed to mitigate effects to the Salton Sea. In addition, inflow to the New River from Mexico, where the flow originates, may also be subject to future reductions. For example, reductions in surplus Colorado River flows to Mexico could, in turn, affect New River flows back across the border. It is also possible that the Coachella Valley groundwater management program would affect inflows. These variables translate to an uncertainty with respect to actual Salton Sea inflows. Therefore, three inflow scenarios are considered in this report:

1. The anticipated QSA schedule that includes water releases to mitigate effects to the Salton Sea over the next 15 years;
2. The QSA schedule with the mitigation water terminated in 2006 and sale of additional water to generate restoration funds; and
3. A schedule that would reduce average inflow to about 800,000 acre-feet/year.

Under all three inflow scenarios, without restoration, salinity in the Sea would more than double over a period of 20 to 25 years, while the water surface elevation would decrease by about 20 feet over the same period.

Overview of Restoration Options

Restoration options have evolved through a process that has involved planning studies, engineering analysis, scientific oversight, and environmental reviews. Some

salinity control methods discussed in this report date back to the 1960s and possibly earlier. The amount of salt that would have to be removed by these methods would depend on future inflows. With reduced inflow, the Sea will begin to shrink and salts will be concentrated; therefore, more salts would need to be removed to control salinity. If the inflow continues to be reduced in the future, greater amounts of salt would need to be removed to meet project objectives.

To address the rising salinity of the Sea, a surrogate outlet must be established. Three basic methods have been considered:

- Pump water out of the Sea and discharge it to some remote location. This could be accomplished by combinations of pipelines and canals to the ocean, the Gulf of California, or some other remote location.

- Pump water out of the Sea and discharge it to local desalting plants or evaporation ponds, possibly in combination with mechanical processes that enhance the rate of evaporation. This would require disposal of salt residues near or within impoundments in the Sea.

- Divide the Sea so that one portion acts as a receptor for the discharge from another portion. Through the construction of retention structures, salts would be allowed to concentrate in one area while salinity levels in the remaining area would be controlled.

A myriad of alternatives have been identified over the years to provide one or another of those outlet scenarios, some of which also help control the elevation of the water surface of the Sea. This report discusses those that have been viewed as the most promising in the past or that have passed earlier screening analyses.

Logical Process for Screening Alternatives

The various categories of alternatives for solving the problems at the Salton Sea can be reviewed through a logical sequence of decisions given the current and likely future conditions at the Sea. The process begins by developing a series of questions which provide a roadmap through a sequence of decision points leading to a logical preferred restoration strategy. This screening process reveals that most alternatives that have been considered in the past do not perform well under reduced inflow conditions. In addition, with reduced inflows most systems need to become very large to respond to rapidly increasing salinity, and consequently, they would become highly expensive. In addition, most processes that remove salt also remove water and thus would exacerbate concerns about elevation decreases under the QSA.

The logic process leads to the conclusion that a concept that bisects the Sea in half may be the most effective restoration strategy. This concept relies on building a causeway/retention structure across the midsection of the Sea to separate hyper-saline and marine basins of the Sea from one another. If the structure is placed at the approximate midsection of the Sea where the west and east shorelines are nearest,

the length of the barrier would be around 8.5 miles, and less if it is designed to work with the Sea at a lower elevation than the current situation. This area is also attractive because the water is shallower than areas to the immediate south and north, which will help reduce construction costs.

A major challenge to this divided lake concept is the feasibility of constructing a facility that is cost effective. The foundation conditions of the Sea have been investigated and found to be composed of a relatively thick layer of fine-grained sediments that create an engineering design challenge. However, conceptual alternative designs of a mid-Sea facility are currently underway and based on preliminary engineering evaluations it is believed that a suitable structure could be constructed at a reasonable cost.

Evaluation of Reasonable Alternatives

The logical process for reviewing alternatives led to the conclusion that alternatives that employ a central dike or dam facility are worthy of further investigation. Such a concept would include a smaller marine lake, and could be developed along one of two options using a central dike or dam: a marine lake in the north or a marine lake in the south. The features and benefits of south and north marine lake concepts based on a dividing structure at this location are described briefly below. There is also a choice about whether or not to control elevation.

South marine lake—A marine lake in the south would have a maximum area on the order of 210 square miles and require an inflow of 980,000 acre feet per year to sustain it at current elevation of about -227 feet relative to mean sea level (msl). The area would be smaller if the lake was to be maintained at a lower elevation. A southern marine lake would be consistent with current wildlife refuge boundaries. The southern marine lake would also take advantage of inflows from the New and Alamo Rivers such that rerouting or transporting these flows would not be necessary. Concentrations of selenium and several other contaminants in the sediments are highest in the northern half of the Sea. Allowing portions of this basin to recede would expose the sediments creating the potential for human health and wildlife impacts.

North marine lake—A marine lake in the northern portion of the Sea would be on the order of 150 square miles and require an inflow of around 800,000 acre feet per year. A marine lake in the north would reduce the concern over selenium sediment effects by effectively capping the sediments with the marine lake. There are also established communities in the northern portion of the Sea such as Desert Shores, Salton City, and North Shore that would benefit from a restored Sea. These communities would likely experience renewed economic development including commercial, recreational, and residential developments. The Torres Martinez Tribe would also benefit from a restored Sea and could implement various economic and natural resource projects. The exposure of submerged areas in the south would allow for geothermal exploration and development of known geothermal resources.

Elevation control—The next issue to be addressed is whether or not to control the water elevation in the marine lake, and if so, what approach to use. A barrier could be used with no elevation control. A retention structure could be used that maintains elevation at current levels. Or, a retention structure could be used that takes advantage of a reduced water surface level.

Given the above considerations, four alternative configurations have been identified for evaluation:

- **South Marine Lake without Elevation Control**—The simplest configuration would be to construct a central barrier and allow the New and Alamo rivers to flow into the south basin and create a marine lake with hyper-saline conditions in the north.

- **South Marine Lake with Elevation Control**—This configuration would be similar to the previous alternative, except that the central barrier would need to be taller and more robust to impound water in the south and create a higher water surface than in the north.

- **North Marine Lake with Elevation Control**— This concept would be similar to the previous alternative with the north-south configuration reversed. In this case, the New and Alamo rivers would need to be extended to the north to provide freshwater inflows to control salinity in the north basin.

- **No Marine Lake**—This alternative is considered in case a mid-Sea barrier or impoundment structure proves to be infeasible or too costly. It would include wetland and habitat restoration elements to achieve as many objectives as possible without maintaining a large lake with a marine fishery.

Evaluation of Reasonable Alternatives

The four reasonable alternatives discussed above were evaluated against the program objectives. For each objective, the alternatives were ranked on the basis of best judgment as to how they would perform under inflows that would be expected with the QSA in place. Finally, an overall composite ranking was developed. A summary of the evaluation process is provided in Table ES-1, where the highest ranking is given a number "1" and the lowest is given a "4."

In addition to rankings against each objective, Table ES-1 shows: (1) an average ranking score calculated by taking a simple average of the rank values for each of the objectives; (2) the number of top rankings; (3) the number of lowest rankings; and (4) the overall average ranking based on the three previous statistics. Based on the data presented here, the **North Lake with Elevation Control alternative received the top ranking and is recommended for consideration as the preferred restoration strategy** for the Salton Sea. As indicated in Table ES-1, the North Lake

Table ES-1. Evaluation of Restoration Options

Objectives	Restoration Alternative			
Project Objectives Used in this Report	South Marine Lake wo Elevation Control	South Marine Lake w Elevation Control	North Marine Lake w Elevation Control	No Marine Lake
Preserve Sea as Repository for Agricultural Runoff	1	1	1	1
Provide Large Marine Lake with Stable Elevation	3	1	2	4
Improve Water Quality: Salinity	1	1	1	4
Improve Water Quality: Nutrients/Other Constituents	2	2	1	4
Maintain and Improve Habitat	3	2	1	4
Time to Achieve Water Quality and Habitat Objectives	3	1	2	4
Respond to Inflow Changes	2	4	3	1
Increase Recreational and Economic Potential	3	2	1	4
Address Air Quality (PM_{10}) Concerns	3	1	1	3
Provide High Safety Rating/Low Risk of Failure	2	3	3	1
Overcome Institutional Barriers/Public Acceptance	3	2	1	4
Reasonable Cost/High Probability of Financing	3	4	2	1
Average Score	2.4	2.0	1.6	2.9
Number of Top Rankings	2	5	7	4
Number of Lowest Rankings	1	3	1	8
Overall Ranking	3	2	1	4

with Elevation Control alternative received the highest ranking with respect to seven of the 12 objectives and the lowest ranking for only one objective.

The Preferred Project: A Vision for the Future

Starting with the north lake concept and adding other features, a preferred project emerges that has the potential to create outstanding opportunities for the Imperial and Coachella valleys. This vision of the future combines a healthier and more stable marine lake that has lower salinity with a variety of ecological and recreational features. It also includes measures to mitigate potential air quality degradation that may be associated with sediments exposed by declining lake levels that result from decreases in inflow. The concept is illustrated in Figure ES-1.

Figure ES-1 illustrates the wide range of habitat and recreational features that could be included as part of the vision of the future for the Salton Sea ecosystem. The features of the preferred project are conceptual. Some features have been developed in more detail, such as the central causeway/retention structure. Technical reports are underway to further describe the causeway/dike and other features, such as the shallow water habitat. Other features, such as fresh water recreational lakes and wetlands, were reviewed by an Outdoor Recreation Advisory Task Force.

Figure ES-1. Preferred Alternative Concept Plan for the Salton Sea Area.

The Recreational Task Force included representatives of recreational groups, cities and other organizations, primarily from the north end of the Imperial Valley. During initial meetings of the Task Force, the members voiced support for many elements of the preferred project. The final report from the Task Force, including their recommendations, is provided in Appendix D of this report.

Design Features

Two of the most important design features of the preferred plan are the structural design of the central causeway/retention structure and the inflow requirement to support the plan. A working group of 15 civil and geotechnical engineers was convened to review the feasibility of constructing a dike, or retention structure/causeway anywhere within the Salton Sea. After considering several possible methods, the preliminary conclusions indicate that a rock filled embankment may be the most cost effective construction method. The preferred restoration plan could be sustained by an average annual inflow of 800,000 acre-feet/year, and possibly somewhat lower inflows. The inflow would need to include about 600,000 acre-feet/year to sustain the north lake, with the remaining 200,000 acre-feet plus salt water discharges from the north lake supporting other habitat and recreational features.

Performance and Phasing

The Salton Sea Accounting Model was used to evaluate the performance of the preferred project. The model indicates that if the marine lake is designed for a water surface elevation of -235 feet msl, and a decision is made to move forward with the program in the near future, then the target salinity of 35,000 mg/L could be achieved by 2013. The model suggests that the phasing schedule shown in Table ES-2 could be achieved for a design elevation of -235 feet msl.

Target Elevation

A design elevation of around -235 feet msl is recommended for consideration as the target elevation. It would have a number of benefits including: (1) High enough elevation to allow for gravity flow of salt water to shallow habitat areas and for dust control; (2) Minimal dredging for access to communities, (3) Low enough to provide fall for river extensions; (4) Minimal salinity spike and short time to target salinity; and (5) Reasonable cost…at -235 feet msl the cost estimate for the retention structure is about $150 million less than it would be for the current lake elevation. There may also be some circumstances where -240 feet msl could be beneficial as the design lake level. If it appears that the construction schedule would need to be extended and if additional water can be sold to raise funds and expedite the water surface reduction to -240 feet msl, then an additional savings of about $100 million could be realized, with other factors being equal.

Table ES-2. Proposed Timeline

Timeframe	Activity
2004	Federal, State & Local (SSA) Agencies Pledge to Work Together on Restoration, Enter an MOU
2004	State Advisory Committee Develops Criteria and Reviews Alternatives
2004	Begin Detailed Design
2005	SSA Establishes Tax Increment District
2005	Draft Project-Level Salton Sea Restoration EIR/EIS
2005	Final Project-Level Salton Sea Restoration EIR/EIS
2006	Complete Detailed Design
2006	Phase One Construction: Develop Quarry Site, Begin Wetlands and Interim Shallow Water Habitat Construction
2006	Mitigation Water Sold
2007	Phase Two Construction: Begin Extension of Rivers and Causeway
2009	Phase Three Construction: Begin Marina Dredging
2010	Complete Causeway
2013	North Lake Salinity Targets Met
2015-	Phase Four Construction: Phased In Shallow Water Habitat

Cost and Financing

The construction cost of the program for a design elevation of -235 feet msl is estimated at between $650 and $730 million based on a conceptual-level cost analysis. This estimate includes the mid-Sea retention structure/causeway, appurtenances, dredging to communities, greenbelt channels to the north lake, a fresh water recreational lake, Torres Martinez wetlands/habitat, upstream wetlands, and an initial phase of shallow water habitat construction. Total annual operating expenses are estimated at about $10 million, including costs for maintenance of the mid-Sea retention structure, appurtenances and channels, and for future expansion and maintenance of shallow water habitat areas.

Potential financing sources include funds from Proposition 50, funds generated through the QSA legislation, local funds generated through formation of a Tax Increment District, and possible other State and Federal sources.

Recommendation

The preferred project is an integrated multi-functional plan that is recommended as an opportunity to provide outstanding ecological, recreational and economic benefits to the Salton Sea area.

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Chapter 1: INTRODUCTION

The Salton Sea is subject to rising salinity and high levels of nutrients. The Salton Sea Reclamation Act of 1998 directed that studies be conducted to evaluate the feasibility of possible actions to allow continued uses at the Sea. Following the passage of the Act, a study was initiated to develop alternative measures to address rising salinity and other problems at the Sea. In response to the Act, a draft environmental impact statement/environmental impact report (EIS/EIR) was released in January 2000. The January 2000 EIS/EIR underwent agency and public review in the spring of 2000, and public hearings were conducted. In light of public and agency comments, further internal reviews of the alternatives presented in the draft EIS/EIR, and various congressional requests, further analyses and design work has been performed.

In April 2003, the the Salton Sea Authority (Authority) Board of Directors (Board) endorsed moving forward with an Integrated Water Management Plan. Recognizing that inflows to the Sea were likely to be reduced in the near future, the Plan evolved from concepts proposed by US Filter, the Pacific Institute, and others as well as earlier work by the Authority and the Bureau of Reclamation (Reclamation). The Authority subsequently commissioned the engineering feasibility studies and further analysis of the Integrated Plan documented in this report.

During 2003, the Quantification Settlement Agreement (QSA) was also in the process of being approved and agreements developed to acknowledge the linkage between water transfers and the health of the Salton Sea. Three bills were signed into law in September 2003 that specify a State-led program to develop a preferred restoration alternative by December 2006. The package of legislation also provides a mechanism to generate up to $300 million for Salton Sea restoration through the sale of transferred Colorado River water. The State is now in the process of implementing the planning requirements for this suite of legislative bills dealing with Salton Sea restoration.

1.1 Background and History of the Salton Sea

The Salton Sea Basin is part of the Lower Colorado River Delta system. The present-day Sea was formed in 1905 by flooding on the Colorado River, which accidentally breached an irrigation control structure on the River allowing the entire River to flow into the Salton Basin for a period of about 18 months. Since then, agricultural drainage flows from the surrounding watersheds of Imperial, Coachella, and Mexicali Valleys and smaller contributions from municipal effluent and stormwater runoff have sustained the Sea. This is not the first time the Salton Basin has contained a lake, however. Historical evidence and geologic studies have shown

that the Colorado River has spilled over into the Salton Basin on numerous occasions over the last thousand years, creating intermittent lakes. Evidence of an ancient shoreline suggests that Lake Cahuilla occupied the Basin until about 300 years ago. From 1824 to 1904, Colorado River flows flooded the Salton Basin no fewer than eight times. Each time, the lake went through a cycle of fresh to salty water as the lake eventually evaporated.

The Salton Basin extends from Banning, California, on the north to near the international border with Mexico on the south. At present, the Sea itself is about 35 miles long and 15 miles wide. With a current surface elevation at about 227 feet below mean sea level, the Sea has a maximum depth of about 50 feet. The Sea's salinity concentration is about 44,000 milligrams per liter (mg/L), which is about 25 percent saltier than ocean water. Recent annual inflows have been in balance with the water that evaporates from the Sea's surface. Inflows contribute about 4 million tons of salt each year to the Sea. Since the Sea is a terminal body of water (it has no outlet), salinity continues to rise as salts are left behind while water evaporates from its surface.

In the early 1900s, the Sea was relatively fresh and thereafter salinity fluctuated, but with a general increasing trend. By the 1950s through the 1970s, the salinity was near ocean salinity levels, and the Sea became an attractive recreation site. Private land around the Sea was subdivided into lots, roads were bladed, and land speculation flourished. Fish were introduced into the Sea and several marine species have thrived. Tilapia, a fish commonly raised in fish farms, accidentally found their way into the Sea and are now the predominant fish species. The Sea is located along the Pacific flyway and provides habitat and seasonal refuge to many species of birds. A federal wildlife refuge, established at the south end of the Sea as a sanctuary for birds, provides viewing and educational opportunities. In 1956, a state recreation area was established along the east shore of the Sea to provide camping and boating access.

The Salton Sea fills a depression in a hot desert environment. Without an outlet, the natural progression of the Sea is for the water to become more saline over time and monumental efforts would have to be made to reverse that progression. As the Sea becomes saltier, the ecosystem will change in response to the more saline environment.

1.2 Past Studies

Rising salinity concentrations and the realization in the 1950s that salinity levels would eventually affect uses of the Sea, led to studies of ways to manage salinity. An early investigative report was prepared in 1965, a Federal-State Reconnaissance Investigation was conducted in1969, and a Federal-State Feasibility Study was completed in 1974. A rising water surface elevation and consequent stabilization of salinity muted the call for implementation of salinity control actions at that time. In

the mid-1980s, federal and state agencies again began looking at ways of controlling salinity. Public Law 102-575, passed in 1992, gave Reclamation the authority to conduct salinity control studies. In response to that law, Reclamation and the Authority, which was established in 1993, published and provided a report to Congress in 1997 that contained an evaluation of a wide suite of alternatives that would address the salinity and elevation problems of the Sea.

1.3 The Salton Sea Reclamation Act of 1998

On November 12, 1998, Congress enacted Public Law 105-372, The Salton Sea Reclamation Act of 1998. This Act authorized the Secretary of the Interior to complete studies of options that:

1. Permit the continued use of the Salton Sea as a reservoir for irrigation drainage,
2. Reduce and stabilize the overall salinity of the Salton Sea,
3. Stabilize the surface elevation of the Salton Sea,
4. Reclaim, in the long term, healthy fish and wildlife resources and their habitats, and
5. Enhance the potential for recreational uses and economic development of the Salton Sea.

The Act also directed the Secretary to consider inflow reductions that could result in total inflows of 800,000 acre-feet or less per year. Options that were to be considered included segregating the Sea into one or more evaporation sections, pumping water out of the Sea, augmenting inflows, combinations of various options, and other options as the Secretary deems appropriate. The Act indicated that options that relied on importation of water from the Colorado River should not be included in the study. This is consistent with the Colorado River Compact, the Boulder Canyon Project Act, and the 1964 Supreme Court Decree in Arizona vs. California which limit beneficial use of Colorado River water to domestic and irrigation purposes. A copy of the Salton Sea Reclamation Act is included as Attachment A.

An alternative screening process was conducted in 1999 as part of the process of developing restoration strategies to be evaluated in the EIS/EIR (Tetra Tech 1999). An alternative that would have included construction of an impoundment structure in the central part of the Sea and create a smaller marine lake in the north was initially rated as one of the top two among 39 alternatives. This alternative was later eliminated from further analysis because of cost considerations at the time when future inflows were uncertain. The EIS/EIR was prepared evaluating five alternatives which involved combinations or large in-Sea evaporation ponds and/or on-land enhanced evaporation systems among numerous other elements.

On January 27, 2000, then Secretary of the Interior Babbitt transmitted certain reports to Congress as specified in the Act. Among these reports was an EIS/EIR, which was distributed for public review and comment. Comments were numerous and substantial. Consequently, subsequent to the publication of those reports, work on alternative formulation, further development of costs, and analysis of additional options have continued.

1.4 Current Program Objectives

Key program objectives have been developed to complement and provide more specifics to the goals provided in the Salton Sea Reclamation Act of 1998 and to incorporate work done by the Authority and Reclamation since 1998. These objectives reflect the current needs of the restoration effort with respect to the present understanding of the future volume of waters that flow into and sustain the Sea.

The restoration effort has been an open process that has involved input from the Authority Technical Advisory Committee (TAC) and Board of Directors (Board), broad involvement from agency personnel, and input from public workshops and a coalition of environmental interests. The process has included screening of alternatives using objectives and criteria developed with input from all of these sources. Program objectives have evolved over time in response to a number of external factors, including decisions on water transfers that will reduce inflows to the Sea. From this process, a set of objectives has evolved that is used in this report as a basis for evaluating alternatives and recommending a preferred project. A total of twelve objectives are included which would address the concerns that have been most often expressed by various stakeholders. Table 1-1 lists the current program objectives and shows how these objectives link to the goals identified in the Reclamation Act.

The objectives used in the identification of a preferred alternative are discussed below. Each of these project objectives has been considered as development of the preferred project has proceeded.

Preserve the Sea as a Repository for Agricultural Runoff

Agriculture constitutes the major economic base in Imperial County and a significant part of the economy in eastern Riverside County. The Imperial and Coachella valleys provide an important source of vegetables and other produce to the nation, particularly in the winter. Because of the importance of drainage to maintaining the agricultural economy and the lack of an alternative disposal site, the Sea serves as the repository for agricultural drainage. In 1924 and again in 1928, President Coolidge issued Executive Orders setting aside federal land under the Sea as a public water reserve for irrigation drainage. In 1968, the state of California declared by statute that

Table 1-1. Restoration Objectives and Goals of the Reclamation Act of 1998

Objectives	Goals of the Salton Sea Reclamation Act of 1998				
Project Objectives Used in this Report	Permit continued use as a reservoir for irrigation drainage	Reduce and stabilize the overall salinity	Stabilize the surface elevation	Reclaim healthy fish and wildlife resources and their habitats	Enhance potential for recreational uses and economic development
Preserve Sea as Repository for Agricultural Runoff	✓				
Provide Large Marine Lake with Stable Elevation		✓	✓	✓	✓
Improve Water Quality: Salinity		✓		✓	✓
Improve Water Quality: Nutrients/Other Constituents				✓	✓
Maintain and Improve Habitat		✓		✓	
Achieve Water Quality/Habitat Objectives Timely		✓		✓	
Respond to Inflow Changes			✓		✓
Increase Recreational and Economic Potential					✓
Address Air Quality (PM_{10}) Concerns				✓	✓
Provide High Safety Rating/Low Risk of Failure				✓	✓
Overcome Institutional Barriers/Ease of Permitting	✓	✓	✓	✓	✓
Reasonable Cost/High Probability of Financing	✓	✓	✓	✓	✓

the primary use of the Sea is for collecting agricultural drainwater, seepage, leaching, and control waters. Agriculture in its present form relies on the ability to discharge drainage into the Sea. Thus, the continued use of the Salton Sea as an agricultural drainage repository is a fundamental component of the Salton Sea Restoration Project.

Provide Large Marine Lake with Stable Elevation

Over the years, rising levels of the Salton Sea have flooded residential and agricultural properties around the Sea as well as tribal lands. More recently concerns have been focused on the likely decreases in Salton Sea elevation that would occur as a result of reductions of inflows to the Sea. In spite of these concerns, a broad range of interests including the TAC, Board, public, environmental groups and agencies have stressed the ecological and economic importance of maintaining a large marine

lake. Therefore, maintaining a large marine lake with a stable water surface elevation is one of the primary objectives.

Improve Water Quality: Salinity

Increasing salinity in the Sea, which is currently about 44,000 mg/L, already may be threatening the reproductive ability of some parts of the biota. If the current trend of increasing salinity continues, sport fish in the Salton Sea will be eliminated over the next few decades. Therefore, controlling salinity is a critical need if the Salton Sea is to support biodiversity similar to what currently exists. In addition, the Sea is located along the Pacific Flyway, the most western of the major migration corridors for waterfowl and other species. Therefore, the fish populations in the Sea are an important food source to fish-eating birds that use the Pacific Flyway. Because of its affect on the ecology of the Sea, controlling salinity is a fundamental component of any restoration alternative.

Improve Water Quality: Nutrients/Other Constituents

The Salton Sea is a highly eutrophic water body characterized by high nutrient concentrations, high algal concentrations, high fish productivity, low clarity, very low dissolved oxygen concentrations, massive fish kills, and noxious odors. High nutrient loadings are due to the inflows of nitrogen and phosphorus as byproducts from the use of agricultural fertilizers in the Imperial Valley watershed. The eutrophic state of the Salton Sea with its high biomass translates to high fish production, especially for forage fish such as tilapia. If the Salton Sea were less eutrophic, there likely would be fewer tilapia, fewer and different algal blooms, and fewer occasions of fish kills associated with anoxic conditions. Other water quality issues include selenium, other chemicals, and bacteria. All of these issues must be addressed to benefit the fish and wildlife resources and habitats of the Salton Sea as well as human health concerns. As with salinity, effectively managing the Sea's water quality is linked to the general health of the Sea and will need to be integrated into restoration planning.

Maintain and Improve Habitat

The biological resources of the Sea and its value to society are linked through the Sea's avian diversity, the productivity of its sport fishery, and its attraction as a recreational destination. With approximately 400 species of birds reported in the area, the Salton Sea ecosystem is one of the greatest areas of avian biodiversity in the nation. It also provides habitat to several special status species such as the California brown pelican (*Pelecanus occidentalis*), Yuma clapper rail (*Rallus longirostris yumanensis*) and the dessert pupfish, all listed as Federal Endangered Species. Historically, the sport fishery has been the most productive of any California inland water body, and the large biomass of fish has been the food base for the large number of fish-eating birds at the Sea. Over the past two years there have been substantial decreases in the number of fish in the Sea, likely because of a number of stress factors.

Because of significant losses of interior wetlands, including over 90 percent of those within California, the Sea serves an important role in the international, regional, and local conservation of migratory birds. Significant proportions of some populations have become dependant on the Sea. For some of these species there may be no alternatives because of bioenergetics (the energy transformation and exchange between living organisms and their environment) associated with food availability (quantity and quality), travel distances between migration stopover points, and body condition relative to breeding success. The complex interrelationships of the Sea's ecosystem are a critical factor in developing a viable restoration scenario.

Achieve Water Quality and Habitat Objectives in a Timely Manner

According to fish survey data gathered by the California Department of Fish and Game, fish populations in the Salton Sea have decreased sharply in the last two years. There apparently has also been a corresponding decrease in the populations of fish eating birds present at the Sea. With projected decreases in baseline flows and implementation of the QSA, the salinity in the Sea is expected to increase at a greater rate than it has in the past, thus further stressing the fishery. Therefore achieving water quality and habitat objectives in a timely manner will be an important restoration objective.

Respond to Inflow Changes

With implementation of the QSA, it is likely that the average inflow to the Sea will decrease markedly over the next 15 to 20 years. While inflow to the Sea has historically varied from year to year, ten year averages for each of the past four decades have varied little, and the average inflow to the Sea during that period was greater than 1,300,000 acre-feet/year. With the QSA in place, in twenty years the expected value of inflow to the Sea will be about 930,000 acre-feet/year. Without any other actions, such an inflow reduction would cause the Sea to shrink to about 70 percent of its current size, a reduction of about 100 square miles.

The water transfer agreements contain predictable transfer schedules over the 75-year term of the program. However, options for up to 1.6 million acre feet of additional transferred water may or may not occur depending on a number of factors. In addition, inflow to the New River, one of the main tributaries of the Sea, is also variable from year-to-year due to usage patterns in Mexico, where the flow originates. These variables translate to an uncertainty with respect to actual Salton Sea inflows. Since a reasonable range of inflow patterns over time can be predicted, a preferred alternative will need to take the flow variability into consideration.

Increase Recreational and Economic Potential

Recreational use of the Sea includes waterfowl hunting, boating, fishing, bird watching, and photography. Waterfowl hunting is a long-standing tradition at the

Salton Sea and even during the 1920s attracted hunters from Long Beach, Los Angeles, and other areas. The sport fishery of the Sea is focused primarily on orange-mouth corvina (*Cynoscion xanthulus*), tilapia (*Oreochromis mossambieus* and other species and hybrids), bairdiella or Gulf croaker (*Bairdiella icistia*), and sargo (*Anisotremus davidsoni*). All of these are introduced species. Tilapia are the dominant component of the fish biomass and are a major food item for pelicans and other fish-eating birds at the Sea. The popularity of bird watching at the Sea has increased in response to the diversity of the Sea's avifauna and has resulted in the international bird festival becoming an annual event. An evaluation of the economic impacts associated with bird watching at the Sea disclosed a substantial economic benefit to the local communities and businesses.

An added benefit to the local economy of a restored Salton Sea would be the resulting development of residential, commercial, and retail land uses adjacent or in close proximity to the Sea. The increased economic development would also generate sales and property tax revenue that would benefit the local economy. Some studies have estimated the potential property tax revenue at between $1 billion and $2 billion over a 45-year time horizon.

Address Air Quality (PM10) Concerns

The reduction in inflow to the Sea in the future is expected to result in the exposure of large areas of currently submerged lakebed at the Salton Sea. As discussed above, inflow reductions could result in the exposure of about 100 square miles of sediments. The sediments beneath the Sea have not been exposed for a century and consist of fine-grained silts and clays. These soils may be prone to wind erosion when they are exposed to the atmosphere and become dry. The climate of the Salton Sea basin is such that high winds and sustained wind of moderate speed can cause substantial amounts of fine particulate matter to be suspended and transported long distances. The amount of particulate matter finer than 10 microns present in the atmosphere is monitored and referred to as PM_{10}. This fine particulate matter is of concern because it can be transported deep inside human lungs, and is especially harmful to young children, the elderly, and those with respiratory disease such as asthma. This issue will need to be addressed for any restoration to be a viable solution.

Provide High Safety Rating/Low Risk of Failure

Because of the magnitude of the investment necessary to develop and sustain a viable restoration alternative, a preferred restoration alternative must provide a high level of safety while at the same time having a low risk of failure. This is especially true for the construction of any water impoundment or barrier that could release substantial amounts of water in the event of catastrophic failure such as caused by an earthquake. Other features of the preferred restoration alternative should be designed to minimize safety risks to property, residents, and visitors to the Sea. This

objective of the restoration planning process will need to be carefully evaluated through engineering evaluations and pilot projects and other scale-up projects before full implementation can occur.

Overcome Institutional Barriers/Public Acceptance

The evaluation of restoration alternatives must consider the reality involved in the permitting and approval process for projects of this magnitude. Projects that involve connecting the Sea to ocean water such as pipelines or canals are infeasible due to international barriers in the case of the Federal Republic of Mexico, and land use and multi-jurisdictional issues in the case of the west coast of California. Even if all activities to restore the Sea are contained within the Salton Sea Basin, there are many federal, State, and local agencies that will need to issue permits and approvals for a preferred restoration alternative. The time required to permit the preferred alternative and the support of the local community is a critical factor in restoration planning.

Reasonable Cost/High Probability of Financing

While a precise budgetary cap has not been established for the cost of a preferred alternative, there is a limit to the amount that society will be willing to spend for Salton Sea restoration. Due to competing needs and limited resources, the cost and benefit of a restored Sea will need to be demonstrated in order to obtain the financial backing of government at all levels. While the State has adopted legislation that would accrue up to $300 million for a Salton Sea restoration fund, other sources of funds may be available through the federal government or through specialized financing methods such as an Infrastructure Finance District around the Sea. This objective will need to be carefully considered in the evaluation of restoration scenarios.

1.5 Purpose of Report

This report is intended to document a two-step process that has led to the identification of a preferred project. Chapters 2 and 3 provide the background for this process, respectively, by discussing how the Sea would respond to inflow reductions, and providing an overview of restoration options. Chapter 4 presents the first step of the process, which is a logic-tree evaluation that illustrates how features of restoration options can be eliminated through a series of queries. For example, one query is "Would pump-in/pump-out systems work?" referring to the practicality of systems such as pipelines that would exchange Salton Sea water with ocean water. This step of the process documents the logic that has been used to eliminate unreasonable options and to identify the most feasible restoration strategy. The second step in the process is presented in Chapter 5. Here, alternatives are formulated from the strategy developed in the previous step and ranked with the respect to the program objectives. This step leads to a preferred conceptual

alternative. Chapter 6 provides a more complete discussion of the preferred alternative, including its features, cost analyses, water surface elevations, performance factors, program phasing, and implementation.

Supporting technical information for the main report is provided in four appendices and a companion report, URS (2004).

Appendix A provides information about how shallow water habitat features could be developed for the project, and includes a report on the findings of a two-day workshop on shallow habitat.

Appendix B presents a preliminary cost assessment that has been prepared for the preferred restoration project. An important component of the overall cost of the plan would be a central, mid-Sea impoundment structure. Various conceptual designs have been considered for this structure. These concepts along with cost estimates for each are described in URS (2004). Appendix B provides supporting information for an overall preliminary cost estimate for the preferred project and includes costs for the central retention structure obtained from URS (2004).

Appendix C describes the results of the application of the Salton Sea Accounting Model (Model) which was used to forecast future salinity and elevation in the Sea. The Model was used to assess the performance of restoration alternatives, as well as to evaluate the effects water transfer agreements. The Model runs were performed by Reclamation. Appendix C focuses on the performance of the recommended preferred project, but also includes discussions of the performance of other alternatives considered in the main report along with comparisons to some other alternatives considered in the past.

In February 2004, the Authority appointed an Outdoor Recreation Advisory Task Force to evaluate recreational potential of a restored Salton Sea and present recommendations to the Authority Board. The Task Force presented their report to the Board on June 24, 2004. Appendix D provides the committee's report in its entirety.

Chapter 2: INFLOWS: RESPONDING TO REDUCTIONS

As discussed previously, with implementation of the QSA, the average inflow to the Sea is expected to decrease over about 15 to 20 years from over 1,300,000 acre-feet/year to an expected value of about 930,000 acre-feet/year. While the water transfer agreements contain predictable transfer schedules, there is an option for up to 1.6 million acre feet of additional transferred water if the water is not needed to mitigate effects to the Salton Sea. In addition, inflow to the New River from Mexico, where the flow originates, may also be subject to future reductions. For example, reductions in surplus Colorado River flows to Mexico could, in turn, affect New River flows back across the border. It is also possible that the Coachella Valley groundwater management program would affect inflows. These variables translate to an uncertainty with respect to actual Salton Sea inflows. Therefore, three inflow scenarios are considered in this report:

1. The anticipated QSA schedule that includes water releases to mitigate effects to the Salton Sea over the next 15 years;
2. The QSA schedule with the mitigation water terminated in 2006 and sale of additional water to generate restoration funds; and
3. A schedule that would reduce average inflow to about 800,000 acre-feet/year.

The three inflow scenarios are illustrated in Figure 2-1.

2.1 Quantification Settlement Agreement

With the signing of the QSA in September 2003 a high degree of certainty was achieved with respect to long-term usage and deliveries of Colorado River water users. The QSA was the result of seven years of intensive negotiations between federal and state government officials and the San Diego, Coachella, Imperial, and Metropolitan Water Districts. This agreement allows for California to ramp down water usage from historical highs of 5.3 million acre-feet annually to the amount entitled by law at 4.4 million acre-feet. The QSA included three California laws that affect the inflows to the Salton Sea and restoration efforts. These laws are briefly summarized in the following paragraphs.

Senate Bill No. 277 (SB 277) enacted the Salton Sea Restoration Act and establishes the Salton Sea Restoration Fund to be administered by the Director of Fish and Game. Moneys in this Fund are to be expended, upon appropriation by the Legislature, for restoration of the Salton Sea and the protection of fish and wildlife dependent on the Sea. This bill also authorizes the Department of Water Resources

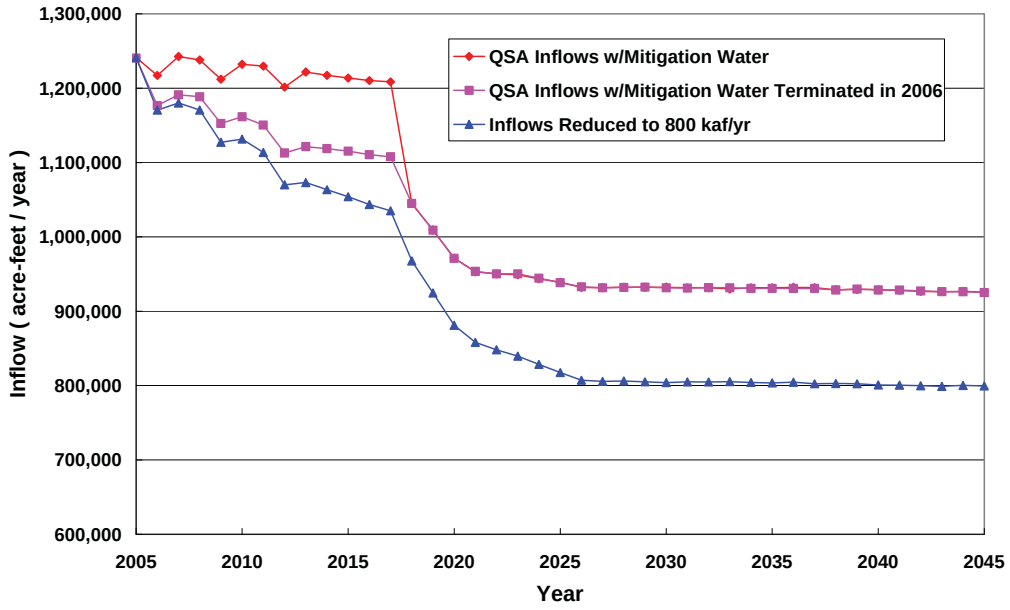

Figure 2-1. Possible Future Salton Sea Inflow Scenarios Evaluated in this Report.

(DWR) to contract with water suppliers to purchase and sell water to achieve the goals of the Act.

Senate Bill No. 317 (SB 317) amended Section 2081.7 of the Fish and Game Code (adopted by SB 482 in 2002) to state revised conditions to issuance of take permits for the QSA, including the take of fully protected species. These conditions require enforceable commitments by Imperial Irrigation District (IID) to provide two 800,000 AF increments of conserved water. SB 317 authorizes the Secretary of the Resources Agency to undertake a study to determine a preferred alternative for the restoration of the Salton Sea ecosystem and the protection of wildlife dependent on that ecosystem. The bill requires submittal of a study identifying the preferred alternative on or before December 31, 2006.

Senate Bill No. 654 (SB 654) amends Section 12562 of the Water Code to extend the deadline for completing the lining of portions of the All American Canal and the Coachella Canal from December 31, 2006 to December 31, 2008, in order to allow additional time to satisfy the requirements for state funding for these projects. In addition, it allocates environmental responsibility among the water agencies and the state for certain environmental mitigation requirements related to implementation of the QSA. The Bill provides a mechanism to implement funding of mitigation costs by authorizing California Department of Fish and Game to enter into a joint powers agreement with Coachella Valley Water District (CVWD), IID and the San Diego County Water Authority for the purpose of providing for payment of environmental mitigation costs.

2.2 Other Actions That May Affect Inflows

Efforts to develop a preferred restoration project are not the only actions that could affect conditions at the Sea. Some other actions—being pursued under other initiatives and by other parties—could also influence the effectiveness of salinity/elevation control projects.

- **Constructed Wetlands Projects**—Several pilot wetlands have been constructed on the New and Alamo Rivers. Expansion of constructed wetlands projects in Imperial Valley could improve the quality of water flowing into the Sea, but would also cause some reduction of inflows.

- **Total Maximum Daily Load Program (TMDL)**—This program, being implemented by the Regional Water Quality Control Board, is designed to provide a long-term reduction in key constituents in waters that flow into the Sea. While improving the quality of water that flows into the Sea would be beneficial, it is also possible that TMDL efforts could result in some flow reductions.

- **Mexicali Wastewater System Improvements**—Mexico has been pursuing construction of projects to improve the collection and treatment of wastewater in Mexicali. These projects will improve the quality of water flowing across the international border but will also divert water away from the Salton Sea. It is estimated that these projects could reduce inflows to Sea by 15,000 acre-feet/year in 2006, increasing to 22,507 acre-feet/year by 2014.

- **Mexicali Power Plants**—Baja California Power, Inc. (BCP) and Sempra Energy Resources (SER) operate power plants that use Colorado River water for cooling. These evaporative cooling systems cause reductions of flow to the Sea. The available data suggests that the range of inflow reductions could be on the order of between 3,000 acre-feet/year to as much as 16,000 acre-feet/year, and likely would be somewhere in between. The Department of Energy is currently preparing an Environmental Impact Statement to comply with a Federal Court order requiring additional environmental review.

2.3 Relationship Between Inflow, Salinity and Elevation

A delicate balance between inflow and evaporation has sustained the elevation of the Salton Sea in the past (see Appendix C). If the inflow to the Sea is reduced as is anticipated under the QSA, evaporation will outstrip inflow and the Sea will begin to shrink until a new balance is achieved. Shrinking of the Sea will cause the salts that are currently in the Sea to concentrate. Compounding this problem, approximately 4 million tons of salt are added annually to the Sea from inflows. In addition, sediments that are now under water would be exposed and could possibly add to the

existing problems with blowing dust in the Imperial and Coachella Valleys. Figure 2-2 provides a visual simulation of how the future shoreline of the Salton Sea would appear after full inflow reductions have been implemented under the QSA without restoration.

Figure 2-3 illustrates expected trends in the water surface, salinity and exposed sediments at the Salton Sea that could be expected with the QSA in place. These charts were prepared by Reclamation using their Salton Sea Accounting Model. The graphs in Figure 2-3 should be viewed as a reasonable forecast of what could happen in the future without any restoration actions. Many factors could affect these future trends including the methods that are used to implement water transfers and actions in Mexico that could reduce flows from across the border.

Other possible sources of water have been considered to sustain the inflow to the Sea, but thus far none have been identified that would provide sustained replacement flows. For example, Reclamation and the Authority are investigating brackish groundwater resources in the East Mesa area south of the Sea as a possible source for replacement water. However, based on previous work, it is likely that there would not be enough water to replace transferred amounts and the source would not be sustainable in the long term. Furthermore, delivery costs are likely to be high.

2.4 Effect on Restoration Alternatives and Cost

The reduction of inflow to the Sea creates a more complex challenge to the development of feasible restoration alternatives and also would have a substantial effect on the cost of most restoration strategies. This is the case because less inflow will create a smaller and shallower Sea thereby concentrating salts in the remaining waters. This will leave less time to fully implement a restoration alternative that preserves the current ecosystem that depends on a fishery to sustain fish-eating bird populations. To combat rapidly rising salinity, traditional methods of removing salts such as solar-pond or pipeline systems would have to be much larger under reduced inflow conditions than they would be under historical inflow conditions.

Figure 2-2. Visual Simulation of Red Hill Marina County Park in 2077 after QSA without Restoration, from IID Conservation and Transfer Project EIS (CH2M Hill, 2002).

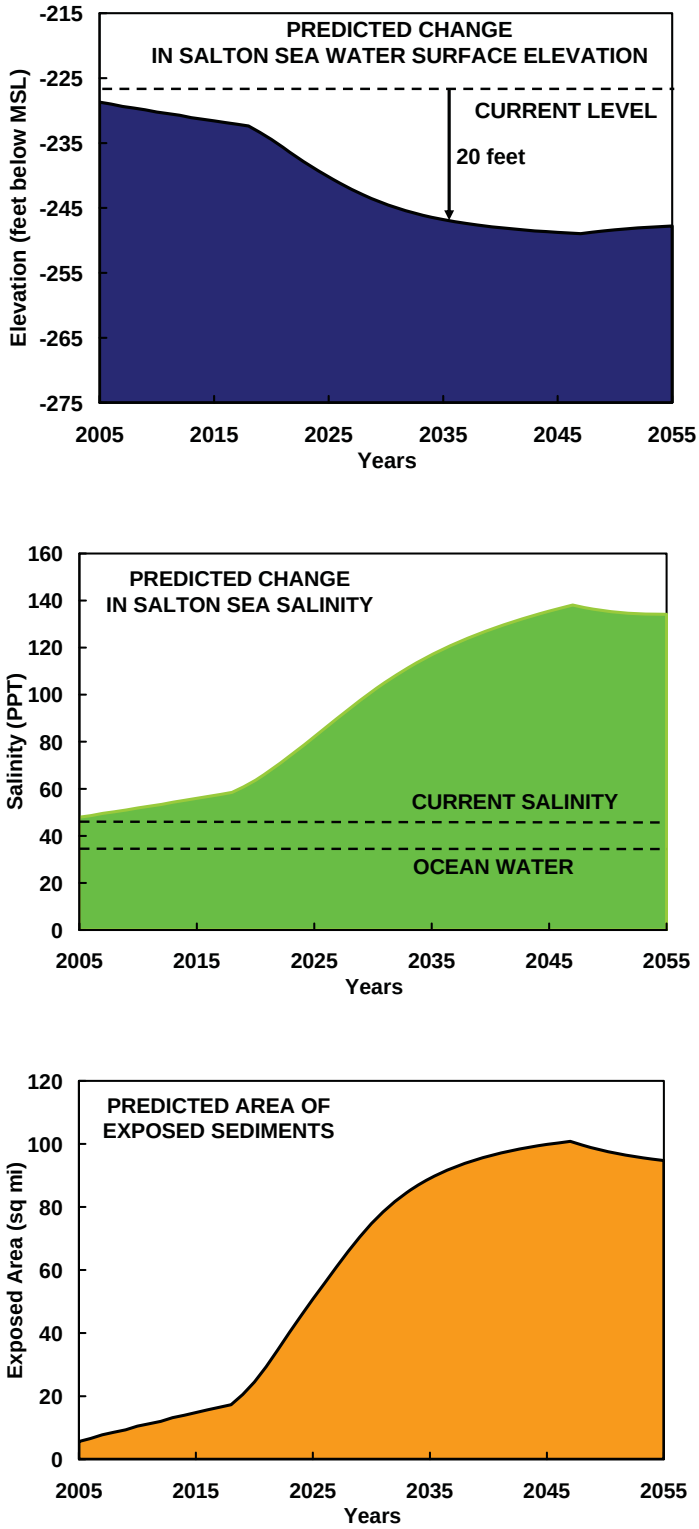

Figure 2-3. Predicted Trend of Water Surface, Salinity, and Exposed Sediments at the Salton Sea with Anticipated Reductions due to QSA Water Transfers without Restoration.

In its 2003 status report on the Salton Sea Study, the Department of Interior (Interior) estimated that the least expensive method to control salinity, on-land solar ponds, would have a present value of $820 million under an inflow scenario similar to what could be experienced with the QSA. The solar ponds and salt disposal areas would require an area of about 70 square miles. Under historic inflow conditions, the pond system could be less than half that size, and by scaling the cost would have a present value on the order of $400 million.

Figure 2-4 illustrates how the cost of an on-land pond system would vary with inflow to the Sea. Present value cost estimates were taken from Interior (2003) for an inflow of 1.0 million acre-feet/year (based on Interior's Inflow Scenario 1) and 0.8 million acre-feet/year (based on Interior's Inflow Scenario 3). The estimate of about $400 million for an inflow of 1.3 million acre-feet/year was extrapolated from those values.

Another complication that results from reduced inflow is the exposure of sediment currently inundated by the Sea. It is believed that the exposed sediment may be prone to being transported to the atmosphere by wind due to its fine grain sizes. This fine-grained material could increase airborne dust exposure to residents surrounding the Sea. The potential for dust generation requires further study and regardless of who pays the bill, it is likely that air quality mitigation will be required and the associated costs will need to be accounted for somewhere.

These and other factors result in less flexibility when developing restoration alternatives and higher costs as inflows to the Sea decrease.

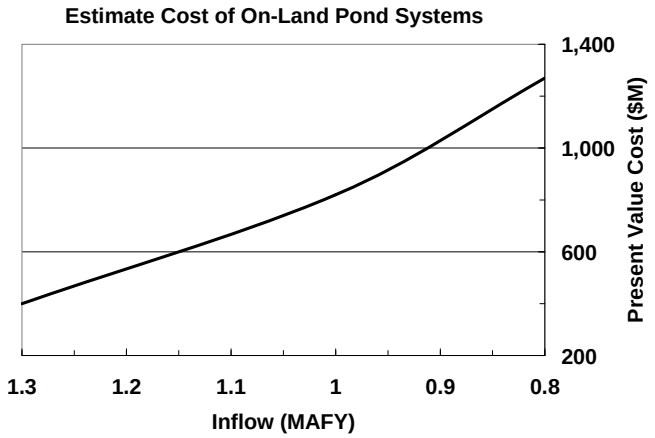

Figure 2-4. Estimated Cost of an On-Land Solar Pond System for Different Inflows, Derived from Interior (2003).

Chapter 3: OVERVIEW OF RESTORATION OPTIONS

Restoration options presented here have evolved through a process that has involved planning studies, engineering analysis, scientific oversight, and environmental reviews. Some concepts discussed here date back to the 1960s and possibly earlier. As stated above, the amount of salt that would have to be removed from the Sea would depend on future inflows. With reduced inflow, the Sea would begin to shrink and salts would be concentrated. If the inflow continues to be reduced in the future, greater amounts of salt would need to be removed to meet project objectives.

To address the rising salinity of the Sea, a surrogate outlet must be established. Three basic methods have been considered:

- Pump water out of the Sea and discharge it to some remote location. This could be accomplished by combinations of pipelines and canals to the ocean, the Gulf of California, or some other remote location.

- Pump water out of the Sea and discharge it to local desalting plants or evaporation ponds, possibly in combination with mechanical processes that enhance the rate of evaporation. This would require disposal of salt residues near or within impoundments in the Sea.

- Divide the Sea so that one portion acts as a receptor for the discharge from another portion. Through the construction of retention structures, salts would be allowed to concentrate in one area while salinity levels in the remaining area would be controlled.

A myriad of alternatives have been identified over the years to provide one or another of those outlet scenarios, some of which also help control the elevation of the water surface of the Sea. Many of the alternatives have been eliminated from consideration for various reasons; the ones discussed here were selected for review because they have been viewed as the most promising in the past or they have passed earlier screening analyses.

The annual inflow of water to the Sea has typically contained about 4 million tons of salt. Even if inflow to the Sea is reduced in the future, it is likely that conservation measures would serve to increase the salt concentration in the inflow such that the total annual salt load to the Sea would remain about the same. Although the salt load is about 4 million tons per year, some salts precipitate as they enter the Sea and, therefore, the amount of salt accumulating in the body of water is somewhat less than 4 million tons per year. However, for planning purposes, it has been assumed that under stable inflow conditions, about 4 million tons per year of salt would need to be removed to stabilize salinity in the Sea.

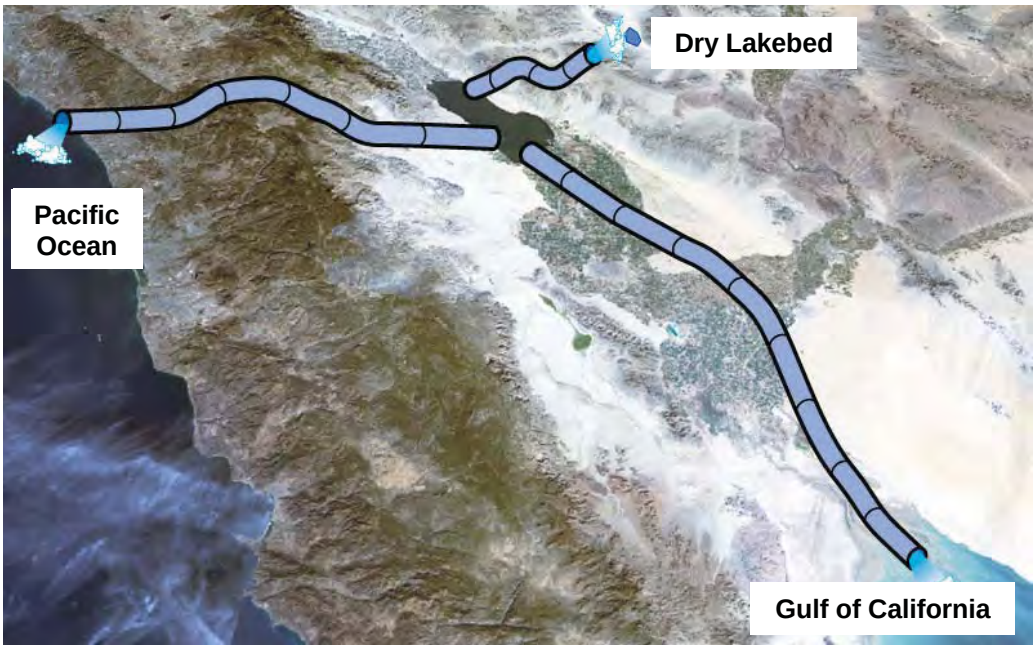

Figure 3-1. Potential Pipeline Routes.

During a transition period, when inflow would be decreasing, it has been assumed that a salinity control system would need to remove 4 million tons per year (to remove inflowing salt) plus an additional 4 to 8 million tons to avoid concentration of salt in the shrinking Sea. Once inflow would stabilize, such that a steady-state elevation could be achieved, salt removal could be reduced to about 4 million tons of salt per year or less depending on the amount of salt precipitation that may occur.

3.1 Pipelines and Canals

Import/export pipelines would convey water from the Salton Sea to the Gulf of California and return water from the Gulf to the Sea as illustrated in Figure 3-1. Pumping water from the Sea removes salt laden water and thus reduces the amount of salt and salinity in the Sea. Using other pipelines, water would then be pumped into the Sea to help maintain elevation. The water surface elevation of the Salton Sea would depend on a balance between water coming into the Sea and water leaving the Sea. Natural inflow, precipitation, and import quantities would be balanced by evaporation and export quantities. Likewise, salinity in the Sea would depend on the balance of salt coming in and salt going out. This alternative has two options: one would have pipelines to pump water in both directions, and another would use pipelines combined with channels. A pump out only alternative could include pumping out to a dry lake bed as shown in Figure 3-1. It has been estimated that pump-in/pump-out scenarios could cost in the $10s of billions and would face significant permitting challenges due to the international issues involved in developing a project that crosses into the Federal Republic of Mexico.

3.2 On-Land Solar Ponds and Enhanced Evaporation Systems

On-land solar ponds would be constructed using standard construction procedures for earthen berms or embankments. With the solar evaporation pond process, a series of shallow ponds would be constructed as shown in Figure 3-2. Salt water would be pumped to the upper-most pond and flow by gravity through the system. Evaporation would cause the water to become saltier from pond to pond. Concentrated brine from the final pond would be pumped to disposal ponds where crystallization would occur and residual salts would be disposed. The pond systems could be made smaller by adding ground-based enhanced evaporation system (EES) units that operate similar to snowmaking equipment as illustrated in Figure 3-3. A tower style enhanced evaporation system has also been considered.

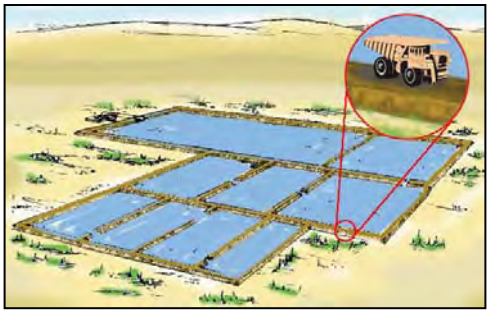

Figure 3-2. Sketch of On-Land Solar Pond System.

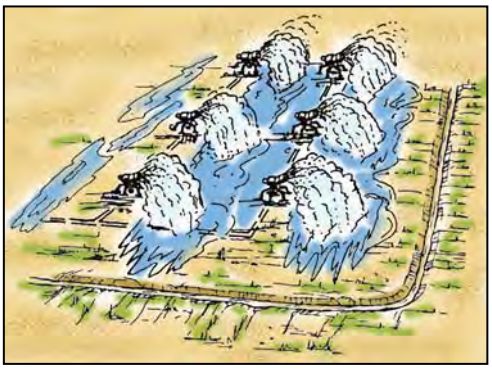

Figure 3-3. Sketch of Ground-Based EES Units.

Since land-based systems would not reduce the evaporative surface of the Sea, but would require water withdrawals, they would tend to lower the elevation of the Sea by 5- to 10-feet below any reductions that occur because of reduced inflows. Coupled with reduced inflow conditions, the Sea elevation could drop 30 feet below its current elevation during a transitional period and ultimately settle at an elevation 20 to 22 feet lower than the current level. Salinity would also exceed 60,000 mg/L during part of the transition, and would take 20 to 25 years until it returned to present levels (44,000 mg/L) or lower. In addition, on-land systems would need to be very large. Without enhanced evaporation units, on-land evaporation pond systems would need to occupy 60 or more square miles.

For methods requiring on-land salt disposal, the disposal options would involve crystallizing salts in an impoundment. Following concentration of salts through evaporative process or other processes, saturated brines would be conveyed to disposal ponds that would be constructed using earthen berms. Salts would crystallize in the ponds forming a rock salt similar to pea gravel that would cause the bottom of the pond to rise over time. As the pond bottom rises, berms containing the pond would have to also be raised. After about 30 years, the height of the berms would be about 25 feet. From the ground, the disposal facility would look like a large desert landfill. Salt disposal modules on land and on flat terrain would be the least expensive salt disposal method. Not all alternatives discussed below would require construction of disposal facilities.

Impoundments, such as those for either the salt removal or disposal components of solar pond systems, have the potential for accumulation of contaminants. A study (Tetra Tech, 2004) of constituent concentrations in solar pond pilot projects at the Salton Sea indicates that constituents including selenium will tend to concentrate in such ponds, particularly in those with the highest concentrations of salts. This finding is contrary to results from locations such as Kesterson Reservoir and numerous evaporation ponds in California's Central Valley where selenium was observed at the greatest concentrations in the initial few impoundments, probably due to high primary productivity. Primary and secondary productivity were observed to be very low in the solar pond pilot project at the Salton Sea. However, this study indicates that there could be some low-level ecological risks associated with concentration of constituents such as selenium in ponds with the highest salt concentrations.

During the recent stages of alternative development, specific locations where facilities could be sited were not identified. Instead, a siting analysis was conducted to identify areas that would be generally suitable for locating salt removal and disposal facilities. About 60 square miles of suitable area were identified for possible siting of facilities that would use enhanced evaporation salt removal methods, and more than 400 square miles were identified as suitable for on-land solar pond siting. More than 100 square miles were identified as suitable for on-land salt disposal.

In its 2003 Status Report, Interior estimated that for the reduced inflow conditions evaluated, the present value cost for on-land ponds could be as much as $1.3 billion; and with enhanced evaporation systems, the present value costs could be as high as $2.4 billion.

3.3 Desalination

From a purely technical perspective, desalination of Salton Sea water has long been considered to be one of the most desirable strategies for controlling salinity in the Sea. A photo simulation of a desalination plant is illustrated in Figure 3-4. Desalination offers the ability to remove salt, while removing very little water. The desalination technologies that have been evaluated in the past have been eliminated from further consideration because of the high cost of

Figure 3-4. Representation of Desalination Plant.

energy associated with most processes. Recently an evaporative technology emerged that would take advantage of waste steam from geothermal operations at the south end of the Sea.

Applying desalination technologies would replace 70 to 80 percent or more of the feed water with fresh distilled water and would produce a concentrated brine stream of about 20 percent of the feed water. This fresh water could be returned to the Sea so that the process would have little effect on the elevation of the Sea or it could be sold to help pay for the restoration effort. Returning fresh water to the Sea would help with salinity control and would also help maintain the water surface elevation. The Sea elevation would still decline as a result of reduced inflow, but not much from the desalination process.

The brine concentrate, amounting to 20 or 30 percent of the feed-water flow, could be disposed of in one of three ways: (1) pumping the concentrate through a pipe into a suitable basin remote from the Sea for its evaporation over time, away from wildlife; (2) processing the brine through crystallizing evaporators to remove saleable sodium sulfate and other sulfates and injecting the sodium chloride and mixed salt residue into the geothermal aquifer, and (3) evaporating the brine to a salt residue using crystallizers and disposing the salt by landfill procedures. The gypsum precipitate could be disposed of at an approved disposal facility or sold for other commercial uses.

Interior (2003) estimated that an evaporative desalination system of the size needed at the Salton Sea would have a present value on the order of $1.2 to 1.5 billion. This estimate includes only the desalination system and brine disposal and not any other elements of a total restoration program. With this type of action, the Sea's water surface elevation would still decline by about 20 feet under an inflow scenario that would be expected with the QSA in place. Therefore, additional funds would need to be expended for control of dust and/or habitat enhancement in the roughly 100 sq. mi. of bottom sediments that would be exposed.

3.4 In-Sea Solar Evaporation Ponds

This alternative would involve the construction of in-Sea solar pond systems with in-Sea salt disposal as illustrated in Figure 3-5. The systems would operate similar to the on-land solar ponds discussed in Section 3.2 above. Salt water would be diverted by gravity flow or pumps through a series of ponds where salts would concentrate from evaporation until ultimately concentrated brine would be formed.

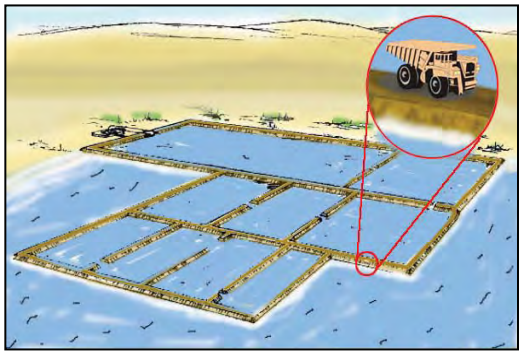

Figure 3-5. Sketch of In-Sea Solar Ponds.

The brine would be diverted to disposal ponds where salts would crystallize and build up over time. An advantage of in-Sea systems over similar on-land systems is that they reduce the surface area of the Sea. The surface reduction compensates for the water that is withdrawn. Therefore, operation of in-Sea pond systems potentially would not affect the elevation of the Sea. A second advantage is that on-land salt disposal areas would not be needed. Eventually salt disposal areas within the Sea could possibly be capped and converted to islands or peninsulas and used for recreational purposes.

Unfortunately, in-Sea construction would be much more expensive than construction on land. In addition, the cost of in-Sea pond systems would go up under reduced inflow conditions. Pond systems would need to be larger to remove more salt that would otherwise concentrate in the shrinking Sea. For the reduced inflow conditions investigated by Interior (2003), they put the price tag of in-Sea pond systems at between $2 and $3.5 billion.

In addition to the added size and cost of in-Sea pond systems with reduced inflow, there is a technical challenge. Under an inflow scenario as expected with the QSA in place, the Sea would drop by about 18 feet. Pond systems constructed in shallow water with today's elevations, would be well above the new water line of a smaller Sea. The surface area reduction benefit of constructing in-Sea would be eliminated and continued operation of the pond system would tend to further reduce the elevation of the Sea in that water would need to be pumped out of the Sea and into the pond system. Under this scenario, the added cost of constructing within the Sea would help with elevation and salinity control during the transition phase, but would not result in a long-term benefit. Alternatively, new ponds could be constructed within the smaller Sea, thus adding cost to the program.

3.5 Replacement Water

The salt removal systems discussed above do not function very well without replacement water. Various sources of replacement water have been evaluated in the past to compensate for reduced inflows to the Sea. Three potential sources that have been considered in the past are discussed below. These potential sources may not be available. Even if available, they would likely not be able to provide reliable and sustainable water in sufficient quantities to make up for inflow reductions.

Flood Flows. One source of replacement water that has been considered previously is flood flows from the Colorado River (flows in excess of the amount of the 1944 Treaty obligation to Mexico that cannot be used or stored within the U.S.). The quantity of these flood flows is expected to decrease over time as the storage and diversion capacity within the U.S. expands. It is very unlikely that this expanded diversion or storage capacity would be available to provide additional water to the Salton Sea.

Central Arizona Salinity Interceptor Project (CASI). Brine reject from the proposed CASI system was considered as a possible future source of water and included as part of some of the alternatives analyzed in the January 2000 Salton Sea EIS/EIR. Subsequently, uncertainties associated with this potential source removed it from consideration. However, if conditions change in the future, it could possibly be reconsidered.

Plan for Desalting the Colorado River Aqueduct Proposed by the City of Brawley, CA. The City of Brawley has proposed a plan to improve the quality of water flowing in the Colorado River Aqueduct. The plan would involve construction of a desalination plant along the Aqueduct. Reject water from the plant could be routed to the Salton Sea to help sustain the lake. The latest estimates indicate that about 60,000 acre-feet/year could be available to the Sea at a salt concentration of about 10,000 mg/L. There is uncertainty as to whether this project will be approved and funded for construction.

Groundwater Sources. Other sources of replacement water that have been studied include the use of brackish groundwater from the surrounding watershed. In the past, no cost-effective groundwater sources were identified. However, recently the East Mesa area of the Imperial Valley has been investigated as a possible transitional source that could be useful during periods of changing inflows. This potential source is also being investigated as a possible means of mitigation for the IID-San Diego Water Transfer Project.

East Mesa represents the triangular area east of East Highline Canal (EHC), West of the Algodones Dunes, and north of the U.S. border. Water quality for much of East Mesa is fairly good at 500 to 1000 mg/L TDS, but there is a large area with a TDS anomaly where the TDS levels are 2,500 mg/L or more. Groundwater of such quality would not be suitable for drinking and would be of little value for most applications. However, this quality of water would likely be acceptable as a source of import water for the Salton Sea.

Preliminary analysis suggests that up to 75,000 acre-feet/year could be imported into the Salton Sea for a period of 10 to 12 years. Depending on which part of the aquifer is tapped, conveyance distances could range from about 10 miles to nearly 50 miles. Preliminary cost estimates suggest that the present value cost of importing East Mesa area groundwater could range from $100 to $400 per acre-foot.

Lawrence Livermore National Laboratory has been provided federal funding to conduct a groundwater study in Fiscal Year 2004. This study may provide additional insight into groundwater storage capacity of aquifers surrounding the Sea. However, based on the current knowledge of groundwater availability it is generally believed that the brackish groundwater available could help the Sea during a transitional period, but would not serve a long-term replacement for reductions in base flow plus an annual transfer of up to 300,000 acre-feet.

3.6 Brackish Water Impoundments

The options discussed in Sections 3.1 through 3.4 have been considered for the Salton Sea in various reports over the past several decades. As discussed above, these methods do not perform well under reduced inflow scenarios. Therefore, in the early part of the present decade, other ideas began to emerge.

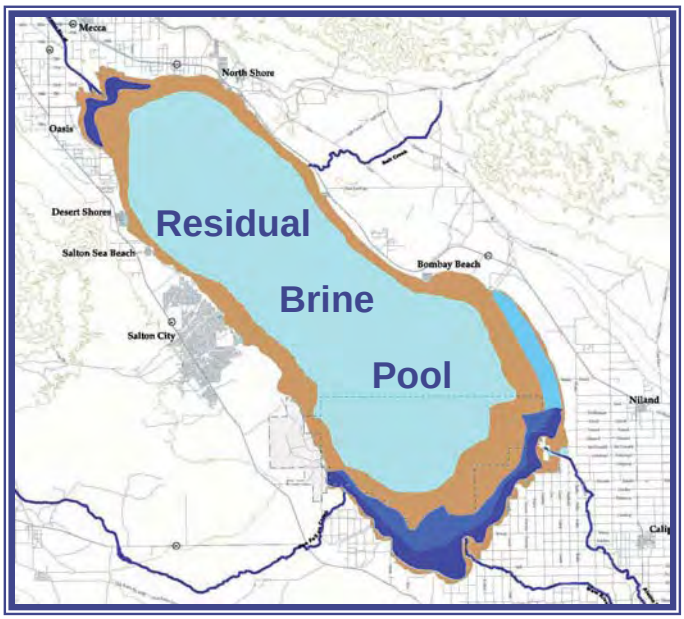

Figure 3-6. Impoundment Locations in Pacific Institute Proposal.

In October 2001, the Pacific Institute proposed a solution to the problems at the Salton Sea that they suggested would provide environmental and recreational benefits at the Sea, but would not control salinity or preserve the fishery within the main body of the Sea itself. The Pacific Institute for Studies in Development, Environment, and Security is an independent, non-profit center created in 1987 to conduct research and policy analysis in the areas of environment, sustainable development, and international security. The proposal was posted on their website at http://www.pacinst.org/saltonsea. html.

This proposal would involve placing treatment wetlands along the New and Alamo rivers and constructing dikes within the Sea near the north and south shores (Figure 3-6) to capture inflows and stabilize the water surface elevation at –230 feet. Water above elevation –230 feet would flow via gravity through pipes in the dikes to the main body of the Sea. Such a gravity fed system requires a reduction in inflows. The impounded north and south shore areas would transition to brackish, estuarine conditions. Actual salinity in these impounded areas would depend on several factors, including the volume and salinity of inflows (salinity of the Alamo and New rivers is currently about 2,900 mg/L) and the total volume of the impounded area.

A detailed review of the proposal was conducted by the Salton Sea Science Office (2002). The review was conducted by a group of nearly 30 scientists and engineers with diverse backgrounds in all aspects of the ecology of the Sea as well as the appropriate engineering disciplines to review the feasibility of the proposal. The review included an assessment of the costs associated with the dikes and other aspects of the proposal. The Pacific Institute estimated that the full proposal could

cost $400 million, based on cost factors from an earlier Salton Sea Restoration Project report; however, the more recent estimate of the present value of the full dike construction program would be over $1 billion. This more recent estimate involves 45 miles of dike most of which would be constructed in 15 feet of water.

The review also identified a number of ecological concerns related to the proposal. The following paragraphs are extracted from the Executive Summary of the Salton Sea Science Office (2002) review:

> The ecological and recreational values of the impoundments would be determined primarily by salinity and contaminant levels and the fact that they would represent only about 12 percent of the area of the present Sea. As freshwater systems, they would quickly be colonized by large numbers of freshwater plants, invertebrates, and fish, with carp, tilapia, catfish, threadfin shad, and possibly largemouth bass dominating among the latter. These fish would be much more heavily infested with parasites than are present Salton Sea fish. As the impoundments would effectively be sluggish extensions of the rivers that feed them, they would have contaminant levels similar to those of the rivers. Selenium levels in impoundment waters would be roughly six times those in the present Sea. Fish and invertebrates in impoundments thus would be likely also to have much higher selenium concentrations than do fish and invertebrates of the present Salton Sea. These would pose significant increased risk to both sport fisherman and to fish- and invertebrate-eating birds, such as pelicans, grebes, ducks and shorebirds. The fish-eating birds would have fewer but more contaminated fish available to them than they do now.
>
> Even after flowing through treatment wetlands, inflow waters would have higher concentrations of microbial pathogens than does the present Salton Sea. These would further inhibit or advise against various types of recreational use of the impoundments. Dense aquatic and terrestrial vegetation would colonize possibly 50 miles of now barren shoreline within the impoundments. This would serve as excellent habitat for certain birds but also for mosquitoes, including Culex tarsalis. The latter is a known vector in the region of western equine encephalomyelitis, St. Louis encephalitis, and, potentially, West Nile encephalitis, as soon as that gets to California from eastern U.S. The 9000 ac of treatment wetlands could also serve as major new mosquito-producing habitat and might also be sites of selenium concentration in the food web. Other biting insects (horseflies, biting midges) would also likely increase in abundance.
>
> The residual Salton Sea would soon go fishless as salinity rose. The current aquatic invertebrate assemblage would also die out. For some years afterward, high densities of brine shrimp, brine flies and water boatmen would be found here and serve to attract large numbers of invertebrate-eating waterbirds. However, with increasing salinity the production of even such salinity tolerant

species drops rapidly. A residual Salton Sea at a salinity of 200 g/L would be as barren of birds as is most of The Great Salt Lake of Utah. Selenium levels in these salinity tolerant invertebrates would also be much higher than those in invertebrates of the present Salton Sea.

Though under the project proposed by the Pacific Institute the ecosystems in the region would initially continue to be as attractive to birdwatchers as the present ones, by most other criteria they probably would be less valuable for wildlife or human recreation and have negative economic repercussions for the region. Fishing, boating, swimming, and camping at the Sea would be less attractive options than they are now. Increased particulate matter air pollution would occur, might affect human health over a large region, and might affect agriculture as well.

A second concept for freshwater impoundments was proposed by US Filter Corporation in 2002. Under this concept, a dike would ring the Sea separating better quality water along the shoreline from hyper-saline water in the center. US Filter's proposal included a desalination plant at the north end of the Sea that would produce approximately 500,000 acre-feet/year of water with low salinity (< 150 mg/L total dissolved solids). This water would be transferred to urban water users via the Coachella Canal and the Colorado River Aqueduct. The concentrate from the Reverse Osmosis (RO) plant would be returned to the central Sea. This concept is illustrated in Figure 3-7.

A review of the US Filter proposal was conducted by Tetra Tech, Inc. (2003) in cooperation with the Salton Sea Science Office and a Citizens Advisory Committee. The review included an assessment of feasibility and cost. US Filter estimated that the costs of dikes for this option would be about $600 million. However, this estimate was based on cost factors from several years ago for dikes that were not designed to have differences in water surface elevation from one side to the other. In addition, US Filter estimated that the length of dikes would be about 80 miles. Current design concepts for impervious dikes that have differential water surfaces would be more costly. In addition, the actual length of dikes along the shoreline would be 95 miles if constructed in 10 feet of water, and 92 miles if constructed in 15 feet of water. Therefore, estimates of the current dike costs alone for the US Filter Corporation proposal, without the treatment plant, are $1.9 billion if constructed in 10-feet of water and $2.6 billion if constructed in 15-feet of water.

The review of the US Filter proposal also suggested that the shallow brackish water impoundments would have many of the ecological problems that would be associated with the Pacific Institute Proposal as discussed above in Section 3.6.

Figure 3-7. Sketch of US Filter Corporation Concept.

3.7 Multiple-Dike Proposals

Over the years, a large variety of diking schemes have been proposed at the Salton Sea. The 2000 EIS/EIR evaluated several alternatives that included diked impoundments. Under constant inflow conditions, dikes would serve to isolate saltier water from less salty water, and the water surface in the main Sea and in the diked impoundment areas would be at almost the same elevation. Under reduced inflows, dikes could be used in a different manner. Under such conditions, dikes could be used to help maintain the Sea's water surface at or near its current levels while the impounded areas would be dry or could be used for other purposes.

In 2003, representatives of the consulting firm Black & Veatch made a series of presentations involving various configurations of dikes. The proposals for stabilizing the Sea would utilize evaporation or brine ponds, created by dredging sand to create dikes that would be up to 1,000 ft wide. An evaluation of the Black & Veatch proposals (Brownlie and Kirk, 2003) suggested that for the reduced inflows under consideration, areas surrounded by dikes would need to be as large as those shown in Figure 3-8. The diked areas would provide an outlet for water to help lower salinity levels in the Sea. In addition, by reducing inflows into the Sea, a supply of

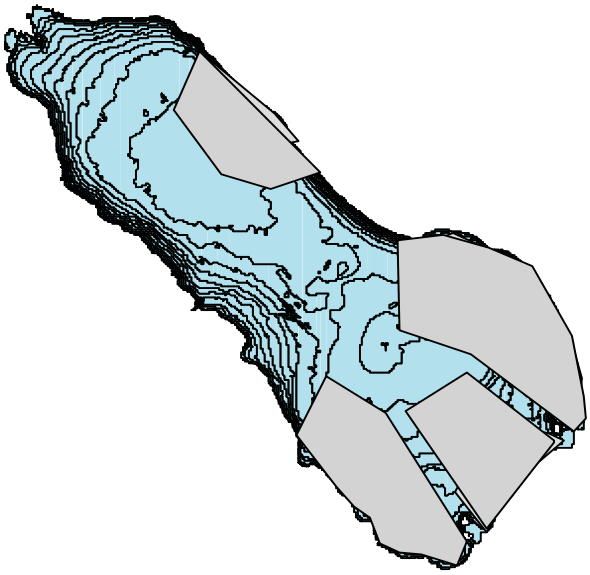

Figure 3-8. A Review of the Black & Veatch Concepts Suggested that the Area Needed to Achieve a Water Balance Would be Like the Gray Areas.

agricultural drainage water could be captured and treated at a proposed treatment plant, creating a water supply to be used for other purposes. These uses could include transfer to local water agencies or the Colorado River Aqueduct. Black & Veatch estimated that up to 400,000 acre-feet of transferred water could be produced under this concept. A shoreline canal would surround the dike system and evaporation/brine ponds to ensure continuity of the existing shoreline. A goal of this concept would be to maintain a significant portion of the overall Sea and its existing shoreline.

The Authority evaluated this concept (Brownlie and Kirk, 2003) and estimated the cost to range from $2.3 to $5 billion to construct the project. Subsequent to the Black & Veatch proposal, a preliminary geotechnical investigation of Salton Sea sediments was conducted by the Authority (URS and Tetra Tech, 2004). The investigation showed that bottom material consisted primarily of fine materials that may not be suitable to serve as hydraulically dredged and placed fill material for dikes. The cost estimates quoted for the Black & Veatch proposal could be updated with the latest design information, but the cost would still be expected to be well in excess of $1 billion because of the significantly greater length and amount of material.

3.8 Central Causeway Options

The reviews of the dike concepts discussed in Sections 3.6 and 3.7, above, suggested that the use of dikes to create a smaller marine lake coupled with other uses of water were worthy of further consideration. These considerations led to a concept that a causeway could be constructed across the central portion of the Sea to create a marine lake on one side and an area for habitat enhancement or other uses on the other side.

Concepts similar to this had been considered and highly rated several years ago but had been eliminated from further consideration because of costs. However, with the rising cost of other alternatives because of inflow reductions, this concept seemed worthy of renewed consideration and further development. There are several ways in which a central causeway could be used. For example, a central causeway could be

used to serve as a salt barrier with no elevation control. Under such a scenario, the water level would be about the same on either side of the barrier, but one side could be maintained at ocean-like salinity while the salinity on the other side would continue to rise. Over time, with the QSA in place, the water on both sides of the barrier would decrease to about 18 feet lower than the current level Sea.

An alternative to the barrier concept discussed above, would be to build the causeway as an impoundment structure to maintain a managed lake level on one side and allow the water level on the other side to adjust according to inflows. The Salton or North Lake concept illustrated in Figure 3-9 would follow this premise and utilize a mid-Sea impoundment to create a marine lake in the north and a variety of habitat and recreational features in the south. The concept would also allow for the expansion of geothermal energy in the south, in an area that is now under water.

The Salton or North Lake concept was presented to the Authority Board of Directors in early 2003. The Board endorsed the concept as a highly promising solution to the problems at the Sea and authorized further development of the concept. Further discussion of the evolution and enhancement of this basic concept is provided later in this report.

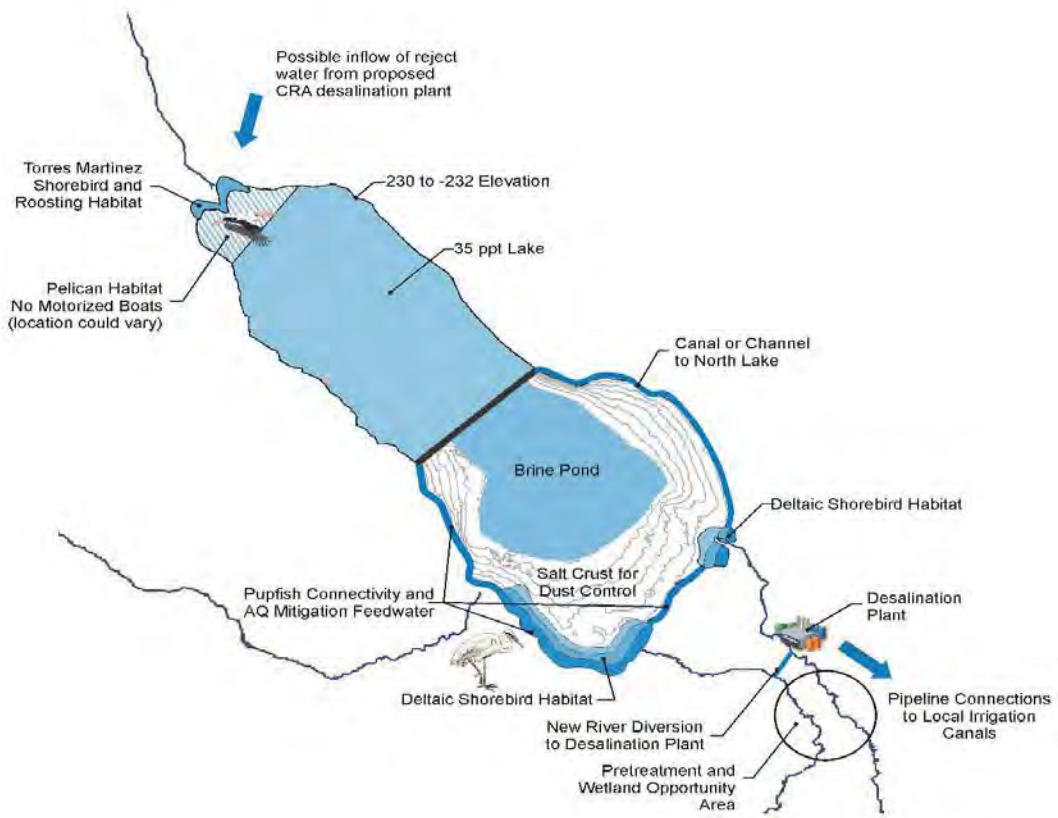

Figure 3-9. Salton or North Lake Concept.

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Chapter 4: LOGICAL PROCESS FOR ALTERNATIVE SCREENING

The various categories of alternatives for solving the problems at the Salton Sea can be reviewed through a logical sequence of decisions given the current and likely future conditions at the Sea. The process begins by developing a series of questions which provide a roadmap through a sequence of decision points leading to a logical preferred project. The questions and logical decision points are discussed below and diagramed in Figure 4-1.

4.1 Would pump-in/pump-out systems work?

Probably the largest and most critical issue for achieving a broad range of project objectives is the control of salinity. This is a far-reaching concern that has implications for both the ecology and the economy and recreational value of the area. Thus, probably the first logical question is: could we create an outlet to the Gulf of California or Pacific Ocean to remove salt and at the same time bring ocean water back in to help sustain the Sea? From the perspective of those interested in preserving the Sea, export of salts to a distant location is very appealing. In addition, a pipeline or pipelines combined with canals to the Gulf or Ocean would also offer the opportunity of developing a return line that would bring water with ocean-like salinity back into the Sea to help control the water surface elevation of the Sea. Pipelines for pumping water uphill from the Sea and the Gulf coupled with a canal system on the downslope side could also possibly provide a navigable waterway to the ocean.

As appealing as the pipeline/canal approaches may seem to be on the surface, there are many drawbacks, including extremely high costs. Ocean water is about 20 times more salty than the Sea's current inflow. To achieve a salt balance, and thereby control salinity, and also maintain the elevation of the Sea in a decreasing inflow environmental, massive amounts of water would have to be exchanged. The Interior's 2003 Status Report estimated that pipeline or pipeline and canal systems to exchange water between the Salton Sea and the Gulf of California could cost anywhere from more than $10 billion to $40 billion depending on the system and the extent of inflow reductions.

In addition to shear size and cost factors, the exchange of water with the Gulf or Ocean has other problems. For example, exotic species from the Sea could be introduced into the Gulf and vise versa. It is also possible that bacteria that create red tides in the ocean could be imported that would cause large fish mortality incidents in the Salton Sea. In addition, there would be a number of logistical and international issues that would need to be addressed related to construction in a channel in Mexico to the Gulf of California. Therefore, for the reasons discussed above, pump-in/pump-out systems are impractical. If pump-in/pump-out systems are impractical, would simple pump-out systems work?

4.2 Would pump-out only systems work?

The next question to be answered with respect to salt removal and disposal is: would systems that rely only on pumping salty water out of the Sea work without any pump-in features? A variety of pump-out systems have been investigated. The main problem associated with any of these systems would be size. Under historical inflow conditions, a pump-out system would need to be sized to remove about 5 million tons of salt each year to stabilize and gradually reduce salinity. For the assumed inflow conditions under the QSA, the systems would need to remove 10 to 15 million tons per year or more during the transitional period when the Sea is shrinking. During at least part of the transition period, it is likely that salinities would be too high to support the current fish population; therefore, the fishery would need to be re-established in the future. Eventually, after about 20 to 25 years, operation of any of the systems could be reduced to remove 4 to 5 million tons per year for long term maintenance of lower salinities. Removal of large quantities of salt water would further reduce elevations of the Sea below what would occur with transfers only. The Sea would drop in elevation to about 25 feet lower than its current level.

Some specific features of the various pump-out approaches are discussed below.

On-Land Solar Ponds or Solar Ponds with EES—The primary drawback to using on-land solar evaporation ponds would be the large areas of land that would be needed. It is estimated that the size of a multiple-pond system that could effectively manage salinity in the Sea is on the order of 60 square miles. This large an area presents unique challenges from acquisition and land ownership issues to the high cost of maintenance, volume of water displaced from the Sea and impacts to the fishery. The use of on-land solar evaporation ponds is estimated at around $1 billion. Enhanced evaporation systems (EES) could be added to reduce the land area required. These systems use spray techniques to enhance natural solar evaporation. Interior (2003) estimated that with about 1,000 or more ground-based spray units operating constantly, the area required for evaporation and disposal of salts would be reduced to about 20 square miles. However, there would be significant added cost as well as high on-going operating and energy costs. The cost to construct, operate, and maintain this system for 30 years, expressed as a present value, is estimated at between $1.7 and $1.9 billion for the assumed inflow conditions under the QSA.

Pump-Out to the Gulf of California, Pacific Ocean, or a Dry Lakebed—Pipelines to far-away locations would avoid the in-basin land area requirements that would be associated with solar ponds and their disposal areas. Functionally, they would affect the Sea in a manner similar to solar pond systems in that they would create an artificial outlet for the Sea and thereby remove salty water. The capacity of a one-way pipeline would be about one-tenth that required by the export component of a pump-in/pump-out system. This is because the large volumes of water needed

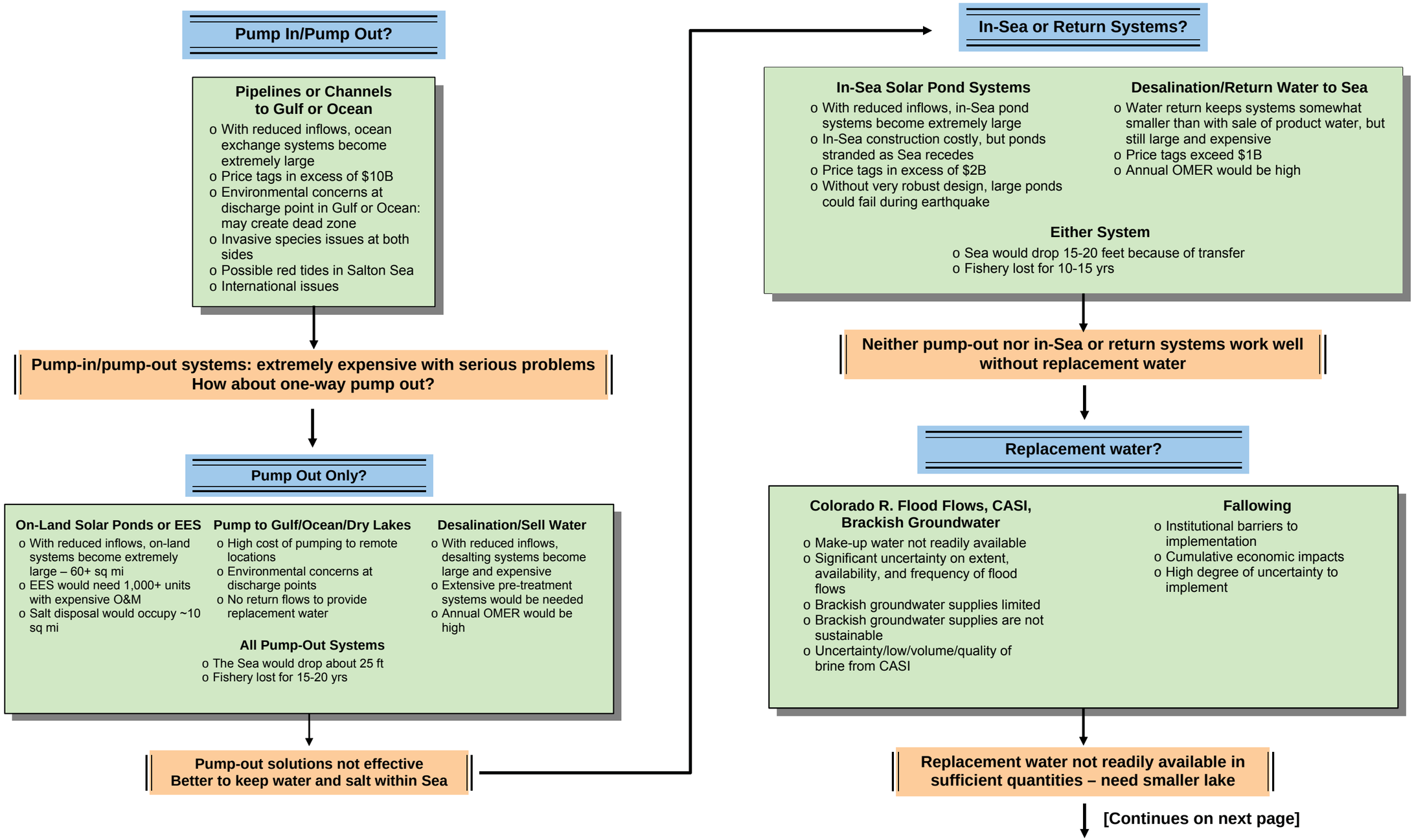

Figure 4-1. Logical Process for Screening Salton Sea Restoration Alternatives (Part 1 of 2).

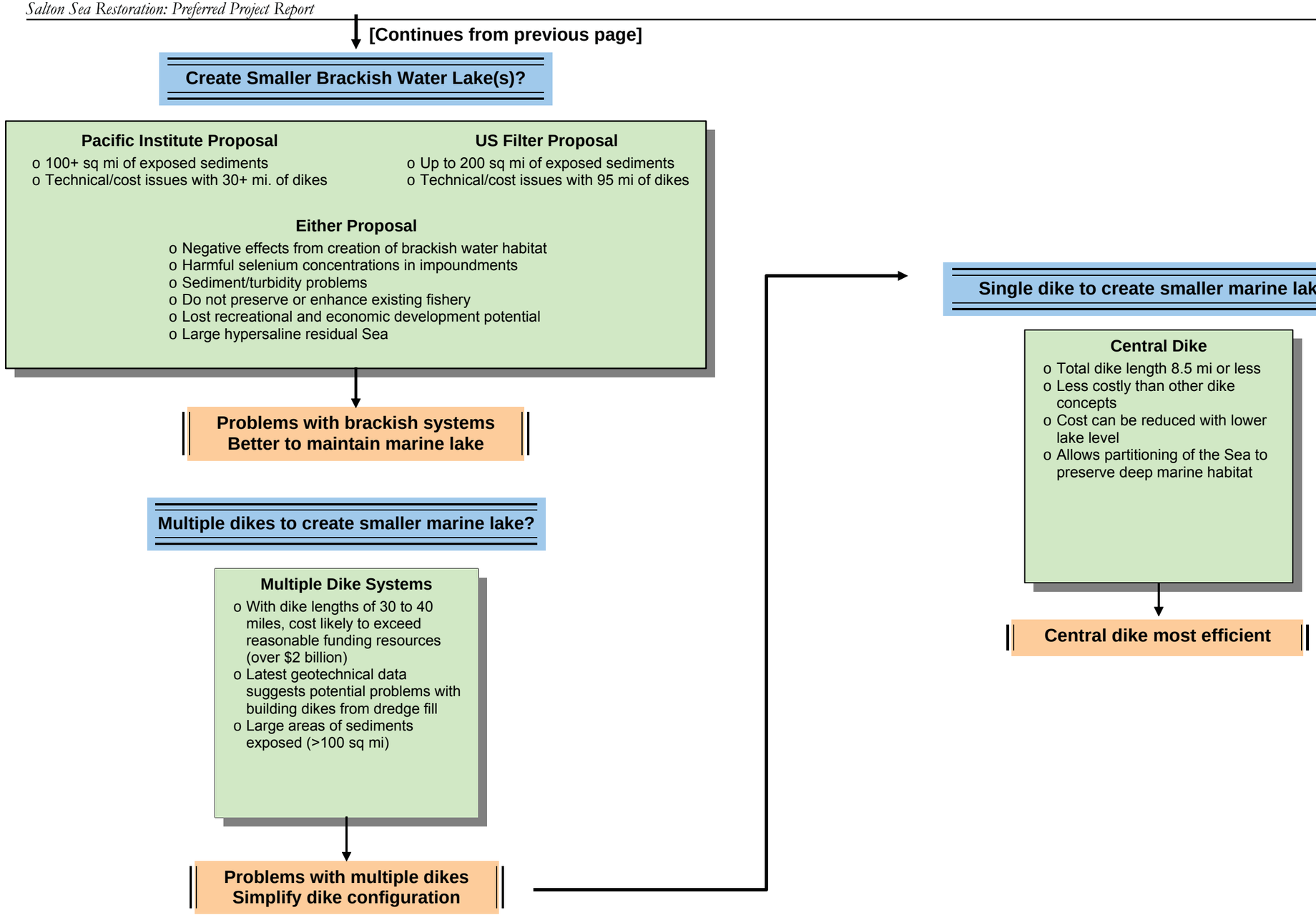

Figure 4-1. Logical Process for Screening Salton Sea Restoration Alternatives (Part 2 of 2).

to balance inflowing highly salty ocean water in a pump-in/pump-out system would not be needed. However, pipelines to remote locations would still be expensive, with price tags likely in excess of $1 billion. Energy and operating costs for pumping to dry lake beds or the Pacific Ocean would be high. Pumping to the Gulf would have a lower energy requirement, but the international issues would need to be addressed. In addition, for all three options, there would still be serious environmental issues at the discharge points that would need to be addressed.

Desalination with Sale of Product Water—The use of desalination technology has been evaluated as a means of controlling salinity. If the product water from a desalination system is sold to help pay for the project, from the Sea's perspective, the system would function as any other pump-out method. As discussed in Section 3, evaporative systems have been considered that would take advantage of waste steam from geothermal operations at the south end of the Sea. However, even with an expensive source of energy, with reduced inflows and the current salinity burden in the Sea, an effective desalination system would need to be extremely large and would be very costly to operate and maintain. In addition, a large volume of brine would need to be disposed and disposal areas could occupy on the order of 10 square miles. The cost for a vertical tube evaporation system would likely exceed $1.4 billion.

All Pump-Out Systems—To summarize, all pump-out systems would be expensive and, in all cases with the QSA, the Sea would drop in elevation to about 25 feet lower than its current level. Inevitably, elevated salinity would occur during a 15 to 20 year transitional period, and the fishery would likely be lost during this period and it would need to be re-established at some time in the future. Given all the drawbacks of pump-out systems, it is logical to explore in-Sea systems or other projects that do not require export of water from the Sea.

4.3 Would in-Sea ponds or systems that return water work?

At least two systems have been investigated that would remove salts from the main body of the Sea, but would not remove much water: in-Sea shallow water solar ponds and desalination systems with return of the fresh water product to the Sea. Again, a significant problem associated with either of these systems would be size. For the assumed inflow conditions under the QSA, the systems would need to remove 10 to 12 million tons per year during the transitional period when the Sea is shrinking. During at least part of the transition period, it is likely that salinities would be too high to support the current fish population; therefore, the fishery would need to be re-established in the future. Eventually, after about 15 to 20 years, operation of any of the systems could be reduced to remove 4 to 5 million tons per year for long term maintenance of lower salinities. Although these systems would not affect elevation of the Sea, there would still be a drop of 18 to 20 feet because of the inflow reductions.

Features of the various pump-out approaches are discussed in the following paragraphs.

In-Sea Solar Pond Systems—Due to reduced inflows, in-Sea pond systems would need to occupy around 55 square miles within the Sea. Since in-Sea ponds would reduce the surface area of the main body of the Sea, the water removed would be balanced by a reduction in the evaporative from the main Sea and there would be no effect on elevation. However, as discussed earlier, a drawback to in-Sea ponds is that the ponds would be stranded away from the Sea as it recedes under reduced inflow conditions thus requiring pumping or relocation of the ponds. The surface area reduction benefit of constructing in-Sea would be eliminated and continued operation of the pond system would tend to further reduce the elevation of the Sea in that water would need to be pumped out of the Sea and into the pond system. Cost to implement this approach has been estimated at over $2 billion. The added cost of relocating ponds as the Sea recedes has not been considered in this estimate.

Desalination with Return of Product Water to Sea—If the product water from a desalination system is returned to the Sea, salt could be removed without removing much water and the system would have little effect on the Sea's water surface elevation. The system could be perhaps 10 to 15 percent smaller than a system where the product water would be sold because the return water would provide some dilution effect. However, the system would still be large and nearly as expensive as where product water would be sold as discussed above and in this case there would be no sale of water to offset the cost. If brine from the process were disposed in in-Sea ponds, there would be no effect on elevation. However, again the Sea would drop because of inflow reductions.

Either System—Either in-Sea solar ponds or desalination systems would be effective under historical inflow conditions. In addition, they could be designed at about 1/3 the size required with QSA inflows at about 1/3 the cost. Therefore, they could be effective if replacement water were available to make-up for inflow reductions from the QSA transfers and other factors that may reduce inflow. Nearly 400,000 acre-feet/year would be needed. Is replacement water available?

4.4 Would pump-out or in-Sea systems work with replacement water?

If a reliable source of water to replace the volume that will be transferred could be identified, then restoration planning could be simplified. The potential sources of replacement water are described below.

Colorado River Flood Flows, CASI or Brawley Desalting Proposals, Brackish Groundwater—The use of Colorado River flood flows has been identified as a potential source of replacement water. Several limitations to this being a feasible solution include the highly uncertain nature of volume or frequency of flood flows in

excess of currently allocated water on the Lower Colorado River and whether these flows could be made available to the Sea over the long term. The use of flood flows for habitat enhancement along the Lower Colorado River is currently under consideration and this use may supercede uses for the Salton Sea.

The use of brine reject streams from the proposed CASI system and the City of Brawley proposal for a desalting plant on the Colorado River Aqueduct have been considered in the past as a possible future source of water. The project is in the planning stages and may not come on-line for another 10 to 20 years. Uncertainties associated with this potential source removed it from consideration. The Brawley proposal could supply 60,000 acre-feet/year at about 10,000 mg/L, but its implementation is also uncertain and this quantity of water would not compensate for the projected flow reductions.

There is currently a study underway by Lawrence Livermore National Laboratory to evaluate the potential to use groundwater from the Imperial Valley Watershed as replacement water for the Salton Sea. However, based on currently available information, it is believed that this source of water could provide about 50,000 acre-feet/year for about 10 years, and would not be sustainable over the long-term. Thus, while this water could be helpful for restoration efforts, this source of replacement water would not be a viable means of making some of the above mentioned technologies more feasible.

Fallowing—Fallowing of farmland currently under production has been considered as a source of replacement water. Under this scenario, farmland that is currently under production would be taken out of production and the water normally used to irrigate the crops could be used as replacement water for the Salton Sea. This approach is expected to be used until on-farm conservation techniques are developed to such a degree as to achieve efficiencies approaching total land fallowing. Unfortunately, over the long term this approach has significant social and political challenges due to the resistance of local farmers to fallow even more land than is currently envisioned under the QSA. Large blocks of land would need to be taken out of production and would result in a loss of jobs and other socioeconomic impacts. It is highly unlikely given current conditions within the Imperial Valley that this approach could be implemented with certainty.

General Availability of Replacement Water—It does not appear that replacement water is available in sufficient quantities to make up for inflow reductions. Therefore, since the available methods discussed above do not work well with reduced inflows, it is necessary to consider ways to create a smaller lake.

4.5 Would it make sense to create one or more smaller brackish water lakes?

Two approaches to developing a smaller brackish water lake or lakes have been proposed…the Pacific Institute and US Filter concepts. While novel concepts, these proposals have significant drawbacks due to the reliance on brackish water systems as the primary habitat to sustain the ecosystem of the Sea, the negative effects of such a habitat in an arid desert environment, and the lost recreational and economic benefits from a large hyper-saline Sea. The US Filter concept first introduced the idea of desalinating water flowing into the Sea and to make this water available for transfer to other water users. The desalination concept is attractive because it creates a revenue stream that could be applied to restoration costs and could be incorporated into other restoration concepts. The Pacific Institute and US Filter concepts are discussed below.

Pacific Institute Proposal—The Pacific Institute proposal relies on creating brackish water impoundments at the north and south end of the Sea to utilize inflows from the main sources of water to the Sea (i.e., New, Alamo, and Whitewater Rivers). A group of more than a dozen scientist and engineers convened by the Salton Sea Science Office to review this proposal identified many serious concerns. The main body of the Sea would continue to increase in salinity eventually becoming hyper-saline and devoid of a viable fishery. This would result in loss of recreational opportunities for the vast majority of the Sea and would likely preclude economic development in communities surrounding the Sea. The impoundment of inflows to the Sea would create a brackish water habitat that would result in increased abundance of biting insects, parasites and pathogens, and an environment for selenium to concentrate at levels harmful to wildlife and humans. This would also significantly impact the sustainability and diversity of the fishery in the Sea. The resulting brackish water fishery would not resemble the current one and fish in the impoundments could pose health risks to humans and wildlife due to elevated selenium levels. Recent cost estimates are that this proposal would cost on the order of $1.2 billion.

US Filter Proposal—As with the Pacific Institute proposal, the US Filter proposal would create a large brackish water environment; however, the US Filter proposal would create this habitat around the entire periphery of the Sea. The Authority commissioned a technical review of this proposal that was conducted in association with the Salton Sea Science Office and a Citizens Advisory Group. The technical review identified many of the same concerns related to the ecosystem, recreation, and the local economy that surfaced during the review of the Pacific Institute Proposal.

The shallow brackish habitat would exacerbate the problems related to fish, bird, and human diseases associated with water borne parasites, contaminants, and mosquitoes. Because the brackish water ring around the Sea would be the primary habitat, the current food web would change to a fresh water web with algae as the

major food base. Extensive growth of vegetation would occur along the shoreline. Temperature ranges in the brackish water ring would be similar to the inflowing rivers, but more extreme than the current Sea. The average water depth in the brackish water ring would be on the order of 5 feet. There would be a loss of recreational and economic development potential due to the loss of the Sea as a hyper-saline water body. It has been estimated that this restoration alternative could cost between $1.9 and $2.6 billion.

Brackish Water Lakes—The brackish-water-lake concepts considered above have serious drawbacks and also would be very expensive to implement. Therefore, it is logical to explore methods to maintain a smaller marine lake.

4.6 Could multiple dike configurations be used to create a smaller marine lake?

In the past, most concepts involving dikes had involved construction of dikes as a means of controlling salinity. Salty water would flow into the area surrounded by dikes and salts would concentrate through solar evaporation. In most cases, there would be no elevation difference between the main Sea and the area behind the dikes. As shown in Figure 3-6, the Salton Sea EIS/EIR (2000) also included alternatives that coupled dikes such as these with a displacement dike at the south end of the Sea. The displacement dike would be used to reduce the evaporative surface area of the Sea to help maintain elevation under reduced inflow scenarios. The area behind such a dike would be dry.

More recently, as discussed in Section 3.7, the consulting firm Black & Veatch proposed creating impoundments at various areas within the Sea to isolate and concentrate salt, thereby controlling salinity increases in the main body of the Sea. The size of the impoundments would be large, about 88,000 acres, and would require extensive dikes to contain the hyper-saline water. Because of the length of dikes required (34-51 miles) the costs associated with these dike configurations have been estimated at between $2.3 billion and $5 billion. The Black & Veatch concept also included desalination and water transfer components similar to the US Filter concept that are not included in these cost estimates. In addition, Black & Veatch assumed that the dikes could be constructed by using fill material from hydraulic dredging operations. Recent geotechnical information from the Salton Sea has shown that because of the fine material on the Sea bottom, this method may be impractical or at least more costly than previously anticipated.

In addition to high price tags and feasibility concerns, multiple dike schemes would have another drawback. They would not be sensitive to inflow reductions. A multi-billion dollar dike scheme could be designed for a certain inflow, but if the inflow was reduced in the future, additional dikes would be needed in the future to continue to stabilize elevation. Given these concerns, it is then logical to investigate a simpler

configuration of a single structure across the middle of the Sea, that would be at most 8.5-miles long, compared to up to 51 miles for multiple-dike configurations.

4.7 Would the use of a central dike to create a smaller lake work?

Rather than creating extensive ring dikes within the Sea and the resulting high cost, a concept that bisects the Sea in half has been proposed. This concept relies on building a retention structure, barrier, or dike across the midsection of the Sea to separate hyper-saline and marine basins of the Sea from one another. The advantage of this concept is the reduction in distance needed to effectively separate these two basins. For example, if the structure is placed at the approximate midsection of the Sea where the west and east shorelines are nearest, the length of the barrier would be around 8.5 miles, and less if it is designed to work with the Sea at a lower elevation than the current situation. A major challenge to this concept is the feasibility of constructing a facility that is cost effective. The foundation conditions of the Sea have been investigated and found to be composed of a relatively thick layer of fine-grained sediments that create an engineering design challenge. However, alternative designs of a mid-Sea facility are currently underway and based on preliminary engineering evaluations it is believed that a suitable structure could be constructed at a reasonable cost.

Chapter 5: EVALUATION OF REASONABLE ALTERNATIVES

The logical process for reviewing alternatives discussed in Chapter 4 led to the conclusion that alternatives that employ a central dike or retention structure are worthy of further investigation. This chapter addresses how the individual components could be combined into alternatives. It also provides an evaluation of those alternatives with respect to the program objectives. All of the alternatives discussed in this chapter would include a wide range of habitat and recreational features that would need to be part of a complete alternative. Chapter 6 presents these features and how they would be integrated into the preferred alternative.

5.1 Formulation of Reasonable Alternatives

A smaller marine lake concept could be developed along one of two options using a central dike or retention structure: a marine lake in the north or a marine lake in the south. A logical location for dividing the Sea is an east-west orientation across central area of the lake. Here, the distance between shorelines is the least and the water depth is 5 to 8 feet shallower than deepest portions of the north and south basins. The features and benefits of south and north marine lake concepts based on a dividing structure at this location are described briefly below. There is also a choice about whether or not to control elevation.

South marine lake—A marine lake in the south would have a maximum area on the order of 200 square miles and require an inflow of 980,000 acre feet per year to sustain it at current elevation (about -227 feet msl). The area would be smaller if the lake was to be maintained at a lower elevation. A southern marine lake would be consistent with current wildlife refuge boundaries. The southern marine lake would also take advantage of inflows from the New and Alamo Rivers such that rerouting or transporting these flows would not be necessary. Concentrations of selenium and other contaminants in the sediments are highest in the northern half of the Sea. Allowing portions of this basin to recede would expose the sediments creating the potential for human health and wildlife impacts.

North marine lake—A marine lake in the northern portion of the Sea would be on the order of 140 square miles and require an inflow of around 800,000 acre feet per year. A marine lake in the north would reduce the concern over selenium sediment effects by effectively capping the sediments with the marine lake. There are also established communities in the northern portion of the Sea such as Desert Shores, Salton City, and North Shore that would benefit from a restored Sea. These communities would likely experience renewed economic development such as commercial, recreational, and residential developments. The Torres Martinez Tribe would also benefit from a restored Sea and could implement various economic and natural resource projects. The exposure of the shoreline in the south would allow

geothermal exploration and development of the known geothermal resources in this area.

Elevation control—The next issue to be addressed is whether or not to control the water elevation in the marine lake, and if so, what approach to use. A barrier could be used with no elevation control. A retention structure could be used that maintains elevation at current levels. Or, a retention structure could be used that takes advantage of a reduced water surface level.

Given the above considerations, four alternative configurations have been identified for evaluation:

- **South Marine Lake without Elevation Control**—The simplest configuration would be to construct a central barrier and allow the New and Alamo rivers to flow into the south basin and create a marine lake with hyper-saline conditions in the north.

- **South Marine Lake with Elevation Control**—This configuration would be similar to the previous alternative, except that the central barrier would need to be taller and more robust to impound water in the south and create a higher water surface than in the north.

- **North Marine Lake with Elevation Control**— This concept would be similar to the previous alternative with the north-south configuration reversed. In this case, the New and Alamo rivers would need to be extended to the north to provide freshwater inflows to control salinity in the north basin.

- **No Marine Lake**—This alternative is considered in case a mid-Sea barrier or impoundment structure proves to be infeasible or too costly. It would include wetland and habitat restoration elements to achieve as many objectives as possible without maintaining a large lake with a marine fishery.

South Marine Lake Without Elevation Control: Example Configuration

As an example, a preliminary configuration for the first alternative listed above is illustrated in Figure 5-1 and discussed here. This alternative would involve construction of a low barrier across the middle of the Sea, thus creating two distinct bodies of water. The South portion of the Sea could be maintained at ocean-like salinities (35,000 mg/L), as it would be fed directly from the New and Alamo Rivers. The north portion of the Sea would become hyper-saline. Precise salinity levels could be maintained in the south by allowing some backflow of hyper-saline water from the north. There would be minimum elevation difference between the two bodies of water, but their habitat characteristics would be different.

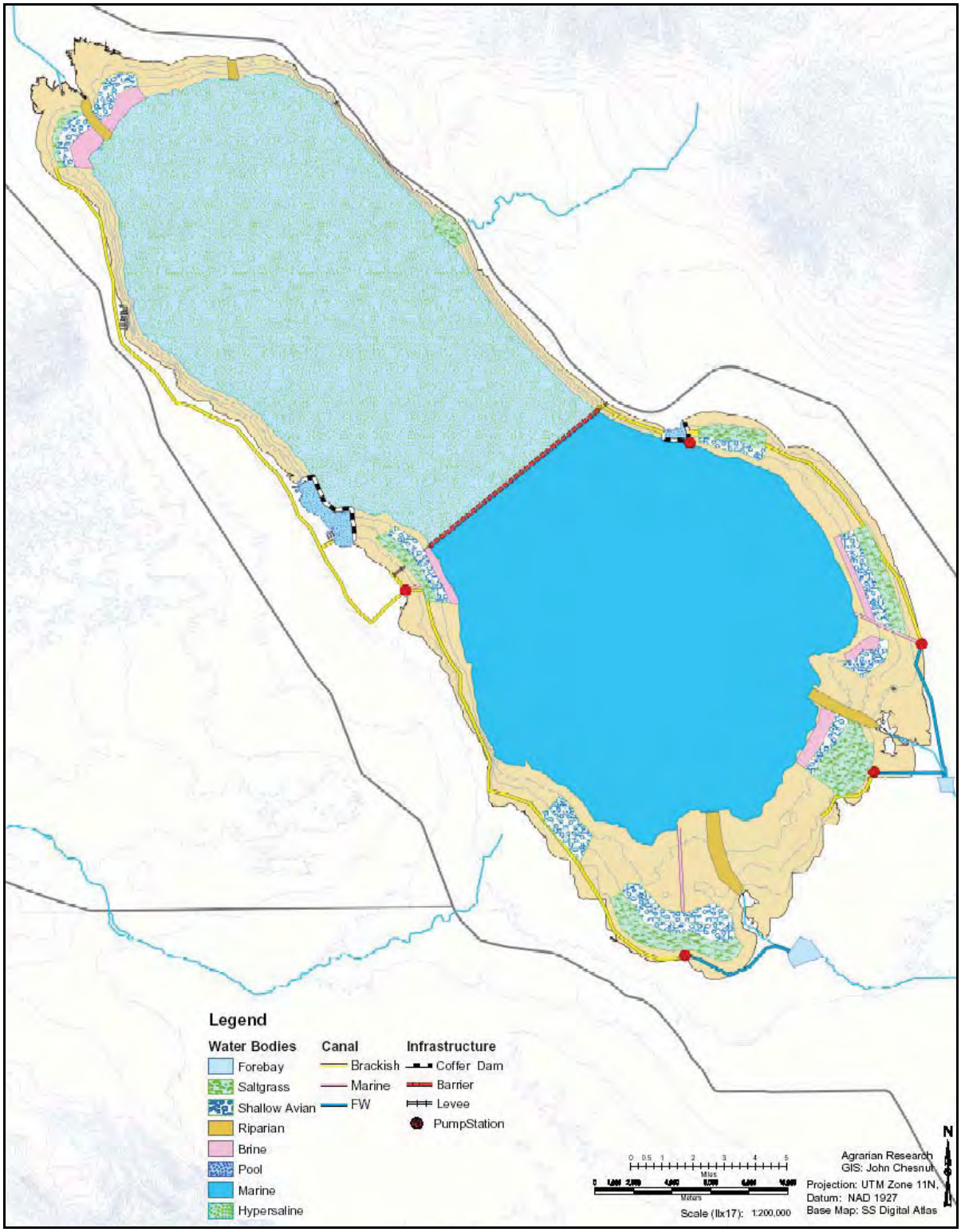

Figure 5-1. Possible Configuration for the South Lake without Elevation Control.

There would be several kinds of constructed habitats associated with this alternative. The canal on the east side of the Sea would deliver water to saltgrass and waterfowl habitats, and would also supply a recreational pool at Bombay Beach. The canal on the west side, which would consist of fresh water blended with Sea water pumped from the South portion of the Sea, would supply additional saltgrass and waterfowl habitat areas. It would also provide water for a recreational pool at Salton City. The west canal could double as pupfish connectivity habitat as well. Additional flooded saltgrass stands would be present at the north, provided with water blended from the west transmission canal and water from the Whitewater River. Saline waterfowl habitat at the north end would be supplied from the same blended water, arriving in the canals from both the east and the west. The outflow from all habitat types would be used to create solar salt concentrators and crystallizers downslope of the saline habitats.

This example alternative includes freshwater habitat in the forebays only, with short lengths of freshwater canals. There would be at least three pump stations required. One would be north of the Alamo River to supply the canals flowing north to Bombay Beach and south to the saltgrass and waterfowl habitats. A blending station would be required at both the New and Alamo Rivers to blend saline and river waters for the canals. Another pump would be at Niland, to augment flows to the north end of the Sea. The third would be near Salton City, to provide additional water to the canal and recreational pool on the west shore. A low mid-Sea barrier would also be required.

Similar examples can be developed for the other alternatives. Examples of how habitat areas could be developed for other alternatives are provided in Appendix A to be supplied.

5.2 Evaluation of Reasonable Alternatives

The four reasonable alternatives discussed above were evaluated against the current program objectives presented in Chapter 1. For each objective, the alternatives were ranked on the basis of best judgment as to how they would perform under inflows that would be expected with the QSA in place. Finally, an overall composite ranking was developed. Each of the objectives and the rankings are discussed below. As discussed in Chapter 1, the current objectives were derived from the goals identified in the Salton Sea Reclamation Act of 1998 as shown in Table 1-1 of Chapter 1.

Restoration Alternative			
South Marine Lake wo Elevation Control	South Marine Lake w Elevation Control	North Marine Lake w Elevation Control	No Marine Lake
1	1	1	1

Preserve the Sea as a Repository for Agricultural Runoff

The continued use of the Salton Sea as a repository for agricultural drainage is a fundamental component of the Salton Sea Restoration Project. All alternatives would preserve the Sea as an agricultural drainage repository. All alternatives are considered equal with respect to this objective, and therefore, all have been assigned a ranking of 1.

Provide Large Marine Lake with Stable Elevation

3	1	2	4

The South Marine Lake with Elevation Control is ranked slightly higher than the North Lake with Elevation Control because it would be 42 square miles larger. Elevation stability would be essentially the same for those two alternatives as the elevation control afforded by a mid-Sea barrier and other facilities would allow for management of Sea surface levels. Conversely, the South Marine Lake without Elevation Control is ranked third because of the lack of the ability to manage Sea surface level. The No Marine Lake scenario scores fourth because it would not meet either of the objectives of a large marine lake or provide any mechanism for stabilizing elevation.

Improve Water Quality: Salinity

1	1	1	4

With the exception of the No Marine Lake scenario, all of the remaining alternatives perform equally well with respect to salinity control. The South Marine Lake without Elevation Control achieves salinity control through the use of a permeable barrier that distributes higher saline water to the northern basin while taking advantage of the relatively fresh water entering the Sea through the New and Alamo Rivers. The South Marine Lake with Elevation Control and North Lake with Elevation Control

likewise control salinity through the use of a mid-Sea barrier that uses either a north or south saline basin as a repository for salinity control.

Improve Water Quality: Nutrients/Other Constituents

Restoration Alternative			
South Marine Lake wo Elevation Control	South Marine Lake w Elevation Control	North Marine Lake w Elevation Control	No Marine Lake
2	2	1	4

The North Marine Lake with Elevation Control scores the highest with regard to achieving water quality objectives because it would employ water treatment wetlands and settling basins to reduce the input of nutrients into the Sea. This alternative would also act as a cap of the higher concentrations of selenium in the sediments of the Sea, thereby effectively reducing the potential for human and wildlife contact with this substance. The South Marine Lake without Elevation Control and South Marine Lake with Elevation Control score equally as well for this objective because they can make use of the same nutrient reduction techniques as the North Marine Lake with Elevation Control alternative. However, both of these alternatives would allow the exposure of sediments in the northern basin that contain higher concentrations of selenium (Figure 5-2) and other contaminants than in the southern basin. Although the No Marine Lake alternative would include source control measures similar to other alternatives, it would not provide an outlet for nutrients or other constituents and has therefore received the lowest ranking.

Maintain and Improve Habitat

3	2	1	4

The North Marine Lake with Elevation Control performs better than the other three alternatives in this category because it allows the continued use of the southern portion of the Sea for wildlife habitat. This alternative incorporates the use of shallow water habitat through a series of ponds that take advantage of inflows from the New and Alamo Rivers as well as the ability to blend saline water from the northern basin. This results in the greatest amount of flexibility among the alternatives to manage shallow water and wetland habitats. In addition, sediments in the north basin that have the highest levels of selenium (Figure 5-2) would continue to be covered by a deep-water lake that would isolate them from access by birds and other biota.

The South Marine Lake with Elevation Control functions similarly to the North Lake with Elevation Control, except the habitat is managed in the northern portion of the Sea and takes advantage of flows from the Whitewater River. However, the habitat created is not as extensive as in the south due to the reduced inflow from the Whitewater River as compared to the New and Alamo Rivers. In addition, selenium in the sediments of the north basin would be exposed. Therefore, this alternative is ranked second.

The South Lake without Elevation Control is ranked third. Without a head differential between basins, it would not be possible to use gravity flow from the marine lake to fill shallow water saline habitat areas. In addition, with an elevation drop of about 20 feet, sediments with higher selenium levels would be exposed around the perimeter of the north basin.

The No Marine Lake alternative is the worst performing alternative for this objective because the salinity in the Sea would reach a level where the fishery would be unsustainable resulting in the loss of a food source for fish-eating birds and no shallow-water shoreline habitat with any functional value.

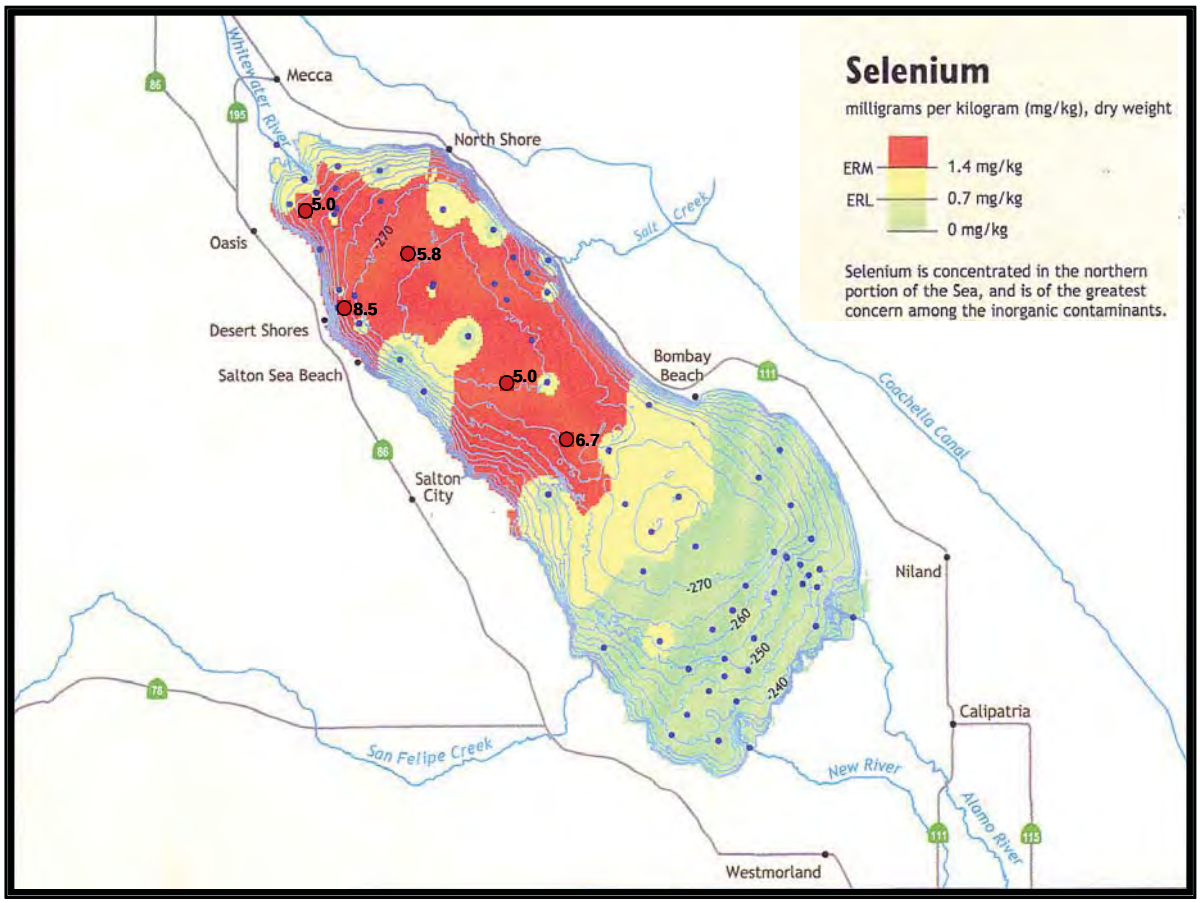

Figure 5-2. Selenium Levels in Salton Sea Sediments.

Time to Achieve Water Quality and Habitat Objectives

Restoration Alternative			
South Marine Lake wo Elevation Control	South Marine Lake w Elevation Control	North Marine Lake w Elevation Control	No Marine Lake
3	1	2	4

The South Marine Lake with Elevation Control is ranked slightly higher than the North Lake with Elevation Control because with direct flows into the south lake, it is estimated that water quality objectives could be achieved earlier upon closure of the lake. This conclusion is based on the assumption that the same design elevation is included for either alternative. The South Marine Lake without Elevation Control is ranked third because it is assumed that the central barrier would not be completed until a nearly stable elevation is achieved, which could be twenty or more years in the future. The No Marine Lake scenario scores fourth because it would not achieve water quality and habitat objectives.

Respond to Inflow Changes

2	4	3	1

The No Marine Lake alternative would perform the best for this objective because inflow would have relatively no affect on the hyper-saline lake, there would be little if any recreational uses, and no structures would be affected. The South Marine Lake without Elevation Control is the next best performing alternative because elevation would be the same in the two basins and could fluctuate depending on inflow scenarios with relatively little impact on the structures associated with this alternative. The North Lake with Elevation Control is ranked third because inflows would impact the water available for dust control and shallow water habitat development and management. The South Marine Lake with Elevation Control is ranked last because of the larger size of the marine lake in the south than for the North Lake alternative. Less inflow, therefore, would have a greater impact on the functioning of this alternative.

Increase Recreational and Economic Potential

3	2	1	4

The North Marine Lake with Elevation Control scores highest for this objective due to the improvement to recreational opportunities that would be available to the communities surrounding the northern basin. Marinas and other boating facilities in and around Salton City, Bombay Beach, Desert Shores, and North Shore would experience a renaissance due to the improved water quality and shoreline stabilization of this alternative. Additionally, these communities could experience significant economic development potential due to the linkage to the rapidly expanding southern Coachella Valley communities. As an added benefit, additional geothermal resources could be exploited in the southern portion of the Sea due to the exposure of areas of known geothermal potential adjacent to existing developed geothermal areas. Farmland in the south could also be reclaimed under this alternative.

The South Marine Lake with Elevation Control alternative, ranked second, would provide for increased recreational opportunities due to the improvement to the water quality and stabilization of the shoreline. Recreation associated with the Sonny Bono Wildlife Refuge and Imperial Wildlife Area would be improved as well as duck hunting that occurs in this area. However, existing marinas and other boating facilities are not as prevalent in the southern portion of the Sea as in the north and these recreational opportunities would not benefit as much as with the North Lake with Elevation Control.

The South Lake without Elevation Control, ranked third, would not perform as well as the two previously discussed alternatives because the northern basin would be saline and would not support a viable fishery or be attractive for recreational uses. However, the southern portion of the Sea could experience similar recreational benefits as the South Marine Lake with Elevation Control alternative.

The No Marine Lake alternative would not achieve these objectives because the Sea would eventually become hyper-saline and would not support a viable fishery or fish-eating bird populations. There would be little if any incentive to use the Sea for recreational purposes if this alternative is implemented.

Address Air Quality (PM10) Concerns

Restoration Alternative			
South Marine Lake wo Elevation Control	South Marine Lake w Elevation Control	North Marine Lake w Elevation Control	No Marine Lake
3	1	1	3

The South Lake with Elevation Control and North Lake with Elevation Control alternatives both score the highest for this objective. This is due to the ability to distribute saline or brackish water over exposed areas in the north and south basins, respectively. Conveyance canals incorporated into these alternatives would allow for gravity flow of water from the higher elevation marine lake over large areas that would not be inundated by a marine lake. These alternatives also allow the creation of salt crust over the exposed sediments thereby reducing the likelihood of fine-grained sediments being exposed to wind dispersion. This would reduce or eliminate exposed sediments that could provide a source of fine particulate matter and become windborne during high wind conditions. The South Marine Lake without Elevation Control and No Marine Lake both perform poorly against this objective because of the lack of flexibility to disperse water over large areas of exposed Sea sediments. This is due in part to the higher elevation of the exposed sediments relative to the reduced elevation of the Sea for these alternatives making distribution of water over these areas more difficult. For these alternatives, salt water or brine would have to be pumped to higher elevation to provide a mechanism to create salt crusts over the exposed sediments.

Provide High Safety Rating/Low Risk of Failure

Restoration Alternative			
South Marine Lake wo Elevation Control	South Marine Lake w Elevation Control	North Marine Lake w Elevation Control	No Marine Lake
2	3	3	1

The No Marine Lake alternative performs best against this objective because there is no structure that has the potential to fail during a seismic event. The South Marine Lake without Elevation Control alternative is the next best performing alternative because water elevation in the two basins is maintained at the same level. Consequently, even under catastrophic failure conditions where the barrier is breached, no change to shoreline water elevations would occur. The South Marine Lake with Elevation Control and North Lake with Elevation Control both perform equally for this objective. In the event of catastrophic failure of the impoundment structure, the water behind the barrier would flow into the opposite basin until equilibrium is reached. If recreational users or others are in the vicinity of the basin being inundated they could become flooded by the flow of water emanating from the upstream basin. Thus, even though there is a low risk of failure of the impoundment structure for these alternatives, the potential outcome is such that these alternatives score last compared to the other two.

Overcome Institutional Barriers/Public Acceptance

3	2	1	4

The North Lake with Elevation Control alternative is ranked first for this objective due to a number of factors that make it superior to the others under consideration. For example, this alternative has the support of many local influential community organizations as well as local government agencies. The local Congressional Representative also has endorsed this concept. Additionally, there are many features of this alternative such as the economic and recreational development potential that provide an added benefit to the local community, thereby increasing the acceptability and support from the community for the alternative. The South Lake with Elevation Control is the next best performing alternative because it includes many of the elements of the North Lake alternative. However, it does not afford the economic and recreational benefits in the northern portion of the Sea where these benefits would likely be more advantageous to economic growth. The South Marine Lake without Elevation Control is the next best performing alternative and has similar characteristics compared to the South Lake with Elevation Control except that the northern basin is a hyper-saline lake that would not afford much if any benefit for economic or recreational purposes. The No Marine Lake alternative is the worst performing alternative because it results in a large hyper-saline lake with little if any ecologic, economic, or recreational potential. It is highly unlikely that the local community, regional, state, or federal agencies would support this alternative.

Reasonable Cost/High Probability of Financing

Restoration Alternative			
South Marine Lake wo Elevation Control	South Marine Lake w Elevation Control	North Marine Lake w Elevation Control	No Marine Lake
3	4	2	1

The No Marine Lake has the lowest cost to construct and maintain of the four alternatives under consideration. Although the North Lake with Elevation Control alternative is the most costly to build and maintain, there is a higher likelihood of this alternative being financed due to the significantly greater benefits that would occur. Government and private financing would be more likely for this alternative because there is a higher degree of public support and the potential for economic development greater than for the other alternatives under consideration. In addition, the Authority is investigating creating an Infrastructure Finance District or similar means to generate tax revenue to assist with financing of the project. The South Marine Lake without Elevation Control is the next best ranked alternative because of the slightly lower cost involved in constructing and maintaining the Sea. However, the economic benefits are lower and consequently financing likelihood lower as well. The South Lake with Elevation Control alternative is the least likely to receive favorable financing because the cost to build and maintain it would be similar to the North Lake alternative but with significantly fewer economic benefits.

5.3 Evaluation Summary

The ranking of restoration alternatives carried out in this study is summarized in Table 5-1. Table 5-1 also shows: (1) an average ranking score calculated by taking a simple average of the rank values for each of the objectives; (2) the number of top rankings; (3) the number of lowest rankings; and (4) the overall average ranking based on the three previous statistics. Figure 5-3 illustrates the number of highest rankings for each alternative. Figure 5-4 illustrates the number of lowest rankings for each alternative. Figure 5-5 illustrates the overall ranking of the three alternatives.

Based on the data presented here, the North Lake with Elevation Control alternative received the top ranking and is recommended for consideration as the preferred restoration strategy for the Salton Sea.

Table 5-1. Evaluation of Restoration Options

Objectives	Restoration Alternative			
Project Objectives Used in this Report	South Marine Lake wo Elevation Control	South Marine Lake w Elevation Control	North Marine Lake w Elevation Control	No Marine Lake
Preserve Sea as Repository for Agricultural Runoff	1	1	1	1
Provide Large Marine Lake with Stable Elevation	3	1	2	4
Improve Water Quality: Salinity	1	1	1	4
Improve Water Quality: Nutrients/Other Constituents	2	2	1	4
Maintain and Improve Habitat	3	2	1	4
Time to Achieve Water Quality and Habitat Objectives	3	1	2	4
Respond to Inflow Changes	2	4	3	1
Increase Recreational and Economic Potential	3	2	1	4
Address Air Quality (PM_{10}) Concerns	3	1	1	3
Provide High Safety Rating/Low Risk of Failure	2	3	3	1
Overcome Institutional Barriers/Public Acceptance	3	2	1	4
Reasonable Cost/High Probability of Financing	3	4	2	1
Average Score	2.4	2.0	1.6	2.9
Number of Top Rankings	2	5	7	4
Number of Lowest Rankings	1	3	1	8
Overall Ranking	3	2	1	4

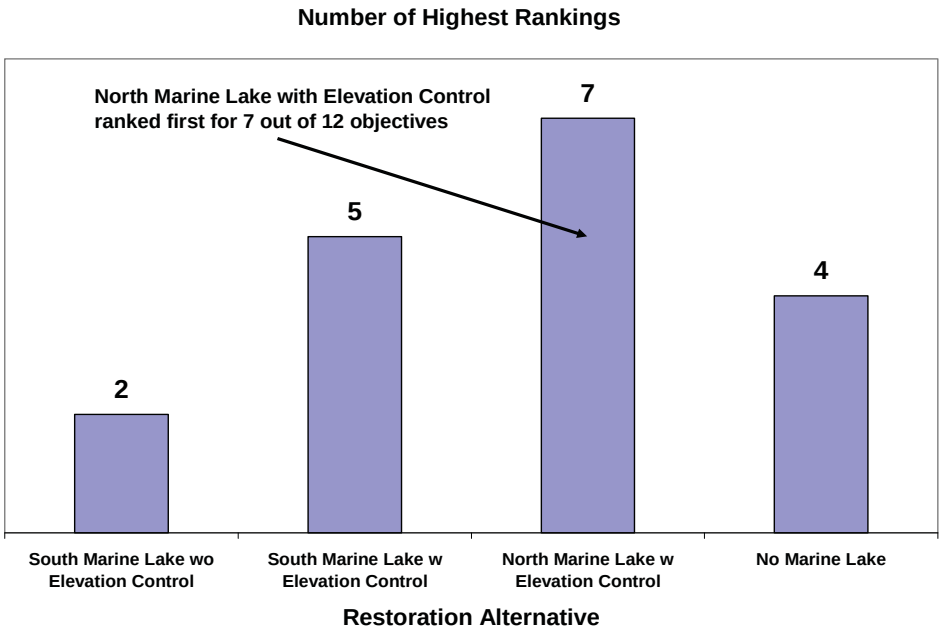

Figure 5-3. Number of Highest Rankings for Each Alternative.

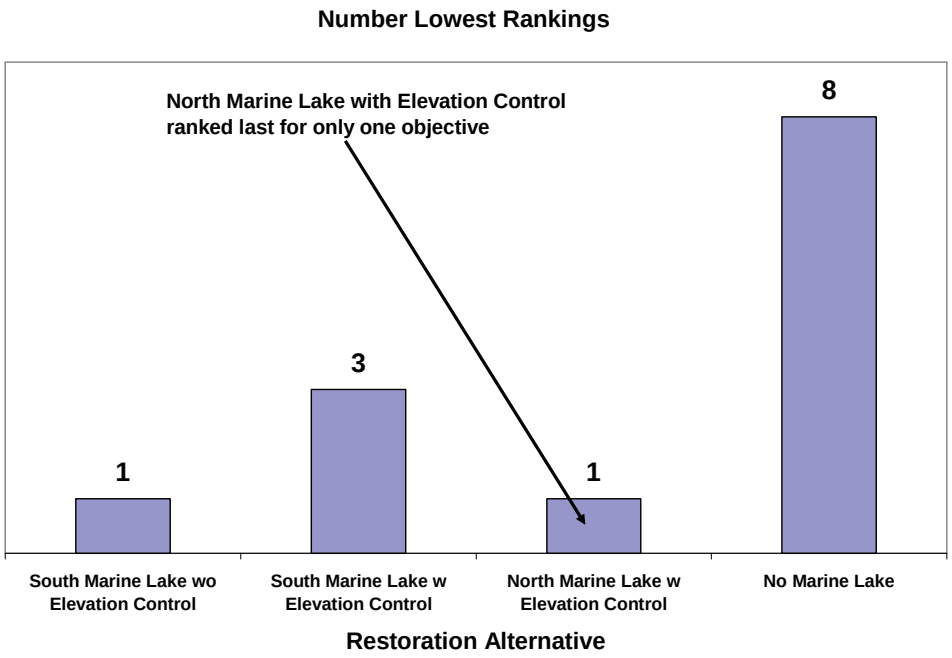

Figure 5-4. Number of Lowest Rankings for Each Alternative.

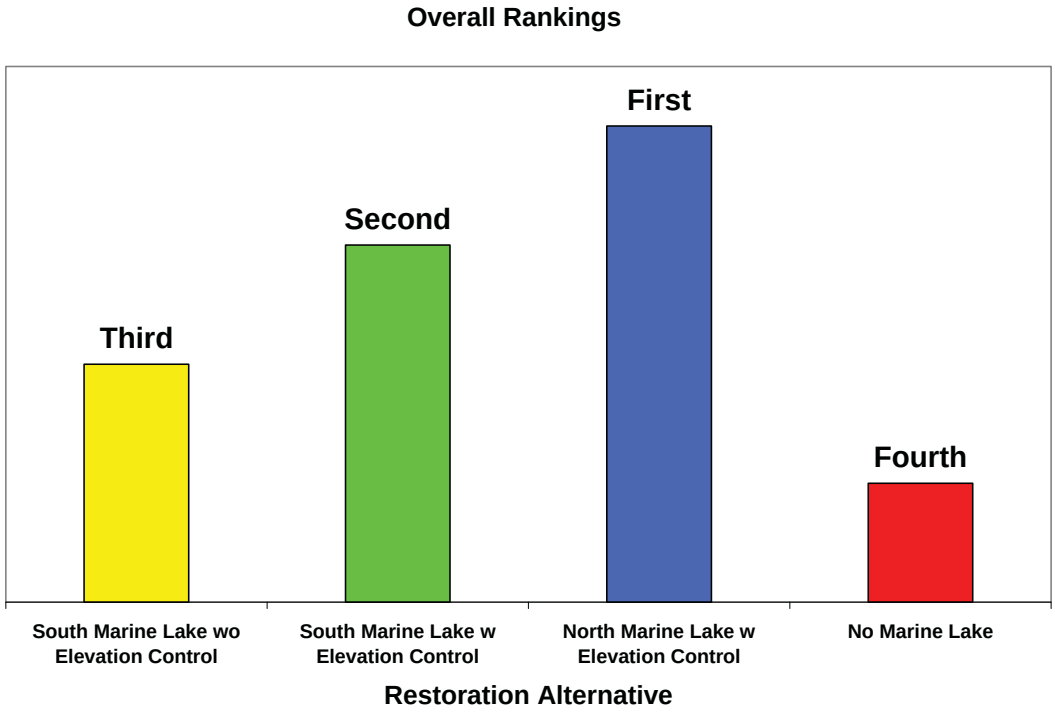

Figure 5-5. Overall Ranking of Alternatives.

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Chapter 6: PREFERRED PROJECT: A VISION FOR THE FUTURE

Starting with the north lake concept and adding other features, a preferred project emerges that has the potential to create outstanding opportunities for the Imperial and Coachella valleys. This vision of the future combines a healthier and more stable marine lake that has lower salinity with a variety of ecological and recreational features. It also includes measures to mitigate potential air quality degradation that may be associated with sediments exposed by declining lake levels that result from decreases in inflow.

The concept is illustrated in Figure 6-1. Features of the plan, preliminary cost estimates, lake elevations, performance, phasing of the project, and implementation of the plan are discussed in this chapter.

6.1 Features

Features of the preferred project concept are discussed below.

The Main Lake

The main lake (Figure 6-2) would be a marine lake with ocean-like salinity with an area of about 85,000 to 95,000 acres. It would be California's second largest lake, behind Lake Tahoe. It would be capable of supporting a marine sport fishery that would also provide a food source for the millions of fish eating birds that use the Salton Sea as a stopover point along the Pacific Flyway. The main lake could be controlled at an elevation lower than the current elevation which would help reduce the cost of the mid-Sea causeway. Access to communities would be provided by dredging channels to local communities which would also create islands and peninsulas that would have new recreation and development opportunities.

Habitat and Recreational Features

Figure 6-1 illustrates the wide range of habitat and recreational features that could be included as part of the vision of the future for the Salton Sea ecosystem. The features of the preferred project are conceptual. Some features have been developed in more detail, such as the central causeway/retention structure. Conceptual designs for the causeway are provided in URS (2004). Many other features, such as fresh water recreational lakes and wetlands, were reviewed by an Outdoor Recreation Advisory Task Force.

The Recreational Task Force included representatives of recreational groups, cities and other organizations, primarily from the north end of the Imperial Valley. Task Force recommendations are provided in Appendix D to this report.

Access to Deep-Water Fishery

In order to provide recreational opportunities with a smaller marine lake, access to the Sea would need to be maintained. If the elevation of the marine lake would be lower than the current Sea elevation, access could be provided by dredging to the existing seaside communities. Although not recommended, if the lake elevation is decreased significantly, dredging channels through the Sea-bottom areas exposed by lower lake levels could also create islands and peninsulas that would have additional recreational value. Access would also be enhanced by rehabilitation or expansion of existing marinas or creation of new marinas. Dredging could also create and enhance perimeter development and also could create development opportunities on Torres Martinez land (Figure 6-3).

Figure 6-2. Artistic Rendering of Lake Overlook Scenic Point.

Figure 6-1. Preferred Alternative Concept Plan for the Salton Sea Area.

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Figure 6-3. Artistic Rendering Peninsula/Resort Concept.

Water Quality

A number of measures would be undertaken to address water quality concerns to ensure that water quality in the main lake is significantly improved over current conditions. These measures are as follows:

- **Created wetlands and sedimentation basins**—Created wetlands and sedimentation basins would be installed to help remove fine sediments and nutrients from the waters that flow into the main lake (Figure 6-4). Locations of wetland habitats and sedimentation basins include areas along the New and Alamo rivers, extensions of those rivers that may be associated with the creation of a smaller marine lake, and areas near the mouth of the Whitewater River. In addition to having benefits for water quality, created wetland areas would provide a variety of habitats for birds as well as recreational opportunities for hunting, bird watching, and possibly fishing. Wetlands could also be designed to preserve snag habitat used by wildlife in the northern and other portions of the Sea.

  Reducing eutrophic conditions of the Salton Sea by reducing nutrients flowing into the Sea is a central project objective. Wetlands have been built through the efforts of the Citizen Congressional Task Force on the New River in the New and Alamo river drainages to, in part, improve water quality. They improve the

turbidity of the water and its nutrient load. While improving turbidity is not the direct objective, reducing suspended sediments in the water column reduces the phosphorous and potential contaminants that are absorbed to those sediment particles.

There continues to be some debate about the value of wetlands along the New and Alamo rivers. Some scientists have expressed concerns that while wetlands do improve water quality downstream, contaminants, such as selenium could become trapped in the wetlands and create biological problems for resident and migratory birds. Limited data is available at this time to indicate that the wetlands are contaminant traps and more study is underway and necessary. Sedimentation basins and wetlands would need to be designed carefully to minimize contact between wildlife and selenium and other constituents.

The Authority has sponsored pilot projects to test other mechanisms to reduce nutrients flowing into the Sea, including use of biological processes upstream (concentrated ponds of algae and fish) and is in the process of evaluating chemical treatment through polyacrlymides (PAMs). These biological and chemical treatments do show early signs of promise. Notably, some farmers are

Figure 6-4. Pilot Wetland Project.

already utilizing PAMs to reduce sediments flowing in their tail water. As the Regional Water Quality Control Board recently noted (memo to Tom Kirk from Doug Wylie, March 23, 2004), total suspended solids (TSS) concentration in the Alamo River last year was 280 mg/L, significantly less than the 1980-2000 average concentration of 377 mg/L. As Mr. Wylie notes, this implies some success by farmers in the Imperial Valley in implementing agricultural management practices.

The Wylie memo indicates that the current wetlands along the New and Alamo rivers reduce total suspended solids by 93 percent from the waters flowing through the wetlands. Using the first two years of data for the New River Wetlands project referenced in the Wylie memo, the wetlands have a 40-50% total phosphorous efficiency. It is expected that this phosphorous efficiency will decrease as the wetlands are fully established due to the saturation of nutrient uptake by the vegetation. In addition, nutrient removal is less efficient as nutrient loads are decreased upstream.

A new wastewater treatment plant in Mexicali is expected to remove about 10% of total phosphorous from the loading to the Salton Sea when fully operational, according to the EPA (2003). Additionally, extending the rivers another approximately 21 miles each in the proposed plan will likely slow water velocities, dropping out additional solids along the way.

Total Maximum Daily Load Program (TMDL)—As mentioned briefly in Chapter 2, the TMDL program is being implemented by the Regional Water Quality Control Board to provide a long-term reduction in key constituents in waters that flow into the Sea. Congress, through the Clean Water Act (CWA), established the legal requirement that states list and rank impaired waterbodies, and that TMDLs be established for constituents that are causing impairment, in accordance with the priority ranking. The Salton Sea watershed has been identified as a priority watershed for the TMDL program.

The Colorado River Basin Regional Water Quality Control Board (RWQCB) in California is currently in the process of establishing TMDLs for these waters. The long-term goal of the TMDL process is to improve the quality of water flowing into the Sea. The sediment/silt TMDLs are now in-place for the New and Alamo rivers and will soon be implemented for some of the agricultural drains. Implementation of the Alamo River and New River silt TMDLs is expected to reduce total suspended solids to 200 mg/L in both rivers by 2015.

The process for implementing TMDLs for nutrients is nearly complete. While sedimentation basins and improvements in Mexico could reduce phosphorous loads to the Sea, opportunities for additional wetlands could reduce nutrient loading even more. Steps are underway to design a nutrient TMDL by the Regional Water Quality Control Board. Implementation of such a TMDL would

further reduce nutrient inputs to the system, but no estimates are available yet as to its likely effect on the Sea.

Figure 6-5. Fresh Water Lake Concept—Lake Red Hill.

Smaller Recreational Lakes

Smaller recreational lakes could include a fresh/brackish water lake near Red Hill Marina (Figure 6-5) that could provide recreational opportunities for boating and water skiing in Imperial County. In addition, other lakes could include one near Red Hill Marina. During the transition period prior to closure of the north marine lake, these smaller lakes could possibly be operated as salt water lakes with managed salinity to act as fish refugios to sustain the marine fish breeding stock until the north lake salinity targets are achieved.

The Causeway

The causeway would be between 7 and 8.5 miles long depending on the elevation of the main lake. It would offer a convenient and time saving means to travel from one side of the Sea to the other, and could also offer shoreline access for people, fishing opportunities, and habitat for fish and birds.

Shallow Brackish and Salt Water Habitat Reclamation

Figure 6-6. Artistic Rendering Shallow Habitat Area.

The creation of shallow salt-water habitat would need to be an integral component of a successful comprehensive restoration strategy due to the ability of the habitat to address multiple issues. Creation of shallow water habitat would allow for reclamation of flooded areas of the Sony Bono Wildlife Refuge, providing more than twice the area of shallow water habitat than is currently present at the Sea (Figure 6-6). As a result of reduced inflow to the Sea and the corresponding reduction in size of the Sea, less shallow water habitat would be available to many of the bird species that use the Sea either seasonally or as

permanent residents. Development of shallow water habitat would provide the important habitat necessary for these bird species.

In addition to habitat benefits, the development of shallow water areas has the potential to mitigate air quality impacts as discussed in the following paragraphs. It is proposed to begin by constructing about 2,000 acres of shallow habitat as an initial phase, and then add more as the lake level in the south basin recedes. The area between the existing shoreline and the one foot depth contour is currently just over 2,000 acres for the entire Sea.

Air Quality/Dust Control Mitigation

The legislation authorizing water transfers under the QSA requires mitigation for air quality impacts at the Sea that would be caused by reduced inflows that result from the transfer. Regardless of the funding source, it is important that air quality be addressed as part of an overall restoration strategy. Some measures that could be undertaken to address air quality concerns of the Salton Sea area as part of an integrated and comprehensive restoration strategy are as follows:

- **Shallow water habitat areas**—As mentioned above, creating shallow water habitat areas would have the added benefit of dust suppression. The development of shallow water habitat has the potential to mitigate some air quality impacts through the spreading and coverage of exposed sediments with shallow water habitat cells or ponds. This would reduce wind fetches and provide wetted areas to saltation of blowing dust particles.

- **Salt crusts**—In addition to dust suppression associated with the shallow water wetted areas, as salt water would be moved through a series of the shallow water ponds, salts would tend to concentrate in the water from solar evaporation. Ultimately, concentrated brine would be discharged from the shallow water habitat areas and the brine could then be used to create salt crusts in areas that would be particularly susceptible to wind erosion. Salt crusts would cover fine sediments that otherwise would be exposed to erosion.

- **Salt tolerant vegetation**—Another feature that could be associated with shallow water areas would be the presence of salt tolerant vegetation. Vegetation would probably need to be included with the overall dust suppression plan.

Geothermal Expansion

It is widely recognized that areas of known geothermal resource potential are located at the southern end of the Salton Sea that are currently inundated. With a receding Sea exposing these areas in conjunction with a restoration plan that would allow further access to these areas, a significant potential to exploit these resources would occur (Figure 6-7). Exposing a large geothermal anomaly would allow for a 1,400

MW expansion opportunity, that could triple the existing and planned capacity of existing geothermal operations.

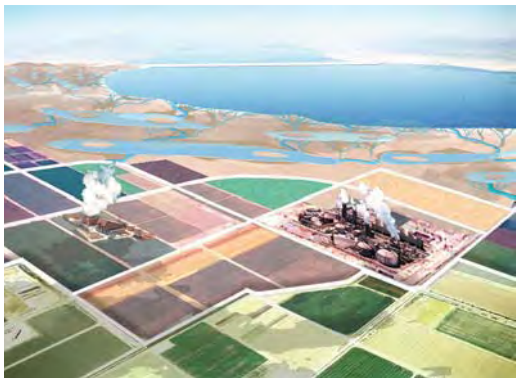


Figure 6-7. Rendering of Geothermal Expansion Area.

Other Economic and Recreational Opportunities

Other opportunities would include the possibility of reclaiming farmland that is now flooded; wide ranging hunting, bird watching, hiking, and water contact opportunities; marina and housing development; and off-road vehicle use areas. It could also facilitate additional water transfers through desalting of inflows or other reuse or conservation measures. As the Sea recedes, previously inundated farmland could be reclaimed and used for agricultural production. The most likely area for this to occur would be in the south adjacent to existing farmland due to economies of scale and because agricultural infrastructure is already in place on adjacent land.

Other Recreation and Public Information Opportunities

The recreational enhancements program should provide for improvements to recreational facilities around the Sea. Specific improvements would be designed to meet future needs, but may include a visitor center, improvements to access areas or creation of new access points associated with these facilities, upgrades to public use areas, and public outreach material. Other recreational facilities such as golf courses could be encouraged through land use planning and zoning designations for areas surrounding the Sea. Hunting and fishing opportunities could also be incorporated into a restoration plan that takes advantage of the new configuration of the Sea.

Wildlife Disease Control

A comprehensive restoration strategy should include an integrated approach to wildlife disease control to reduce the incidences of wildlife disease at the Sea. Avian disease at the Salton Sea has been a chronic problem resulting in an annual loss of several thousand birds. Major epizootics (quickly spreading disease among animals) increased in frequency during the 1990s, which greatly increased the level of losses. During 1992, more than 150,000 eared grebes (*Podiceps nigricollis*) died during a single event of undetermined origin. The deaths of thousands of white pelicans (*Pelecanus erythrorhynchos*) and more than 1,000 endangered California brown pelicans (*P. occidentalis*) during 1996 from type C avian botulism focused national attention on the Salton Sea. That event served as a catalyst to begin the current Salton Sea Restoration Project.

Other diseases affecting birds of this ecosystem are avian cholera, Newcastle disease, and salmonellosis. Algal toxins are a suspected, but unproven cause of grebe mortality. Outbreaks of avian cholera affect a wide variety of bird species and have become annual events, causing the greatest losses in waterfowl, eared grebes, and gulls. Newcastle disease devastated the Mullet Island double-crested cormorant (*Phalacrocrax auritus*) breeding colony at least twice during the 1990s. Salmonellosis has been primarily a cause of mortality in breeding colonies of egrets. Several other diseases have also been diagnosed as contributing to avian mortality at the Salton Sea.

The U.S. Fish and Wildlife Service (FWS), with support from the California Department of Fish and Game, have conducted an on-going program to combat disease at the Salton Sea by providing response to bird die-offs. An initiative of the Salton Sea Restoration Project in the early 2000s to augment FWS surveillance efforts enhanced the early detection of disease, and was another successful first step in minimizing losses. The existing efforts and activities are important steps to address disease impacts and should be continued and enhanced. Major bird mortality events have essentially not occurred in the past several years

An enhanced approach that provides a continual interface between environmental monitoring, disease surveillance and response, and scientific investigations of disease ecology would be the next step. Expanded wildlife rehabilitation would also be provided because the avian botulism problem continues to affect pelicans at the Salton Sea. Therefore, the goal for the long-term disease control effort would be to provide an integrated approach to controlling wildlife disease (including fish and birds) at the Salton Sea in a manner that enhances opportunities for wildlife managers to minimize disease events and associated losses. This approach would include programs to monitor environmental conditions; detect, diagnose, and respond to disease events; collect and rehabilitate afflicted wildlife; and further development of a sound understanding of disease ecology at the Sea.

Salt Pond

The salt pond would occupy about 60,000 acres and would provide for storage salt for at least 300 years to preserve the function of the Sea as repository for agricultural runoff.

6.2 Preliminary Cost Assessment

A preliminary cost assessment has been prepared for the preferred restoration project. An important component of the overall cost of the plan would be the central impoundment structure. Various conceptual designs have been considered for this structure. These concepts along with cost estimates for each are described in URS (2004). Appendix B provides supporting information for an overall preliminary

cost estimate for the preferred project including costs for the central retention structure obtained from URS (2004) and other features of the project. A cost summary for the total project is provided in Table 6-1. The table includes cost estimates for two possible designs for the impoundment structure and two possible design elevations for the water surface of the marine lake. Lowering the design elevation would lower the cost of the impoundment structure.

Each of the features included in the cost estimate are discussed briefly below:

Impoundment Structure/Causeway— A working group of 15 civil and geotechnical engineers was convened to review the feasibility of constructing a dike, or retention structure/causeway anywhere within the Salton Sea. The group reviewed data from the recent geotechnical investigation of the Sea and suggested alternative design concepts. Cost estimates were developed based on the concepts identified by this group. Cost estimates are very preliminary at this point, and, as of this writing, have not yet undergone review by the work group.

Of the concepts proposed by the work group, the most cost effective structure appears to be a blanketed rockfill design. This concept would consist of an embankment built in the water and entirely out of rock fills. To mitigate seepage through the dam, a blanket of fine material would need to be placed on the upstream slope. Conventionally, this is usually an asphalt or concrete pavement. However, the Sea level would preclude those for this concept. The upstream blanket for this concept would consist of depositing fine-grained soils on the upstream slope to "plug" the rockfill. Ten to 25 feet of the weak soils below the embankment would be excavated and replaced with rock fills. This material could be used to provide the blanket. Alternatively, a bentonite slurry wall could be constructed through the dam along its crest to provide a seepage barrier. The slurry wall would add $60 to $70 million to the project. The conceptual design includes inclinations of 4:1 on the upstream slope and 7:1 on the downstream slope. The crest of the dam would be 30 feet wide and provide for 5 feet of freeboard above the lake. This concept is shown in Figure 6-8.

Lower marine lake levels would require less embankment volume for the impoundment structure, and would cost less. Table 6-1 presents the estimated costs for the Blanketed Rockfill structure for lake elevations of –235 and –240 feet msl. This evaluation indicates that the mid-Sea dam would cost about $100 million less with a 5 foot drop in lake level below -235 feet msl. Conversely, if the structure were designed to maintain the current water elevation, the cost estimates would go up by about $150 million.

Appurtenant Structures—The cost of appurtenances such as spillways and other outlet structures, and the channels leading to the shallow water habitat areas have been factored in as five percent of the impoundment structure.

Table 6-1. Preliminary Cost Estimate for Preferred Alternative Concept

Item	Cost ($M) at El=-235' msl		Cost ($M) at El=-240' msl	
Initial Construction Costs	Blanketed Rockfill	Rockfill w Slurry Wall	Blanketed Rockfill	Rockfill w Slurry Wall
Mid-Sea Retention Structure/Causeway	$ 418	$ 489	$ 354	$ 418
Appurtenant Structures (Spillways, etc.)	21	24	18	21
Dredging to Communities & Island Creation	6	6	20	20
Greenbelt Channels to North Lake (Incl. 20 sed. basins, 2,500 ac wetland, 20% planted)	76	76	66	66
Recreational Lake (approx. 1,000 ac)	45	45	45	45
Torres Martinez Wetlands/Habitat	20	20	20	20
Upstream Wetlands (Top 5 sites, 1376 ac)	58	58	58	58
Shallow Water Habitat Initial Phase (2,000 ac)	8	8	8	8
Total Construction Costs (rounded)	**$ 650**	**$ 730**	**$ 590**	**$ 660**
Annual Costs	**Cost ($M/yr)**		**Cost ($M/yr)**	
Causeway, Channel & Appurtenance O&M	$ 5.1	$ 5.9	$ 4.4	$ 5.0
Add Shallow Habitat (500-1,000 ac/yr)	3.0	3.0	3.0	3.0
Habitat O&M	2.0	2.0	2.0	2.0
Total Annual O&M ($M/yr)	**$ 10.1**	**$ 10.9**	**$ 9.4**	**$ 10.0**
Present Value of Annual Costs ($M) - based on 30 yrs	$ 150	$ 160	$ 140	$ 140
Total Present Value Cost ($M)	**$ 800**	**$ 890**	**$ 730**	**$ 800**

Note: Does not include costs for development of recreational facilities, new highways, or new lakeside development.

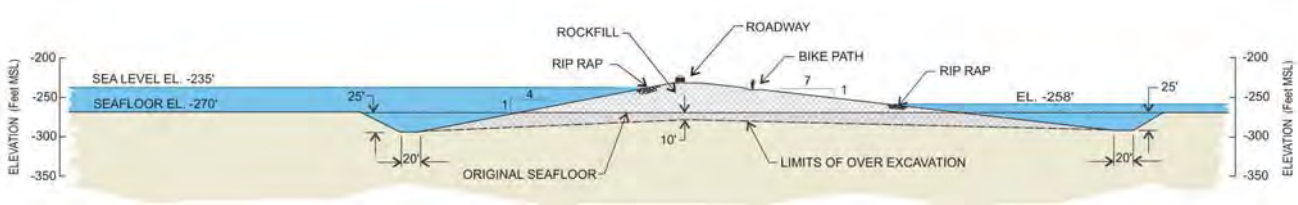


Figure 6-8. Typical Blanketed Rockfill Impoundment Structure Cross Section.

Dredging to Communities and Island Creation—With lowered lake levels, existing Sea-side communities would be at some distance from the Sea. Dredging is proposed to restore access to the Sea for these communities. Dredging could also create islands and peninsulas that would provide recreational and habitat value as well as create opportunities for development. Dredging cost estimates are based on preliminary estimates of the quantities that would need to be removed for different lake elevation targets. A raw unit cost of $2.90/cubic yard was then applied for dredging along with factors for mobilization, unlisted items, contingencies, and costs such as design and construction oversight.

Greenbelt Channels to the Lakes with Wetlands and Sedimentation Basins— The New and Alamo rivers would need to be extended to reach the north basin marine lake (Figure 6-9). The cost of constructing a wetland greenbelt area around these river extensions has been included along with the cost of constructing 20 sedimentation basins. The Nolte (2002) report commissioned by the Citizens Congressional Task Force to evaluate potential wetland sites that could be developed in the New and Alamo river channels was used as an important source of cost information.

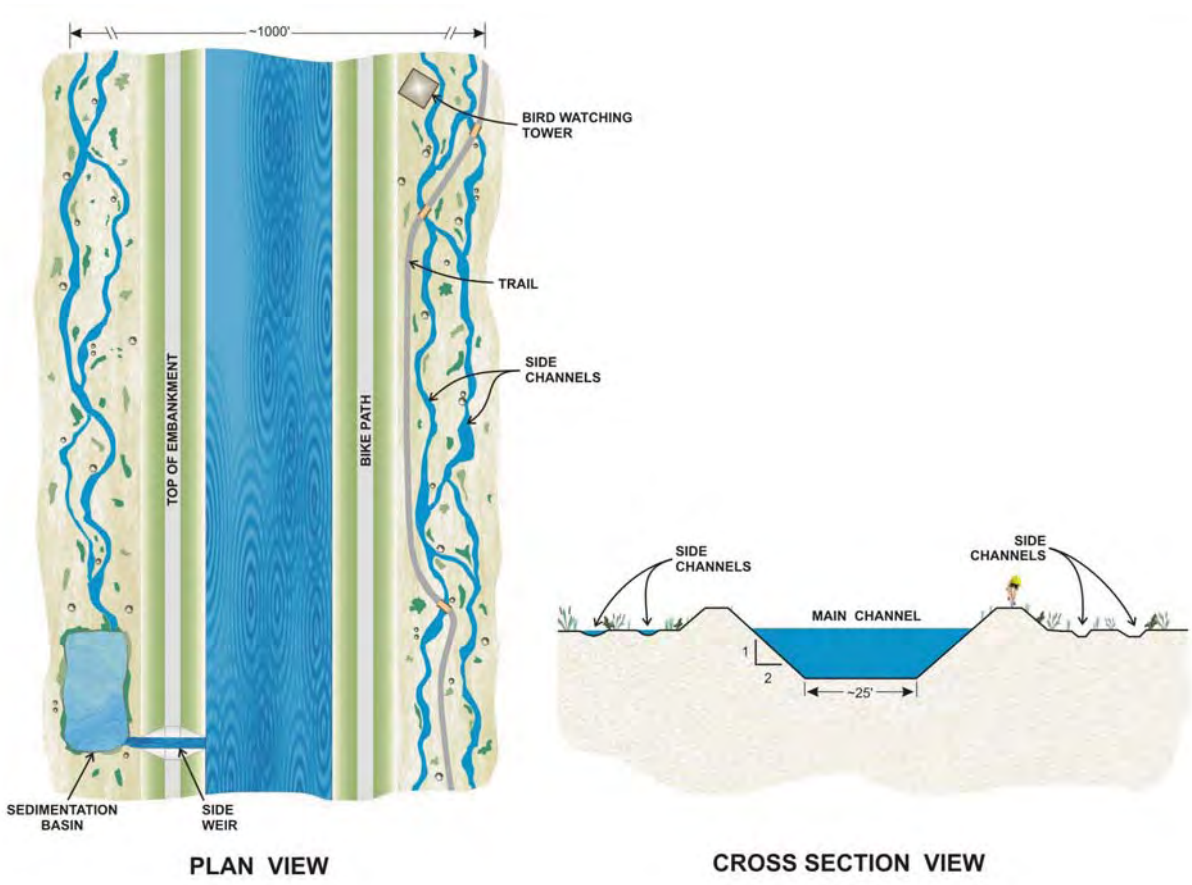


Figure 6-9. Schematic of Greenbelt Channel Extension Concept.

The wetland greenbelt for both channels was estimated at 2,500 acres and it was assumed that vegetation would be planted on 20 percent of this area. It was assumed that over time vegetation would grow to fill the area. The unit cost for vegetation was also taken from Nolte (2002). For purposes of providing costs of a preferred project, wetlands and sedimentation basins were assumed. However, if other biological or chemical treatments are found more effective some amount of wetlands or sedimentation basins could be replaced with such treatments.

Wetlands expansion could be justified on economic, habitat or other purposes. For this report, the projected amount of wetlands and sedimentation basins is a function of the water quality improvement that would accrue to the water bodies envisioned in the current Salton Sea boundaries. The Nolte (2002) report identifies 4,276 acres of potential wetlands for a cost of $182 million. To achieve water quality targets, this report assumes 1,376 acres in the five highest rated sites of those wetlands could be constructed in the first phase of the proposed project.

For sedimentation basins, estimates were derived from the evaluation of plans to desalt the Alamo and/or New Rivers. US Filter, Black & Veatch and others have, in the past, suggested desalting the rivers in the Imperial Valley to provide product water for sale to urban or other communities. To properly operate such desalting plants, river water must be very clear. To reduce turbidity, a rule of thumb is often used that sedimentation basins should have an area of about 10 square feet for every gallon per minute of flow. That translates to a requirement of 110 acres of sedimentation basins to treat a flow of 800,000 acre-feet/year. The base cost for these was taken from the Nolte (2002) report on constructing wetlands on the New and Alamo Rivers, for a typical 5.5 acre sedimentation basin. Constructing 20 5.5 acre sedimentation basins will provide the total 110 acres needed for sedimentation.

Other Features—Preliminary cost estimates have been included for three other features: a 1,000 acre shallow recreational lake, a Torres Martinez wetlands/habitat feature, and an initial phase of shallow water habitat construction.

Operation and Maintenance Costs and Other On-Going Costs—Preliminary estimates have been provided for operation and maintenance of the various features such as the mid-Sea retention structure, appurtenances, and channels. In addition, costs are included for maintenance and for future expansion of shallow water habitat areas. It is anticipated that 500 to 1,000 acres of new shallow salt water habitat could be added each year to full build-out of about 20,000 acres. These areas would provide habitat for birds as well as help with dust suppression.

6.3 Program Financing

As noted in Section 6.2, the total project capital costs are projected to be between $590 and $730 million. Several potential funding sources are discussed in this section, some of which the Authority might wish to pursue. A more detailed cost

analysis and financing plan will be possible following final design decisions and completion of all environmental compliance requirements.

Proposition 50—Proposition 50 funds could be used to jump start restoration in the near term. California's legislature, through SB 654 (Machado), provides $50 million to assist in implementation of the Salton Sea preferred project. $20 million of that funding has been separately allocated to the State's new 3-year study of the Sea via a programmatic environmental impact report.

Should study funding instead be directed at a "project" level, construction could occur much sooner than the State's current stated intentions. In addition, much of this funding could be allocated for actual improvements related to Phase 1 construction activities (see Section 6.5), such as expansion of freshwater wetlands and creation of sedimentation basins, and process costs be kept to a minimum (e.g. $2 million).

California's Salton Sea Restoration Fund—The largest current committed funding source is related to the agreements to transfer water from the Imperial Valley to urban and other communities known as the QSA. The QSA and related legislation (SB 277, SB 317, SB 654) provide for $30 million to be contributed to a restoration fund by water transfer parties. The biggest QSA contribution to the restoration fund comes from the potential sale of mitigation water.

Under the terms of the QSA, potential impacts from water transfers to the Salton Sea are mitigated/addressed by sustaining inflows to the Sea for the first 15 years of the water transfer. However, if a restoration plan, such as the one proposed in this report, is found to not require the mitigation water, the water could be sold to urban water districts to generate approximately $200 million.

Additionally, $60 million could be generated for the restoration fund from the purchase and re-sale of additional water from the Imperial Irrigation District. Metropolitan Water District will also contribute to the restoration fund for all special surplus water received by MWD from the Colorado River. The total QSA-related contribution to restoration funding could reach $300 million.

Most of the $300 million QSA-related contribution to restoration funding involves, in many ways, accelerating the water transfers to the coast. The proposed project facilitates such an acceleration. In fact, the proposed project benefits from the acceleration due to the reduced time to achieve the target elevation as well as any money generated for the restoration fund from the acceleration.

Interestingly, water transfers could be accelerated beyond that contemplated in the QSA to provide more water supply to urban communities during the initial ten to fifteen year period and, if designed similar to the above arrangements, could provide additional funding for Salton Sea restoration. However, the Imperial Irrigation District would need to be consulted in depth to determine the capability to accelerate

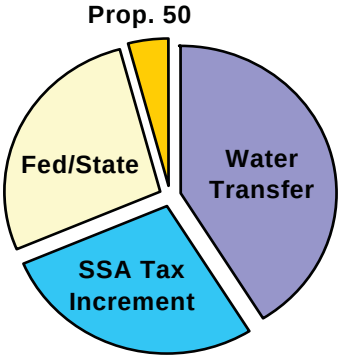
efficiency improvements or other water savings beyond that contemplated in the QSA.

Local Tax Increment—With restoration of the Sea, it is expected that property values will increase. As a result, property tax revenues will also increase. Redevelopment project areas and infrastructure finance districts allow government to capture the new or "incremental" increased revenues to support capital projects without increasing the tax rate. This makes particularly good sense at the Sea given the direct link between the project, restoration of the Sea, and property value/tax revenue increases.

About five years ago, the Authority's Economic Development Task Force identified tax increment financing as a potential financial tool for the Authority. The Authority sponsored legislation that was authored by Senator Dave Kelley to allow the Authority to establish an Infrastructure Finance District around the Sea. The Authority commissioned a study by Rosenow Spevacek Group to conduct a tax increment financing feasibility study. The study indicated that several hundred million dollars could be generated through a tax increment district around the Sea. And that the revenue projects could significantly increase with an expansion of the Authority's boundaries.

Early in 2004, the Authority significantly increased its boundaries to increase the revenue potential. For purposes of this conceptual financing plan, we have conservatively estimated that $200 million, present value, could be generated for the project.

Federal Funding/State Bond Financing—Of the projected $730 million capital cost of the preferred project, approximately $500 million, or over 70%, could be generated within the region. Any remaining necessary funding could be provided by Federal appropriations and/or State bond financing. Such funding could be equal to the local, tax increment funding, or about $200 million.



Federal and State of funding is certainly a political challenge, particularly in an era of federal and state budget deficits and financial challenges. However, increasing broad based support for restoration, evidenced by the formation of the Salton Sea Coalition and recent state legislation is an encouraging sign. The availability of regional matching funding, the $500 million, also improves prospects for federal or state matching funds. In the past year, while to-date unsuccessful, federal and state legislators have floated various bond and authorization packages for restoration ranging from $300 million to $1 billion.

Total operations and maintenance costs of the project are projected to be less than $9 million annually, but must be addressed. Changes in the State's government code which allows the Authority to create a tax increment district could allow that funding source to pay for operations and maintenance requirements.

Given the amount of additional habitat created on the Sonny Bono National Wildlife Refuge, additional annual federal funding may be necessary to help manage what will likely be prolific bird habitat.

Access and Use Fees—Other aspects of the project could generate significant annual revenues. Access and use fees at the proposed freshwater lake in the Imperial Valley could defer maintenance costs on that facility (salt cedar control, etc.). If a roadway runs along the causeway, it could be tolled to help fund annual maintenance of the facility. Commercial leases of the facility and/or land sales of public land could also be used to support the capital or ongoing costs of the project.

6.4 Performance

The performance of the north marine lake has been evaluated by Reclamation using the Salton Sea Accounting Model (Appendix C). The salinity projections for two inflow scenarios are shown in Figure 6-10 and 6-11. Figure 6-10 provide salinity projections for the north lake with QSA inflows with mitigation water ending in 2006 for three possible lake level design elevations: -230, -235, and -240 feet msl. Figure 6-11 provide salinity projections for the north lake for the 800,000 acre-feet/year inflow scenario, for the same three possible lake level design elevations.

The performance data in Figure 6-10 shows that the lake could reach a salinity target of 35,000 mg/L by 2013 for the -235 feet msl design elevation case, for QSA inflows with mitigation water ending in 2006. For the -240 feet msl design elevation case, it would take an extra 5 years for the salinity to get back under 40,000 mg/L for this inflow scenario, and it would reach the 35,000 mg/L target by about 2020. However, Figure 6-11 shows that for the 800,000 acre-feet/year inflow case, the salinity could reach 35,000 mg/L by about 2016. In either case, the -240 feet msl design elevation project would have higher peak salinity during the transition period than the higher elevation design.

6.5 Target Lake Elevation

A design elevation of around -235 feet msl is recommended for consideration as the target elevation. It would have a number of benefits:

- High enough elevation to allow for gravity flow of salt water to shallow habitat areas and for dust control.
- Minimal dredging for access to communities.

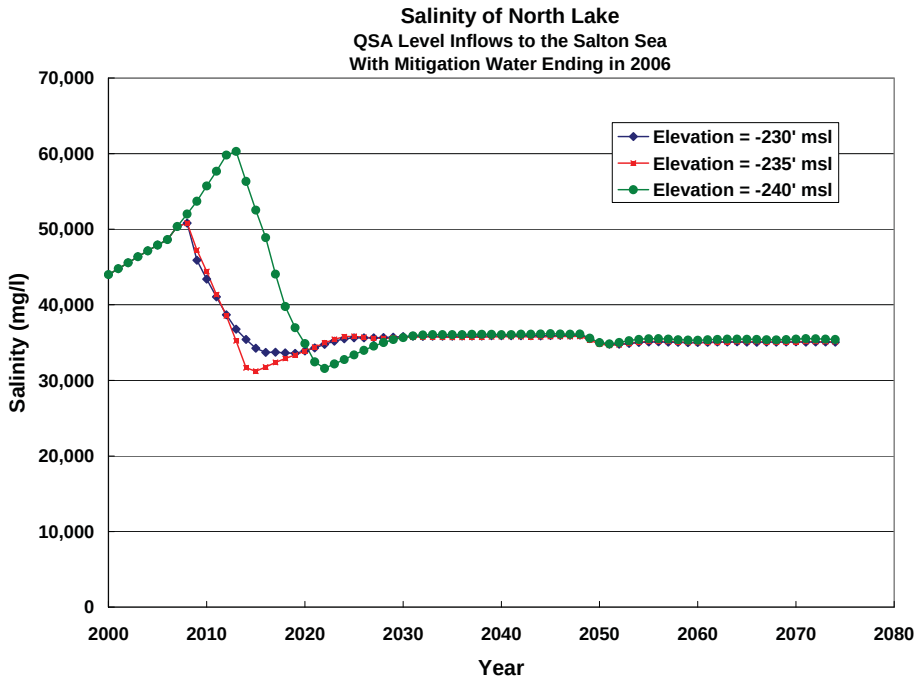


Figure 6-10. Projected Salinity in North Lake for QSA Inflows with Mitigation Water Ending in 2006.

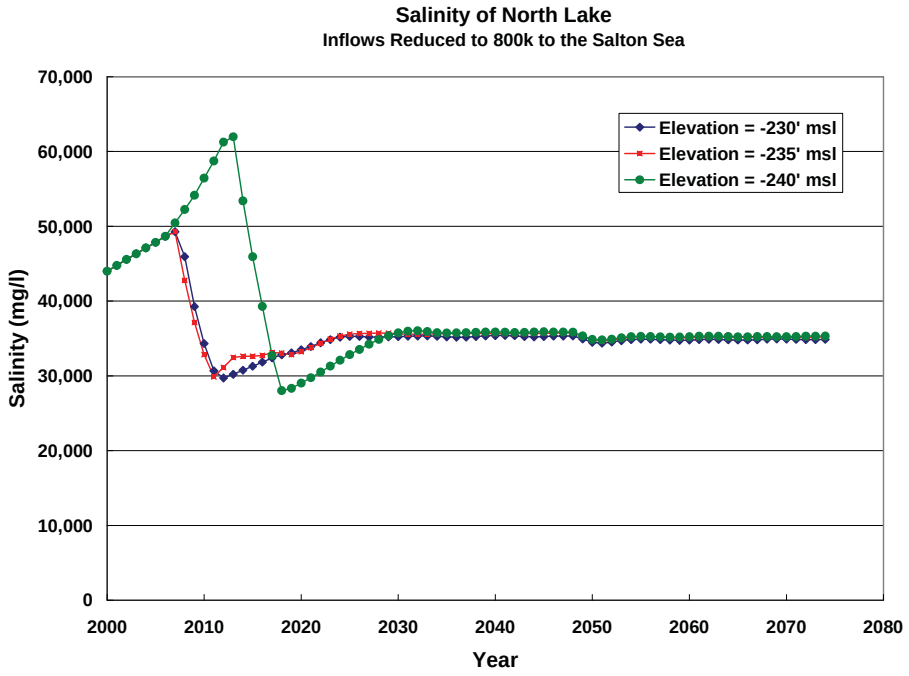


Figure 6-11. Projected Salinity in North Lake for 800,000 Acre-Foot/Year Inflow Scenario.

- Low enough to provide fall for river extensions.
- Minimal salinity spike and short time to target salinity.
- Reasonable cost…at -235 feet msl the cost estimate for the retention structure is about $150 million less than it would be for the current lake elevation.

While elevation -235 feet msl provides a reasonable design target, there are some considerations where -240 feet msl should be considered. If it appears that the construction schedule would need to be extended and the 800,000 acre-feet/year inflow is realistic, then -240 feet msl should be reconsidered as there could be a savings of about $100 million, with other factors being equal.

6.6 Program Phasing

Project phasing will depend on the design elevation of the north marine lake. Significant savings can be achieved in the embankment construction by lowering the lake elevation. In general, reducing the height of an embankment by a factor of two will decrease its cost by a factor of four. Because the lake will respond to inflow reductions gradually over a period of years, the lower the design elevation, the longer it will take to achieve closure of the lake. The north lake cannot be closed until the Sea elevation declines enough to match the desired design elevation. Figure 6-12 illustrates a preliminary phasing plan assuming a design elevation of -235 feet msl.

Phasing of restoration features could be accomplished in the following manner:

1. Installing upstream freshwater wetlands and sedimentation basins coupled with implementing TMDL measures to improve water quality of inflowing could be accomplished as the first step. This step would ensure that once the marine lake is created, the inflows would be of high quality. In addition, it would create recreational opportunities for hunting and bird watching.
2. Dredging of shoreline access areas would begin prior to substantial drops in lake elevation, to begin creating islands and peninsulas.
3. Constructing extensions of the New and Alamo river channels as the lake level begins to recede, in preparation for creating the main marine lake. Additional freshwater and brackish wetlands and sedimentation basins would be created along these channels. Smaller freshwater or brackish lakes and some shallow water habitat areas could also be created concurrently to create additional recreational opportunities and begin dust control measures.
4. Constructing the central causeway to create the main marine lake.
5. Completing the shallow water habitat areas and dust control measures.

Figure 6-12. Proposed Preliminary Phasing Plan.

Table 6-2. Conceptual Implementation Schedule

Timeframe	Construction Phase	Expenditure
2004	Begin Detailed Design	2
2005	Design Continues, Environmental Compliance and Permitting	10
2006	Complete Detailed Design	10
2006	Phase One Construction: Develop Quarry Site, Begin Wetlands and Interim Shallow Water Habitat Construction	20
2007	Phase Two Construction: Begin Extension of Rivers and Causeway	110
2008	Construction Continues	160
2009	Phase Three Construction: Begin Marina Dredging	190
2010	Complete Causeway	148
	Initial Construction Program Complete: Total Expenditures	650
	Begin Operation Phase	**Annual Expenditures ($M/Year)**
2011-2014	Operation and Maintence (O&M)	5.1
2015-	O&M Plus Phased In Shallow Water Habitat	10.1

Based on Blanketed Rockfill Dike at Elevation -235 feet, msl.

6.7 Implementation

A conceptual implementation schedule is provided in Table 6-2 including a preliminary estimate of phasing of expenditures. The funding profile is illustrated in Figure 6-13. Implementation of the project would begin with contracting for detailed design, environmental compliance, and permitting. The detailed design phase would include a second phase of geotechnical investigations, geophysical surveys, seismic stability analysis for the embankment structure, identification of a quarry site, site surveys, detailed construction and operation cost estimates, and preparation of permit applications. For environmental compliance, the Authority could then begin preparation of a site specific Environmental Impact Statement/Environmental Impact Report (EIS/EIR) to analyze the preferred alternative and the other alternatives discussed in Chapter 5. Alternatively, the State could incorporate the preferred project into its CEQA documentation process. The major construction phase is anticipated to be about a four year program.

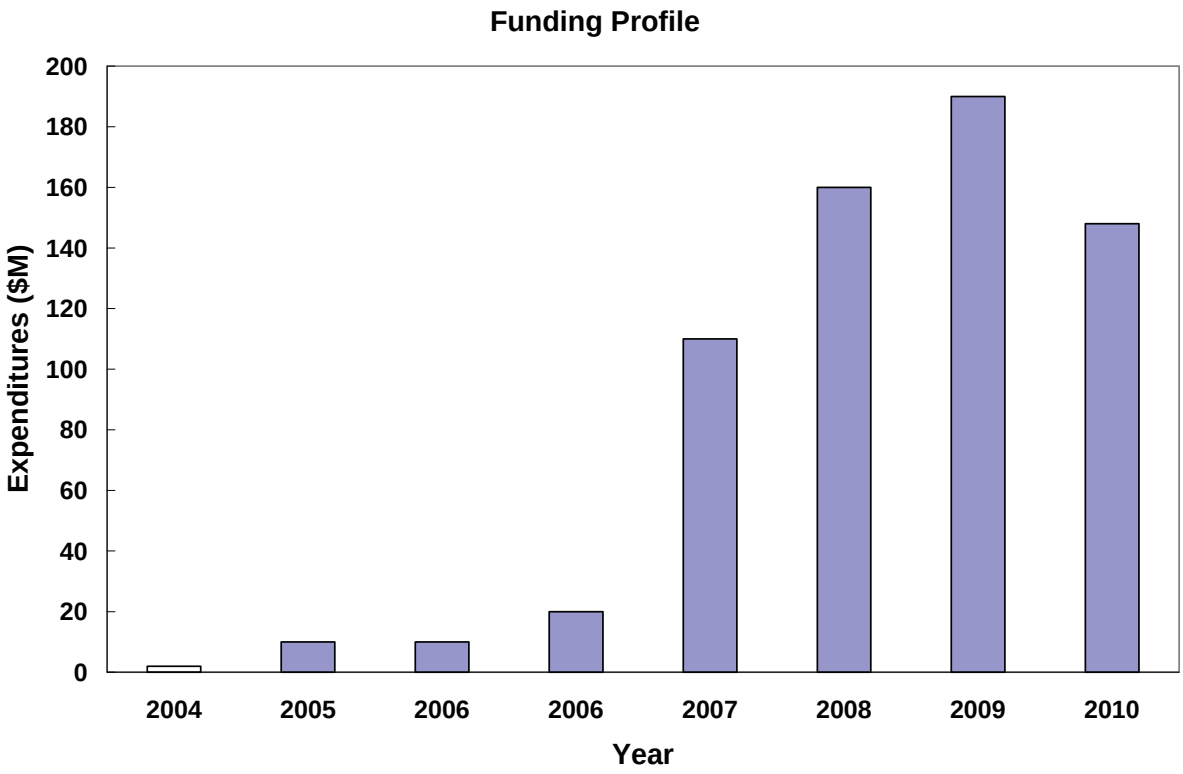


Figure 6-13. Preferred Project Preliminary Funding Profile.

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Appendix A
SHALLOW WATER HABITAT AT THE SALTON SEA

A.1 Overview

A workshop was convened in San Diego, California by the Salton Sea Science Office to address issues associated with the development of shallow habitat at the Salton Sea. As all of the proposed Salton Sea restoration or recovery scenarios include shallow habitat, the physical, chemical, biological, and engineering issues associated with such habitats are important to consider as the alternatives are being evaluated.

The workshop began with a tour of the shallow ponds at the Western Salt facility in Chula Vista, which has recently been acquired for management by the United States Fish and Wildlife Service. Berm structure and salinity profiles, in addition to use of the ponds by various bird species, were examined and discussed.

At the workshop, background information on shallow habitat evaluation associated with the US Filter proposal, data on eutrophication, the results of an environmental risk assessment of the shallow salt ponds of the Salton Sea solar pilot project, and a summary of the sediments of the Salton Sea were presented. Following these presentations, the group divided into three work groups to focus on biology (especially bird species), physical and chemical qualities of shallow habitat, and engineering considerations for construction of the habitat. The participants reported back on the major findings of each group.

The general conclusions can be summarized as follows:

- Shallow habitats should be developed using Salton Sea water rather than water from rivers or drains due to selenium concerns. Shallow water impoundments that begin with water containing more than 2 ppb selenium should be discouraged.

- Shallow habitats should be sited where they take optimum advantage of shallow slopes, of proximity to existing reserves or habitats, and of proximity to agricultural fields, as these siting considerations give the developed habitats their highest value.

- The salinity of the habitats is of minor concern, as any waters between about 30 and 150 parts per thousand total dissolved solids (PPT TDS) will provide foraging value to a variety of birds. If environments including brine at the saturation level for salts are present, however, proximity to lower salinity habitats is important. Salinity targets should be out of the range for avian botulism.

- Selenium is the most important water quality concern, although data on DDE should be carefully considered as well.

- Eutrophication level for shallow habitat areas is not a concern.

- Construction of the shallow habitats could utilize structures developed with low-cost agricultural specifications, subject to site-specific and risk assessment review.

There were no "data gaps" that were suggested as being critical to moving forward with developing a preferred alternative concept. It is now possible to develop conceptual level cost estimates for both the construction and the operation and maintenance (O&M) of shallow water habitat areas. More detailed cost estimates can be developed in concert with the preparation of site-specific habitat restoration plans.

As regards the applicability of shallow habitats to the alternatives under consideration, the results of the workshops suggest that overall, from the point of view of shallow habitat, a preferred alternative would have the following features:

- Construction opportunities at the south areas of the basin, on clay soils with shallow slopes adjacent to existing refuge and reserve lands. This requirement eliminates the South Marine Lake with Elevation Control alternative, but remains feasible with the other scenarios.

- Gravity delivery of water from a restored portion of the Sea, which would be low in selenium and of a salinity about that of ocean water. This requirement would be possible with the alternatives involving a south or north marine lake with elevation control.

- A pumped delivery of water from a restored portion of the Sea, which would be low in selenium and of a salinity about that of ocean water. This would be possible with all scenarios, but more pumping would be required with the barrier and the no barrier alternatives.

A.2 Background

The Salton Sea Science Office (SSS0) conducted a workshop on January 28-29, 2004 in order to evaluate the major considerations associated with the development of

shallow water habitat at the Salton Sea. Experts in water quality, biology, and engineering who possess special expertise in saline conditions were invited to participate in this workshop. The goal of the workshop was to engage in discussion about the issues surrounding the creation of shallow water habitat at the Salton Sea, and to develop some recommendations for the restoration planning team that are based in sound science and pertinent experience. This paper reports on the findings of that workshop.

With inflows to the Salton Sea expected to decrease substantially in the future, there would be a considerable expanse of shoreline exposed by the retreating Sea. These exposed sediments could create significant air quality problems if they prove to be emissive of PM_{10} (particles smaller than 10 microns) during wind events. Furthermore, the retreating Sea will provide for less shallow water habitat than is currently present in the basin. Shallow water habitat is important for many of the bird species that use the Salton Sea either seasonally or as permanent residents. Development of new shallow water habitat, then, is a proposal that accompanies all of the restoration scenarios currently under consideration, as it both protects exposed sediments from wind erosion, and also provides important habitat for birds.

A.3 Approach

The planning committee for the workshop consisted of Dr. Douglas Barnum and Dr. Rey Stendall of the SSSO, Dr. William Brownlie of Tetra Tech, Mr. Robert Prohaska of Essex Environmental, and Ms.Carla Scheidlinger and Mr. Frank Stradling of Agrarian Research. This group developed the approach and the materials used for the workshop.

The overall approach was to provide appropriate and pertinent background material for all participants, to engage in a field trip to obtain some first-hand impressions of the kinds of habitats that would be under consideration, and to facilitate focused discussions on several aspects of shallow habitat development. The background material and field trip produced some common ground for discussion, which was augmented by a brief presentation of the six conceptual alternatives for Salton Sea restoration that are currently under consideration. In addition, the planning team developed a habitat grid that describes the kinds of habitats that would be associated with each alternative. From that grid, habitats that were characterized by shallow water were singled out for discussion at the workshop.

The major categories of issues associated with shallow water habitat were water quality, biological factors affecting bird use, and engineering concerns. Regarding water quality, the physical and chemical characteristics of the water that would supply the shallow habitats were judged to be highly variable, and a professional consensus regarding optimal as well as hazardous water quality conditions is desirable prior to the selection of a preferred alternative. The biological characteristics that each habitat develops are equally variable, and the quality of habitat that could be created for bird

use is of great interest. Once again, a consensus as to optimal and hazardous habitat conditions was sought. Finally, the development of shallow water habitat involves engineering considerations regarding the kinds of infrastructure elements required for such habitat, and the construction constraints and opportunities that the Salton Sea environments offer.

In order to sort out and effectively discuss these three categories of issues, the workshop plan included separate break-out sessions where each set of considerations could get appropriate attention from the participants.

In summary, then, the approach was to provide an on-the-ground view of the kinds of habitats and infrastructures under consideration, put the habitats in the context of the restoration alternatives, provide sufficient background data to encourage fully informed discussion, and to focus on the three areas of evaluation for habitat and restoration planning.

A.4 Workshop Summary

Field Trip. The field trip took place on Wednesday January 28, 2004 at the Western Salt facility in Chula Vista, California. The tour was conducted by Brian Collins of the Tijuana Estuary Reserve in Imperial Beach, California, and by Gene Mullineaux of Western Salt Company.

Western Salt Company is located in the extreme south end of San Diego Bay, and has been in operation for decades. This 800 acre site was once a thriving estuarine system that was home to numerous fish and wildlife species. The United States Fish and Wildlife Service's Coastal Program, working with the Refuges and Endangered Species programs, acquired the entire 800 acres into the Refuge system, and is now preparing habitat management and restoration plans.

The ponds viewed on the tour were generally of medium depth, between 1 and 6 feet deep. They varied in salinity from that of ocean water (about 35 PPT TDS) in the primary system, to about 60 PPT in the secondary pools, to 280 PPT in the pickling pools, to saturation for sodium chloride, which is at about 340 PPT, or 34 percent salt. Gypsum precipitation in the ponds was said to be at about 110 PPT. The primary systems contained fish, and were used by terns, pelicans, and osprey. In ponds between 80-120 PPT, *Artemia* were found, although fish were absent. No salt had precipitated at that point. In ponds with a TDS of greater than 120 PPT, brine flies were the only invertebrates noted.

The ponds operate principally by gravity flow, with head differential built with depth. Some amount of pumping is necessary to move the brine, but it is minimal. Some odor has been reported from the ponds, presumably from the sediments, which are probably anoxic. The ponds are considered to be eutrophic, which is not a problem for the salt industry, but is not ideal for deep marine habitat.

The ponds were constructed with native material, which was a mixture of sand, silt, and clay, and which had been bailed up with an excavator during construction. Although the berms had to dry out and set up for almost a year before they could be formed into the roads the tour was driving on, they had been used for water ponding immediately after construction.

The general take-home messages from the field trip for the three areas of inquiry were as follows:

- Ponds can be built with fairly simple technology, including berm construction using dredging, or bailing up of sediments using an excavator. The sediments can take time (1-2 years) to fully dry, but the berms can be used to impound water immediately.

- The quality of the water as regards salinity produces a wide range of habitat conditions, from including fish, to providing only brine flies. At very high salinities where NaCl crystallizes, the habitat is essentially sterile, but can provide safe resting places for birds. Odors coming from eutrophic waters and anoxic sediments were noted.

- Bird habitat is variable, depending on salinity and depth. Nesting habitat can be improved by graveling levees, and making them wider. The deeper ponds support certain birds, including fish-eating birds. The shallower habitats (less than 8 inches) have more bird species diversity.

Orientation. An initial orientation presentation was provided to all participants. In addition, four presentations were made by workshop participants that introduced data that have bearing on the topic of shallow habitats. After the presentations, participants broke into focused workshops on either biology, water quality, or engineering. Although several participants "floated" between two workshop sessions, most individuals remained in a single workshop group. The discussions that took place in these three groups are summarized below.

A.4 Water Quality Panel

Participants. The participants in the Water Quality Panel were Dale M. Robertson (U.S. Geological Survey), Geoff Schladow (University of California, Davis), Chris Holdren (Reclamation), Chris Amrhein (University of California, Riverside), Sujoy.Roy (Tetra Tech), Francisco Costa (California Regional Water Quality Control Board), Rick Gersberg (San Diego State University), Debi Livesay (Torres Martinez Desert Cahuilla Indians), John Chesnut (Agrarian), and Carla Scheidlinger (Agrarian, moderator).

Freshwater Wetlands. The discussion began with an assessment of the potential for using freshwater (as defined by input from the New and Alamo Rivers, as well as

from the drains of the Imperial Irrigation District farms) for supplying shallow habitats. Such habitats were discussed and compared to the wetlands that have been constructed for multiple purposes, including water treatment, along the New River, and which are proposed additionally for the Alamo River. Potential benefits included removal of sediment, nitrogen and phosphorus, as well as reduction of biological oxygen demand (BOD).

Data from the existing New River wetlands at Imperial and Brawley (unpublished data from Imperial Irrigation District, 2003) indicate that about 50 to 70 percent of the total nitrogen is removed from the water as well, although the form in which it is removed varies with the wetland area. Up to 45 percent of total phosphorus was removed in these wetlands, as well as a maximum of 28 percent of the incoming selenium. Almost none of the coliform bacteria remained in the water after passing through the wetlands. Such wetlands can, then, function reasonably effectively for water treatment, and industry standards suggest that treatment efficiencies can be improved in wetlands designed specifically for treatment, rather than for multiple uses including habitat.

Sedimentation basins, however, must be considered separately from wetlands or habitat areas. The sedimentation cells of the New River wetlands removed about 95 percent of the total suspended solids from the water entering the projects. It was agreed in the workshop that any areas that were expected to remove sediments would quickly fill up if they were shallow, and that wetlands should not be expected to double as sediment traps. If the removal of sediment is a goal, then deep sediment retention basins should be implemented upstream of shallow habitat areas. Such basins can be extremely effective at controlling sediment, and should be cost-effective to construct, operate and maintain.

The use of additional shallow freshwater wetlands outside of the river channels for treatment purposes was not generally encouraged. Phosphorus reduction would be more effectively achieved using best management practices (BMP's) on farms rather than attempting to remove phosphorus in treatment wetlands. In any case, trapping sediment tends to remove about half of the phosphorus anyway, as the phosphorus is deposited with sediment. Although nitrogen removal can be accomplished by treatment wetlands, the Salton Sea is strongly phosphorus limited, so nitrogen removal is less of an issue.

Regarding habitat using freshwater, liabilities arising from the construction of extensive shallow freshwater wetlands included tamarisk infestations and mosquito problems. Overall, however, the show-stopper for freshwater wetlands using the available source water was selenium concentration. Data show that algae in the rivers contain up to 2 mg/kg of selenium, which is at the threshold of concern. Any water used for shallow habitat should contain no more than about 1.5 ppb selenium at the point where it is introduced into the shallow habitat system. This level is somewhat lower than the selenium concentration reported in the river systems. Shallow habitat using freshwater, then, has few benefits and serious liabilities. An exception would be

large, deep ponds for sediment removal which would be managed to discourage use by birds that feed principally on insects.

There was some discussion about constructing shallow habitats with freshwater on exposed sediments of the Salton Sea instead of in the river channels, with the structure and function of rice paddies in the Central Valley proposed as a model. This concept was generally rejected, as the initial water quality that would be used here is characteristic of drainage water rather than of irrigation water, and is high in selenium and organics. Blue-green algae could pose serious odor problems in shallow habitats supplied with such water. If the ponds in this scenario were to be managed for seasonal use, the problems with selenium could become multiplied, as selenium could be mobilized from the sediments each time the areas are re-wetted, causing a spike in selenium concentration in the water, which could prove toxic to the wildlife attracted to the seasonal habitat.

Saline Habitats. The next kind of habitat considered was a saline shallow habitat that would be accomplished by blending Salton Sea water with the river or drain water. The participants were unanimous in their opinion that, in order for such water to comprise high quality habitat, river water would have to be blended with Salton Sea water to a final concentration of lower than 2 ppb selenium. The final salinity or eutrophication level of the water was of little concern; what matters is obtaining a low selenium concentration in the water supply to the shallow habitat. Such a blending scenario was deemed feasible, as the group concluded that it was reasonable to assume that the same selenium removal mechanisms that operate in the Salton Sea now would continue to function in a reduced Sea; that is, the Sea would continue to function as a selenium sink. The preferred scenario, however, was to use the remaining Sea as a selenium filter, and to construct shallow habitat using only water that had been obtained from the Sea itself. Blending, then, would not occur, and habitat would be constructed with salinity levels at or above the salinity of the Salton Sea. Furthermore, any reject water from a desalination plant should be discharged directly to the brine pool, without being passed through the Sea. This would remove some additional selenium from the water that would ultimately be available for habitat.

It was acknowledged that even if the water supplying the shallow habitats were to be introduced at a concentration of less than 2 ppb selenium, the selenium concentration could increase through evaporation. The habitat that would result would be of lower quality, but probably not enough to trigger unacceptable risks. The group offered the opinion that as the selenium concentration would increase, the risk of deformities in birds would also increase. However, the risk in this case is judged to be minimal because of the low selenium concentrations anticipated, and the idea that the risk to a few individuals would be offset by the expanded habitat that would beneficial to many more individuals. It could be envisioned, then, that the effect would be a net benefit

Pesticides. Although selenium was by far the greatest concern regarding water quality for this group, the concentration of DDE, which is a breakdown product of DDT and can appear in elevated concentrations in the eggs of birds, was also discussed. At this point, the data show that DDE concentrations are above safe levels in 40 percent of the egg samples taken around the Salton Sea. DDE is adsorbed onto soil particles, and therefore enters the food chain from sediments, which emphasizes the need to keep contaminated sediments isolated from bird habitat. Chris Amrhein provided an article that indicated that field observation of DDE in marine sediments suggests a half life of about 10 years. The process operating to reduce DDE levels in sediment is reductive dechlorination. Most researchers acknowledge that anaerobic dechlorination is not, on its own, a complete remedy for removal of DDE from sediments. Sediment-coring observations suggest that natural dechlorination is slow and occurs only to a limited extent. Although reductive dechlorination is a natural process, whether it is actually making a significant impact on the DDT contamination remains to be seen. For the Salton Sea, the implementation of BMP's that minimize the release of DDT into the environment would therefore reduce the DDE risk in the future.

As in the case of phosphorus, DDE could also be at least partially removed in a sediment trap. In addition to DDE, there are many organics, pesticides and fumigants that are known to be sediment associated, so they would be removed in a sediment trap or be sequestered in the Sea sediments. Others are not associated with sediments, although there are little data.

Trace Elements. Arsenic and boron were also discussed. Arsenic levels are elevated in fish tissues at the Sea, and could pose a risk of causing cancer in humans consuming the fish. However, the carcinogenic (organic) species of arsenic in fish in the Salton Sea is low. The arsenic levels do not pose a threat to wildlife, as the cancer risk is limited to humans. At the north end of the Salton Sea, monitoring at the Torres Martinez reservation has revealed concentration of arsenic of up to 110 ppb in shallow groundwater and surface water. Arsenic concentrations are as high as 55-58 ppb in the Whitewater River. These levels considerably exceed the drinking water standard of 10 ppb arsenic. Such elevated levels may or may not pose a threat to wildlife. As regards boron, this element concentrates linearly, and tracks salinity. It does not bioconcentrate, but at high levels could pose a wildlife risk. Birds accumulate boron through eating vegetation, not from ingestion of insects. Boron at a neutral pH takes the form of boric acid, which is not toxic. At high (alkaline) pH, boron becomes borate, which is toxic. Such high pH conditions would not be anticipated in shallow saline habitats.

Other trace elements occurring in water currently feeding the Salton Sea were also discussed, including mercury, chromium, cadmium, lithium, magnesium, and copper. No data regarding these elements were discussed, but it was agreed that they should be monitored. The water quality of the effluent from the geothermal wells should be monitored also. It was noted that there are industrial wastes from Mexico that are present in river water. Only about 10% of the water in the New River water will be

treated by a new treatment plant, so such wastes will not be eliminated. There are no data that the group was aware of on hormones and hormone mimics.

Other Issues. It was mentioned that CO2 devolving from underground could also be an issue in shallow ponds, as it could effect a change in pH. The group felt that this would not constitute a serious problem.

Algal toxins were discussed as an issue, but there are not much data on this. Viruses, Newcastle's and bird diseases were mentioned, but no conclusions regarding water quality were reached.

The changing salinity of the bodies of water associated with a rehabilitated Salton Sea was discussed. The most frequently discussed scenario included a reduced volume Sea with a salinity somewhat lower than what is currently present, at a target of approximately that of ocean water (~35 PPT TDS). There would also be a brine pool or sump that would be hyper-saline. In the rehabilitated Sea, there would be less calcite, and therefore somewhat less phosphate removal. As eutrophication in shallow habitats was not a concern, higher phosphorus levels were not considered to be important. Selenium removal should not be affected by decreased salinity. Algal toxins, however, could be expected to increase if salinity falls much below 25 PPT. The target salinity should remain well above the avian botulism growth zone, which can be determined for specific water bodies with good accuracy from computer models.

As for the brine pool, it would be physically inaccessible to birds in most years, as it would be covered with a salt crust. In flood years, however, it could be a serious problem, as fresh water would float on top of it after rain storms and from any uncontrolled discharges. It was noted, however, that one of the federally designated roles of the Salton Sea is as an agricultural sump. Evolution of the Salton Sea to a hyper-saline condition would be anticipated with reduced inputs in any case, regardless of restoration efforts. There were two major concerns about this highly concentrated body. One was for selenium. Selenium concentration that is at 1-3 ppm qualifies a substance as a toxic waste, but farm evaporation ponds in the Central Valley have been determined to be exempt from the toxic waste regulation in this context A similar exemption could be anticipated for the Salton Sea, if selenium concentration was to reach that level. The salt crust, however, would isolate the selenium in the sediments, so the group felt that selenium would not be a problem in this high salinity environment.

Salinity. High salinity itself was another potential concern. It was suggested that there may be a high level of salinity beyond which contaminants are not an issue because there is no usage by birds. If this were the case, high salinity could decrease risk. It was noted that at 120 PPT, there is basically no food source. Between 44 and 120 PPT, however, data show low selenium, so again there is a low risk. A shallow pond at the mirabilite (decahydrated sodium sulfate crystal) concentration point could encrust bird feathers with the crystals, which poses a health hazard to birds so

affected. Brine concentration data show that at 60 F the mirabilite concentration point is at about 100 PPT, so brines of that concentration could be discharged to the brine pool and get absorbed into the brine. It was also noted that in the shallow habitat scenarios discussed, there would be ample high quality habitat for the birds to escape to, where they could both clean their feathers from salts, and obtain food uncontaminated with selenium.

Habitat Acreage Estimates. A preliminary water balance calculated for the reduced Sea scenario indicated that there would be a requirement of discharging about 40,000 Acre-feet/year from the reduced Sea in order to maintain stable salinity. With such a discharge, approximately 8,000 acres of saline shallow habitat could be created. As this water is flushed to higher salinity ponds downslope, additional shallow habitat at a higher concentration could be obtained.

A.5 Biology Panel

Participants. The participants in the Biology Panel were John Y. Takekawa (US Geological Survey), Carol A. Roberts (U.S. Fish and Wildlife Service), Rick Soehren (California Department of Water Resources), Mark Rigby (Tetra Tech), Dan Cooper (Audubon California), Kathy Molina (Natural History Museum of Los Angeles County), Chuck Henny (USGS - Biological Resources Division), and Doug Barnum (Salton Sea Science Office and USGS, moderator).

Approach. The approach taken by the participants in the biology workshop was to consider various habitats and then discuss them according to usage by birds based on whether they were breeding or migratory, the guild or foraging type they represent, and whether or not they are state or federally listed species.

The group then discussed various habitats that are currently present at the Salton Sea, or which would be created under conditions of a declining Sea level or as part of the restoration scenarios.

Estuarine habitat, which is the fresh/salt mixing zone, is not expected to be a significant area under these scenarios.

Flooded agricultural fields (with fresh water) provide breeding habitat, but not nesting or foraging opportunities, for gull-billed terns. Non-breeding birds that would use this habitat include ibis, large waders, snow geese, curlew, gulls, shorebirds, waterfowl, and northern harrier hawks. Various roosting birds would also be expected to forage here.

Riparian zones of native vegetation (mesquite) were distinguished as a unique habitat, which also contain saltbush species and arrowweed. This habitat provides breeding grounds for resident desert bird species such as roadrunners, Gambel's quail, and blacktailed gnatcatchers. Non –breeding migrants such as Wilson's warbler would also utilize this habitat.

Riparian zones of tamarisk provide breeding habitat for cattle egrets, and foraging habitat for non-breeding migrant passerines, especially in the river channels that support the growth of Phragmites.

Earthen channels are important breeding areas for burrowing owls and large wading birds.

Typha marshes, which include standing water that is reasonably fresh comprise habitat for the endangered Yuma clapper rail, as well as for the least bittern, ibis, breeding waders, and breeding waterfowl including the fulvous whistling duck and wintering dabblers.

Salt pans support breeding snowy plovers, stilts, avocets, and wintering savannah sparrows.

Drain influenced lagoons and lagoon overwash areas are habitat for cormorants and roosting birds.

Mudflats, regardless of whether they are within impoundments or not, and regardless of salinity structure, do not provide breeding habitat, but are foraging locations for non-breeding and migrant gulls, waterfowl, shorebirds, a variety of sensitive species, waders, and roosting birds.

Shallow Water Habitat. The discussion then turned to specifically shallow water habitats. "Shallow" was defined as having a maximum depth of three feet, with an average depth of less than one foot. Anything deeper was classed as "deep marine" if it is saline.

Shallow freshwater habitat at the mouths of rivers and drains may include islands that are surrounded on all sides by water, and often feature snags and levees that provide habitat diversity and structure. This habitat could be termed mixosaline brackish, with a salinity of 5-30 PPT.

Salinity Regimes. Additional salinity regimes are overlain on habitat types, and the major impact of salinity changes is on invertebrate populations. That is, salinity is the key habitat modifier, and varies from low salinity to hyper-saline. Assuming that the shallow habitats proposed for development have their lowest salinity at approximately ocean water levels (which is proposed in several of the restoration scenarios), there were three salinity classes identified. In waters of 35-70 PPT TDS, both fish and a variety of invertebrates would be present. For waters between 70-150 PPT TDS, there would be selected invertebrates only. At salinity greater than 150 PPT TDS, micro-invertebrates would be excluded.

Shallow Water Habitat Siting Considerations. Siting considerations for shallow habitats were then considered. It was noted that for breeding birds, the broods need to have access to sources of fresh water, so some habitat heterogeneity is required.

At the least, constructed saline habitats should be near existing fresh water sources such as rivers or drains. Other siting considerations were:

- Develop shallow habitats within areas of shallow slope, which are conducive to maximum water distribution. This is perhaps the most important consideration in order to maximize the amount of habitat that can be created
- Proximity to agricultural lands is important for ibis, curlew, egrets, and gull-billed terns
- Proximity to existing refuges and/or Department of Fish and Game lands is desirable to maximize contiguous habitat opportunity. This requirement suggests that the constructed habitats should be as close to the current shoreline as possible
- Proximity to existing and/or potential breeding areas is important to assure that there is habitat available for use by broods

Conclusions. A summary of the general conclusions of this workshop group is that no single habitat type will be optimal for all species. Taking species of special concern (i.e., listed species) into account first will guide decisions about what habitats can be developed or protected for the benefit of these species. It may be that protection of existing habitat best addresses many of these species, such as maintaining *Typha* wetlands for Yuma clapper rails, or agricultural drains for burrowing owls. Given that the habitats under discussion were shallow water, it was suggested that siting considerations are more important than determining salinity gradients, as such considerations will determine how to optimize both total area and take advantage of synergistic interactions with nearby or adjacent habitats. Finally, as salinity increases, biological diversity in the shallow habitats decreases, although total biomass of food items may remain high.

The group wanted to acquire photos of each species of concern, and suggested consulting Birds of the Salton Sea and the text Cowardin's Wetland and Deepwater Habitats (Cowardin et al. 1979).

A.6 Engineering Panel

Participants. The participants in the Engineering Panel were Leo Handfelt (URS), Ted Schade (Great Basin Unified Air Pollution Control District), Cheryl Rodriquez (Reclamation), John Vrymoed (California Department of Water Resources), Frank Stradling (Agrarian), and Bill Brownlie (Tetra Tech, moderator).

Approach. This group began by coming to agreement on which types of structures were to be considered, developing definitions for those structures, and identifying issues and areas of inquiry that would be required in order to develop specifications and costs for infrastructure and O&M elements.

Infrastructure Elements. There were three infrastructure elements discussed: berms, dikes, and levees. ***Berms*** were defined as earthen structures less than three feet above the original ground level, with a top width of two to five feet, and with side slopes varying from 3:1 if they are vegetated, to 7:1 if they are not. No slope protection other than potentially vegetation would be associated with a berm. A berm would not support vehicular traffic, although it may or may not be compacted. The purpose of a berm is to control and advance sheet flows of water. Berms enjoy the lowest level of design standards, as they are not constructed to retain much standing water.

Dikes were defined as earthen structures less than 10 feet above the original ground level, with a top width of about 12 feet, with some turnouts included. Side slopes would typically be between 4:1 and 6:1, although further stability analysis was suggested to develop a firmer slope requirement. Slope protection could be vegetation, rock, or a flatter side slope to prevent accelerated erosion. A dike would support vehicular traffic, and would preferably be compacted, and generally capped. It may or may not be keyed into the parent material, depending on the site. The purpose of a dike is to impound and contain shallow water, of a depth of five feet or less. Dikes are not, however, jurisdictional dams.

Levees were defined as earthen structures more than 10 feet above the original ground surface, with a top width of 20 to 30 feet, and with side slopes of 6:1 or flatter. Slope protection would be with rock revetment. Levees are generally compacted, would be capped, and would support vehicular traffic. They may or may not be keyed into the parent material, depending on the site requirements. The purpose of a levee is the retention of water that is deeper than five feet. As such, it may or may not be a jurisdiction al dam.

Construction Issues. There are certain challenges associated with construction of such infrastructures in the sediments of the Salton Sea. Foundation support is of primary importance. Construction would need to be on fat clays, and could take place in shallow water or fully saturated soils. The structures would be constructed of native materials, which would be removed and placed using an excavator walking on mats. The material thus bailed up would need to be allowed to dry, after which it could be compacted. Grid-type geosynthetic mats could possibly be used to help stabilize embankments where soft sediments used in the construction.

Seismic issues are a concern as well. When the structures are designed, articulation of an acceptable level of damage that the structure could be allowed to sustain during a seismic event should be made, and an acceptable cost of repairs for that damage. The most common form of seismic damage is anticipated to be cracking, which can be largely avoided by compaction during construction.

There are certain limitations that will be faced in constructing these infrastructure elements. Cost is a primary consideration. Different foundation conditions may dictate construction methods and specifications that dramatically affect total cost.

Water is another consideration, as construction in shallow water may require alternative methods such as dredging. For the shallow habitats proposed in the restoration scenarios, a salinity break between the habitats and a salt crust developed for dust control must be anticipated, and the structural implications of that break taken into consideration. Finally, there may be a need to evaluate existing construction methods and develop modified or novel alternatives to assure that the methods produce competent structures.

The group discussed what available specification guidelines should be used for these infrastructures in this setting. It was decided to review the applicability of National Resource Conservation Service (NRCS) specifications for berms, dikes, and levees. These specifications were developed for use in agriculture, with assumptions of low cost and minor consequences resulting from damage or failure. Use of such specifications could substantially reduce the construction cost of developing shallow habitats.

The group raised the question of any critical data sets that are needed in order to proceed with detailed shallow habitat designs. The following issues were identified:

- Careful analysis of unit costs. Depending on the specifications adopted, costs could be quite variable for these infrastructure elements. Determination of the most appropriate specifications and thorough evaluation of costs is important.

- Native material vs. imports. Some materials may not be suitable for the sustainable development of infrastructures for shallow habitat. If site evaluations dictate that imported material is required, the costs associated with such materials should be evaluated.

- Seismic response analysis. The Salton Sea is in an active seismic zone. The infrastructure elements developed according to the selected specifications should be evaluated to determine the degree of vulnerability that they would have to seismic activity.

- Cost Factors/Considerations. Selecting the criteria against which costs will be evaluated remains to be done.

- Low risk of failure vs. higher O&M costs. Infrastructure elements constructed with low initial costs may prove to be more vulnerable to damage or failure. Maintenance costs associated with such structures, and the reliability of the structures must be evaluated in terms of costs and benefits associated with any construction specification. It may be most cost effective to build simple low cost berms and pay for O&M later if they get damageds.

Conclusions. In summary, this workshop group examined three infrastructure elements that would be associated with the development of shallow habitat, and

proposed questions and concerns associated with their construction and maintenance. In general, it was agreed that low cost infrastructures designed according to specifications such as those developed by the NRCS deserved evaluation, as this could keep initial costs for a project low. Site specific considerations will have to be thoroughly evaluated to determine the benefits and costs of implementing such specifications, given variable parent material and seismic risk. Low initial costs may imply higher maintenance costs, but this balance may prove to provide a lower cost project overall.

A.7 Workshop Summary

Each panel presented a summary of its discussion to the group at large at the conclusion of the workshop. The general conclusions can be summarized as follows:

- Shallow habitats should be developed using Salton Sea water rather than water from rivers or drains due to selenium concerns. Shallow water impoundments that begin with water containing more than 2 ppb selenium should be discouraged.
- Shallow habitats should be sited where they take optimum advantage of shallow slopes, of proximity to existing reserves or habitats, and of proximity to agricultural fields, as these siting considerations give the developed habitats their highest value.
- The salinity of the habitats is of minor concern, as any waters between about 30 and 150 PPT TDS will provide foraging value to a variety of birds. If environments including brine at the saturation level for salts are present, however, proximity to lower salinity habitats is important. Salinity targets should be out of the range for avian botulism.
- Selenium is the most important water quality concern, although data on DDE should be carefully considered as well.
- Eutrophication levels for the shallow habitats is not a concern.
- Construction of the shallow habitats could utilize structures developed with low-cost agricultural specifications, subject to site-specific and risk assessment review.
- There were no "data gaps" that were suggested as being critical to moving forward with designing a preferred alternative, except the cost development for infrastructure and construction.

A.8 Alternatives Considered

Shallow habitat configurations that could be associated with five possible restoration alternatives for the Salton Sea are discussed in the following paragraphs. These alternatives are briefly described here, with note being made of the habitats that would be associated with each.

South Marine Lake without Elevation Control

This alternative would involve construction of a low barrier across the middle of the Sea, thus creating two distinct bodies of water. The South portion of the Sea would be fresher, as it would be fed directly from the New and Alamo Rivers. The North portion of the Sea would become hyper-saline. There would be minimum elevation difference between the two bodies of water, but their habitat characteristics would be different. A conceptual plan for this alternative is provided in Figure A-1.

The conceptual plan for this alternative has conveyance channels that provide water for constructed habitats along the margins of the shrinking Sea. One conveyance channel would originate in a forebay at the Alamo River and would run from south to north along the east edge of the Sea. Sea water would be blended into this channel for the purpose of providing brackish water to constructed habitats. Another conveyance channel would run from south to the north originating with water pumped from the south portion of the Sea into the channel.

There would be several kinds of constructed habitats associated with this alternative. The channel on the east side of the Sea would deliver water to saltgrass and waterfowl habitats, and would also supply a recreational pool at Bombay Beach. The channel on the west side, which would consist of fresh water blended with Sea water pumped from the South portion of the Sea, would supply additional saltgrass and waterfowl habitat areas. It would also provide water for a recreational pool at Salton City. The west channel could double as pupfish connectivity habitat as well. Additional flooded saltgrass stands would be present at the north, provided with water blended from the west conveyance channel and water from the Whitewater River. Saline waterfowl habitat at the north end would be supplied from the same blended water, arriving in the channels from both the east and the west. The outflow from all habitat types would be used to create solar salt concentrators and crystallizers downslope of the saline habitats.

The conceptual plan for this alternative includes freshwater habitat in the forebays only, with short lengths of freshwater channels. There would be at least three pump stations required. One would be north of the Alamo River to supply the channels flowing north to Bombay Beach and south to the saltgrass and waterfowl habitats. A blending station would be required at both the New and Alamo Rivers to blend saline and river waters for the channels. Another pump would be at Niland, to augment flows to the north end of the Sea. The third would be near Salton City, to

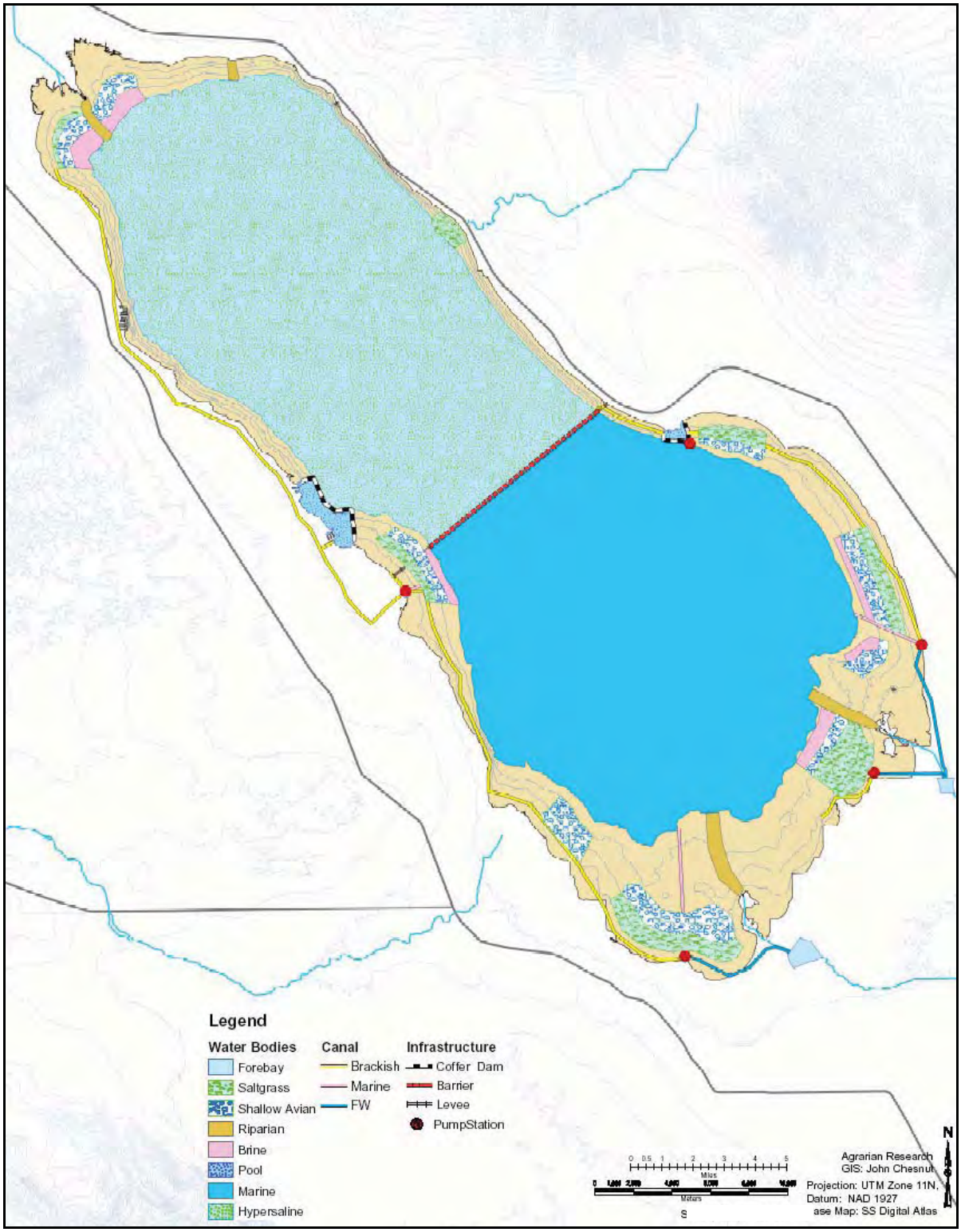

Figure A-1. Conceptual Plan for South Marine Lake without Elevation Control.

provide additional water to the channel and recreational pool on the west shore. A low mid-Sea barrier would also be required.

South Marine Lake with Elevation Control

This alternative would require a retention structure across the middle of the Sea, dividing it into two parts. There would be a large lake maintained at a stable elevation at about ocean water salinity (35 PPT) at the south end of the current Sea. This south lake would be discharged to conveyance channels for habitat development, thus maintaining a stable salinity. The North Basin would dry to a crystal body and salt flats. A conceptual plan for this alternative is provided in Figure A-2.

The Alternative requires conveyance channels that need to run in two directions. One conveyance channel runs along the west edge of the south lake from south to north, carrying water from forebays constructed on the New and Alamo Rivers to the north basin, to prevent increasing freshening of the South Sea. Thus, the New and Alamo Rivers both feed the South Sea directly, and supply water for habitat to be constructed at the west and north edges of the north basin. There are also conveyance channels on the west shore of the south basin that originate in the south lake and flow to the north, and have a salinity level the same as that of the lake. These channels serve as required discharge from the south lake, and also provide water for constructed habitat when blended with the freshwater river channels.

The exposed edges of the west and north end of the Sea would include constructed habitats using a blend of water from the New, Alamo, and Whitewater Rivers, and from the discharge from the south lake. The channels originating from both the southern rivers and from the south lake (after blending in both) would supply brackish water to flooded saltgrass stands that would be created on exposed areas of the north basin. Saline waterfowl habitats would be constructed as well at the northern margins of the Sea. Outflows from the waterfowl habitat and saltgrass habitats would be discharged to concentrator ponds downslope, where they can either form salt beds or be recycled for blending to assure adequate salt concentrations for the habitats.

The channel originating from the south lake could double as pupfish connectivity habitat, as it would allow the fish to migrate from one watercourse to another. A recreational pool would be formed offshore of Salton City, consisting of water blended from both the freshwater channel and the south lake, resulting in higher salinity water. A crystal body and salt flat would result from the shrinking Sea in the north basin.

The only freshwater habitat in this scenario is in the east channel and in the forebays of the rivers. Minimal pumping is required for blending of channel water to assure brackish concentrations for habitat. A mid-Sea dam is required.

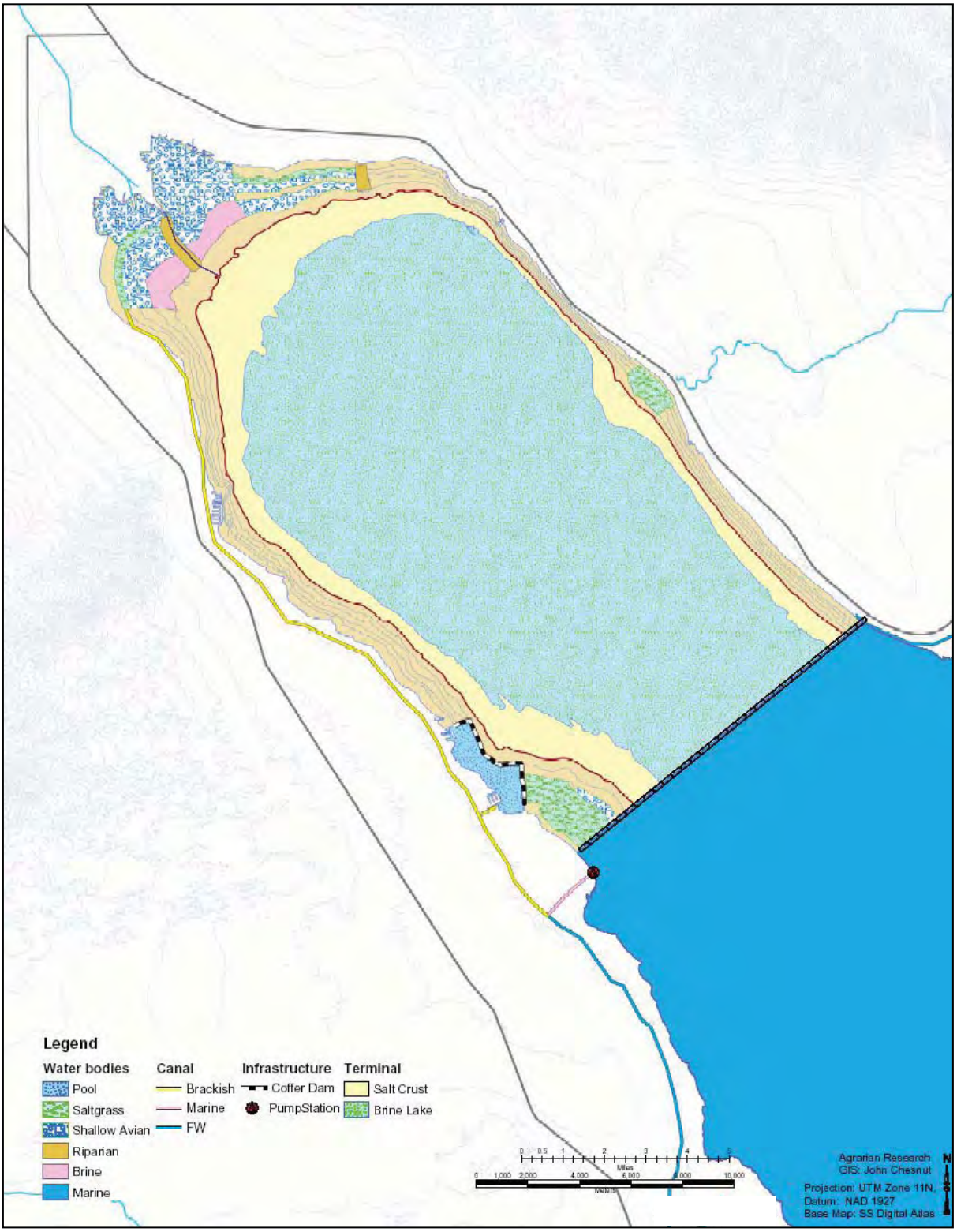

Figure A-2. Conceptual Plan for South Marine Lake with Elevation Control.

North Marine Lake with Elevation Control

This alternative would require a retention structure across the middle of the Sea, dividing it into two parts. There would be a large lake maintained at a stable elevation at about ocean water salinity (35 PPT) at the north end of the current Sea. This Lake would be discharged to conveyance channels for habitat development, thus maintaining a stable salinity. The South Basin would dry to a crystal body and salt flats. A conceptual plan for this alternative is provided in Figure A-3.

This conceptual plan for this alternative includes conveyance channels that need to run in two directions: from the south to feed the north lake with water from the New and Alamo Rivers, and from the north to provide discharge from the north lake to maintain elevation and salinity. Channels from the south to the north along the east shore of the Sea would consist of fresh water originating in forebays constructed on the Alamo and New Rivers. These forebays would give sufficient head to flow the water as far north as the mid-Sea dam, where sufficient water would be discharged to the north lake to maintain salinity and elevation. The remainder of the water would contribute to habitat or to recreational pools. The conveyance channels on the west shore of the south basin originate in the north lake, and have a salinity level the same as that of the lake.

The exposed edges of the south end of the Sea would include constructed habitats using a blend of water from the New and Alamo Rivers, and from the discharge from the

The channels originating from both the southern rivers and from the north lake (after blending in both) would supply brackish water to flooded saltgrass stands that would be created adjacent to the delta areas of the New and Alamo Rivers. Saline waterfowl habitats would be constructed as well at the southwest margin of the Sea. Outflows from the waterfowl habitat and saltgrass habitats would be discharged to concentrator ponds downslope, where they can either form salt beds or be recycled for blending to assure adequate salt concentrations for the habitats. The west channel originating from the north lake could double as pupfish connectivity habitat, as it would allow the fish to migrate from one watercourse to another. A recreational pool would be formed offshore of Bombay Beach, consisting of water blended from both the freshwater channel and the north lake, resulting in higher salinity water. A crystal body and salt flat would result from the shrinking Sea in the south basin.

The only freshwater habitat for this scenario would be located in the east channel and in the forebays. No extensive pumping is required, except for blending for channel water to assure a brackish supply for the habitats.

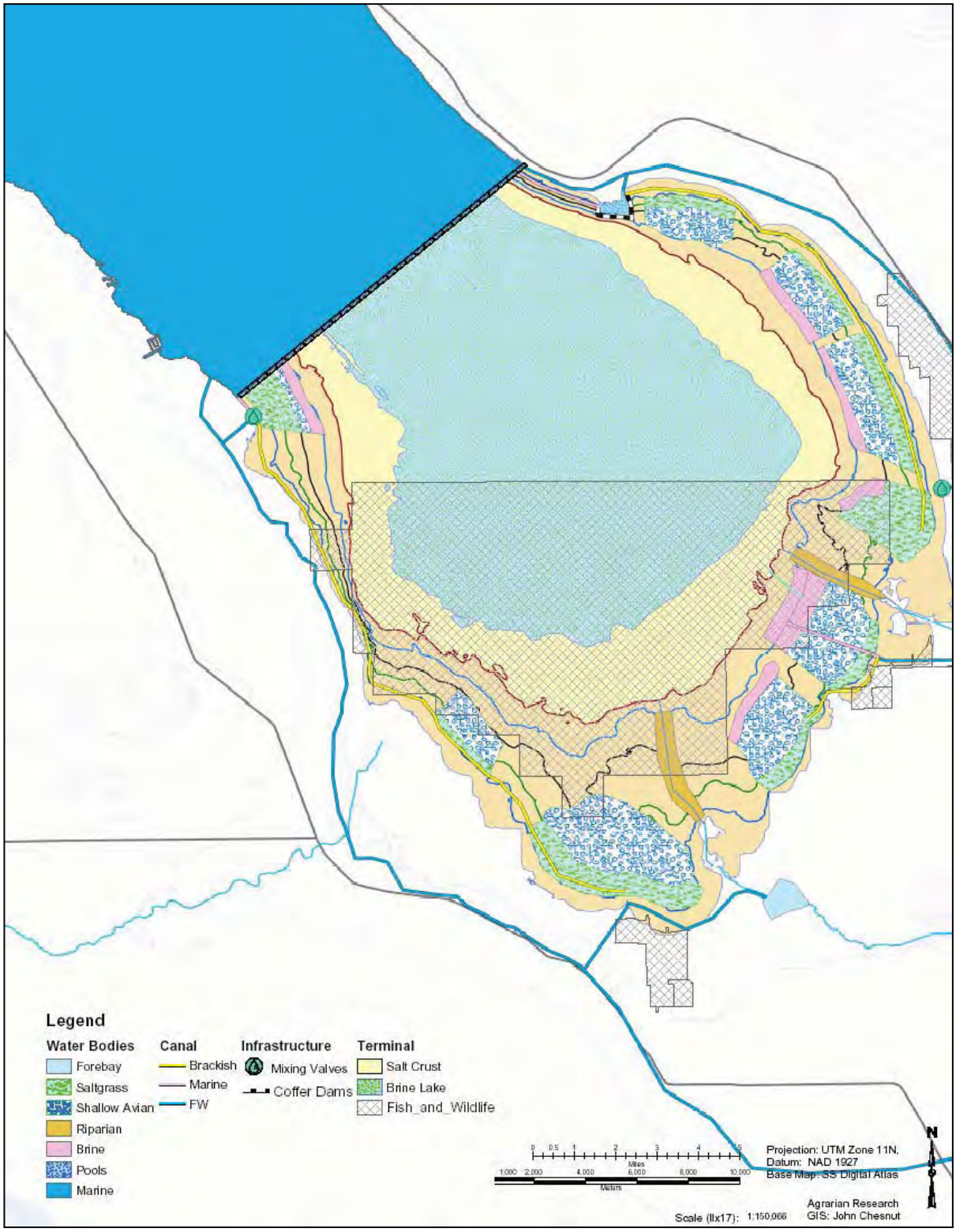

Figure A-3. Conceptual Plan for North Marine Lake with Elevation Control.

No Marine Lake (No Marine Fishery)

Two options are considered for the alternative where a marine fishery is not maintained. For the first option, pumping features would be included to provide brine from the residual Sea and blend it with fresh water to create shallow salt water habitat. For the second option, pumping systems would not be included. Conceptual plans for the pumping and no-pumping options are provided in Figures A-4 and A-5, respectively.

With Brine Pumping. This option provides for a single body of the Sea, with elevation declining by about 30 feet. The main body of the Sea would be hyper-saline, with a potential salinity of about 160 PPT. Constructed habitats would be developed along the exposed margins of the Sea using water delivered from conveyance channels.

This option would include two forebays to capture and build head with New and Alamo River water. There would also be two afterbays which would function as blending stations, receiving water from the conveyance channels delivered from the rivers, and blending it with water from the Sea, which would be delivered via a dredged channel and lifted into the afterbay with a pump. The resulting water would be at about 35 PPT, but any salinity level could be targeted. The blended water would then go into two major conveyance channels, one flowing along the east border of the Sea and the other along the west. These channels would supply constructed habitats.

The west channel could double as pupfish connectivity habitat. Discharges from the channels south of Niland and south of Salton City would form flooded saltgrass habitat, and saline waterfowl habitat. Widening of the channels at coastal communities, including Bombay Beach and Salton City would create recreational pools to a depth of a maximum of 30 feet. The east channel would terminate in such a pool at Bombay Beach, and the west channel would continue to the north end of the Sea. At the north end of the Sea, there would be additional waterfowl habitat supplied with water from the Whitewater River and the channel. Discharge from the areas of waterfowl habitat would form solar concentrators and crystallizers terminating in salt bodies at the north end of the Sea. Discharge from the shallow habitats at the southeast and southwest end would form several deep marine habitats with a salinity that could be blended to attain about that of ocean water (35 PPT) as habitat for pelicans and other fish-eating birds.

This option has freshwater habitat only at the two forebays on the New and Alamo Rivers, and in short segments of conveyance channels between the forebays and the blending stations. It would require several pump stations for blending. The only barriers required would be coffer dams for the deep marine habitats at the south area of the Sea, and the recreational pools at the shoreline communities.

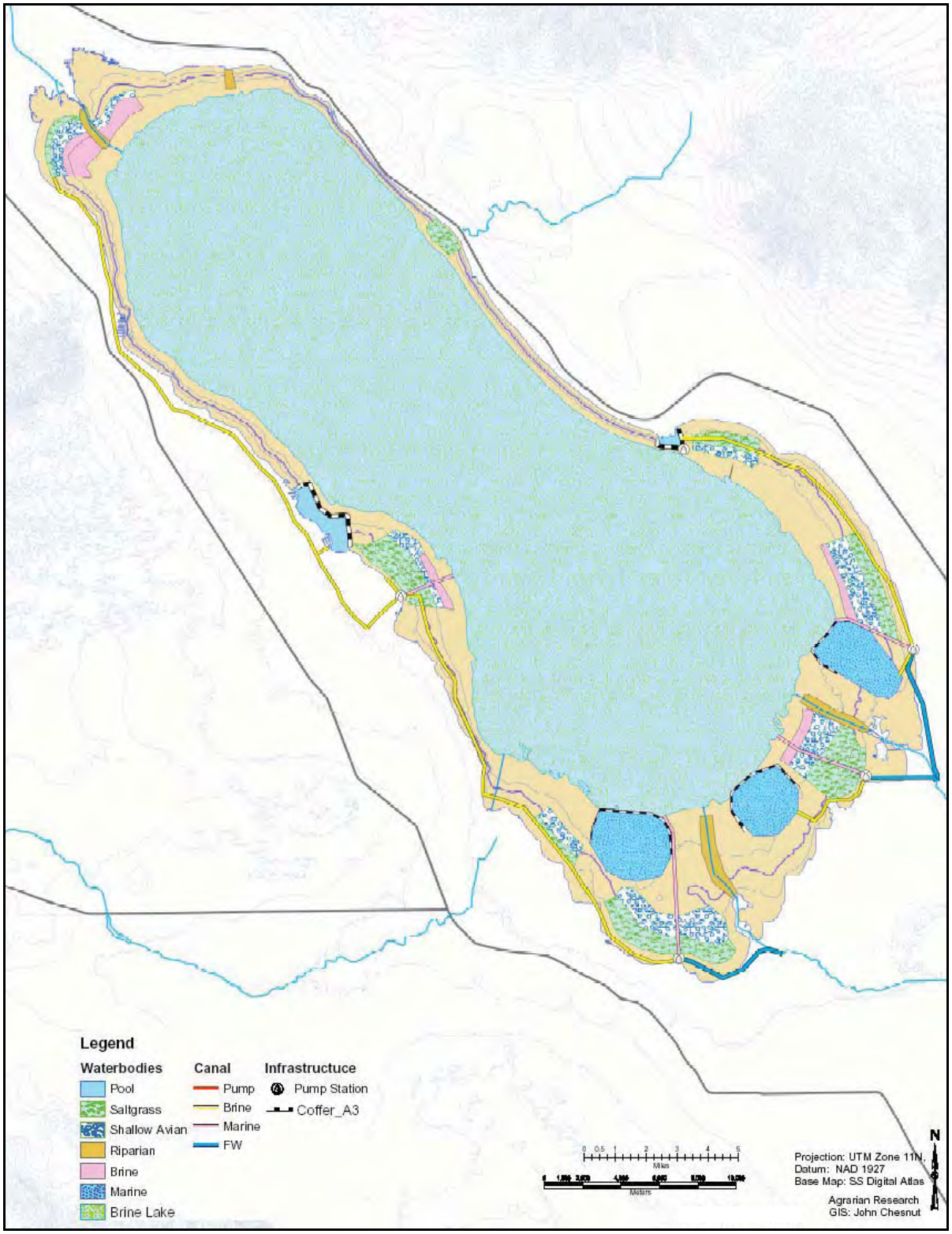

Figure A-4. Conceptual Plan for No Marine Lake (No Marine Fishery), with Pumping Option.

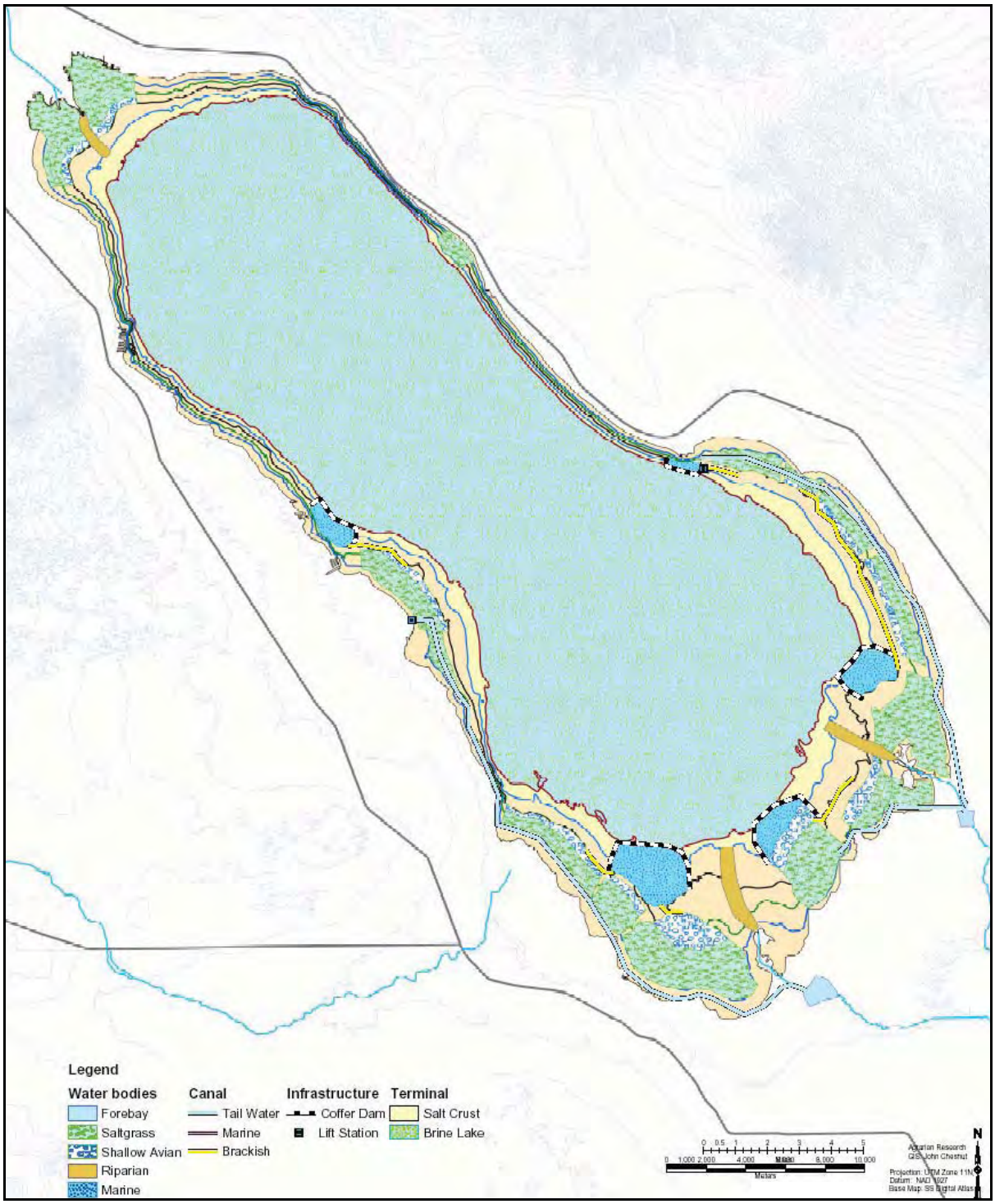

Figure A-5. Conceptual Plan for No Marine Lake (No Marine Fishery), without Pumping Option.

Without Brine Pumping. This option provides for a single body of the Sea, with elevation declining by about 30 feet. The main body of the Sea would be hyper-saline, with a salinity of about 220 PPT. This option would include two forebays to capture and build head with New and Alamo River water. The forebays would deliver water via conveyance channels, one flowing along the east border of the Sea and the other on the west. The west channel could double as pupfish connectivity habitat. Discharges from the channel south of Niland and of Salton City would form shallow water fowl habitat, both fresh and moderately saline, as the water from the upper ponds flowed through to the lower ones, with evaporative concentration. Also formed with water from the channel would be shallow basins planted with saltgrass for the purpose of dust control and seasonal flooding for waterfowl and wading bird habitat. Widening of the channels at coastal communities, including Bombay Beach and the western shore communities would create recreational pools to a depth of 30 feet. The east channel would terminate in such a pool at Bombay Beach, and the west channel would continue to the north end of the Sea. At the north end of the Sea, there would be additional waterfowl habitat supplied with water from the Whitewater River and the channel. Discharge from the areas of waterfowl habitat would form solar concentrators and crystallizers at the north end of the Sea, with some of these environments created at the south end downslope of the waterfowl habitats as well. Discharge at the southeast and southwest ends would form several additional deep marine habitats with a salinity that could approach that of ocean water (35 PPT) for habitat for pelicans and other fish-eating birds. Without additions of brine through pumping, however, these deep habitats may end up with fresher water in them.

This option has freshwater habitat at the two forebays on the New and Alamo Rivers, in the conveyance channels, in the flooded saltgrass and portions of the shallow waterfowl habitat, as well as potentially in the shoreline community pools. The deeper habitats identified as marine may in fact be merely brackish. It would not require any pumping, with the exception of potentially some smaller lift pumps associated with the movement of water in the conveyance channels. There are no Sea dams or mid-Sea barriers, but coffer dams would be required to retain the shoreline community pools and the deep marine environments.

A.9 Shallow Habitat Types

The habitats described below are considered to be the most important shallow habitat types with respect to the Salton Sea restoration process.

In-River Treatment Wetlands

Physical characteristics. This habitat is located within the existing flood plains of the New and Alamo Rivers, above the current level of the Salton Sea. It forms a part of all alternatives considered, except for the barrier alternative, and is a potentially important element of treatment before the water enters the Sea. These habitats

would occur at an elevation of –200 to –205 feet, above the current shoreline of the Sea. They are supplied with water from either the New or the Alamo Rivers. The ponds are constructed on the floodplains, and vary in depth from 0.5 to 10 feet. The water is fresh, varying from about 2.5 to 5 PPT TDS. Suspended solids in the water are low, being removed by the sedimentation cells at the intake to the wetland systems. Nutrient content is medium, as the wetlands remove some amount of nutrients, especially nitrogen. The degree of eutrophication, then, is medium. . Selenium concentration is medium (6-15 ppb), as selenium is not removed efficiently by the wetlands and can concentrate evaporatively. The evaporation rate in these ponds would be the same as that of fresh water (5.6 feet per year), and the water would remain in any given pond for about 3-5 days, depending on season. Wind fetch across the ponds would be of very short length, and the ponds would in general border on streambank riparian habitat, either of native species such as mesquite, or of introduced species such as tamarisk.

Biological characteristics. This habitat would be rich in life forms, harboring bacteria, algae, and higher plants. The invertebrates present would be those characteristic of freshwater environments, as would the fish. Birds attracted to this area would be riparian birds and waterfowl, a well as wading birds which feed on the invertebrates and fish found in the freshwater environment.

Function of the habitat type. These ponds would provide foraging, resting, and nesting habitat for waterfowl and wading birds, and contribute to the richness of the riparian environment. Properly designed for the functions of water treatment, they may remove much of the suspended solids (up to 98 percent) and perhaps 50 to 70 percent of the nitrogen.

Environmental quality. The overall environmental quality of this habitat, if it is indeed constructed for the purpose of water treatment, is judged to be poor. Specifics of the environmental benefits and liabilities were discussed in the workshop. It is not recommended to construct large areas of this habitat type, due to selenium concerns.

Conveyance Channels

Physical characteristics. This habitat is located as a narrow band above the current level of the Salton Sea, moving along the contours above the current shoreline of the Sea at about –205 to –225 feet. It forms a part of all scenarios considered, and is a critical component of all scenarios, as it delivers water to a variety of other habitats. The conveyance channels may be either freshwater or moderately saline, depending on the scenario considered. They are supplied with water from either the New and/or Alamo Rivers, or from a blending facility that would mix river waters with brine from the Sea itself.

For the South Marine Lake without Elevation Control there is a freshwater conveyance channel that would originate from the Alamo River and would run from south to north along the east edge of the Sea, delivering water to a recreational pool

at Bombay Beach. Additional Sea water could also be blended into this channel for the remainder of the distance to the north end of the Sea, creating a moderately saline environment. Another conveyance channel would run from south to north originating with water pumped from the north portion of the Sea into the channel. This channel would provide recreational pools at Salton City, Desert Shores, and other locations, consisting of saline water.

In the South Lake with Elevation Control Alternative, there is one conveyance channel that runs along the east edge from south to north, carrying water from the rivers to the north basin, to prevent increasing freshening of the South Sea. In addition, there is another conveyance channel running along the west edge from south to north carrying South Sea water at 35 PPT. The west channel supplies recreational pools at Salton City and the Desert Shores area.

In the North Marine Lake with Elevation Control Alternative, the channels originating in the south from the rivers are freshwater, and flow to the east of the Sea. The conveyance channels originating from the north lake are the salinity of ocean water, and flow south on the west side of the Sea.

For the No Marine Lake Alternative with Pumping Option, water would be blended from the rivers with Sea water pumped into an afterbay. The resulting water would be at about 35 PPT, but any salinity level could be targeted. The blended water would then go into two conveyance channels, one flowing along the east border of the Sea and the other on the west. The west channel could double as pupfish connectivity habitat.

For the No Marine Lake with No Pumping Option, there would be two freshwater conveyance channels originating in the rivers, one flowing north along the east border of the Sea and the other flowing north on the west. The west channel could double as pupfish connectivity habitat. The east channel would terminate in a recreational pool at Bombay Beach, and the west channel would continue to the north end of the Sea.

The channels in all alternatives are constructed more or less on contour, and are located outside the current shoreline, with a depth of 3 to 10 feet. If fresh, the water varies from about 2.5 to 10 PPT TDS. If saline, the water may be between 20-40 PPT TDS. Freshwater channels could have high levels of suspended solids, but there would be very little TSS in the saline channels, as the sediment would have been deposited in the Sea. Nutrient content would be medium in the freshwater systems, as some nutrients would have been removed by treatment wetlands. Nutrient content would be low in saline channels. The degree of eutrophication, is medium. Selenium concentration is medium (6-15 ppb). If the water is blended, selenium concentration could be lower, as selenium is sequestered in Sea sediments. The evaporation rate in these channels would be the same as that of fresh water (5.6 feet per year), and the water would remain in any given portion of a channel for about 1-5 seconds, depending on flow rate. Wind fetch across the channels would be of very short

length, and the channels would in general border on streambank riparian habitat or on other upland habitat unassociated with the restoration scenarios..

Biological characteristics. This habitat would be rich in life forms, harboring bacteria, algae, and higher plants along the edges. The invertebrates present would be those characteristic of freshwater to saline environments, depending on the water source, as would the fish. Birds attracted to this area would be riparian birds and waterfowl, as well as wading birds and fisheating birds which feed on the invertebrates and fish found in the various waters.

Function of the habitat type. These channels function as conveyance of water to other habitat types, and are not designed to be habitat components in and of themselves. They will, however, have a generally riparian character, with water quality depending on source and development alternative.

Environmental quality. The overall environmental quality of this habitat ranges from good, if the water is saline, to poor if it is fresh. This habitat was not specifically discussed in the workshop, and may need some consideration. If wetlands associated with the channels are proposed, they should be minimal in size due to selenium concerns. Including sedimentation basins or traps before the water is discharged to the conveyance channels is highly recommended as a method of sequestering phosphorus and possibly DDE in addition to the sediment.

Flooded Saltgrass

Physical characteristics. This habitat is located near the shoreline and farther down in the basin, and is included in all restoration alternatives. The habitat would occur at elevations of about –220 to –240 feet, inside the margins of the current Sea. It is supplied with water in a variety of ways, making the habitat consist either of freshwater, or of moderately saline waters (between 2.5 and 15 PPT TDS). The habitat consists of shallow ponds constructed more or less on contour on exposed sediments or near-shore upland areas. Pond depth varies from 0.5 to 3 feet.

In the South Marine Lake without Elevation Control Alternative, flooded saltgrass stands would be present at the north, provided with water blended from the west conveyance channel and water from the Whitewater River. Additional saltgrass stands would be at the southwest edge of the Sea, provided with water blended from water pumped from the south Seaand mixed with water from the New River. All of these stands would be of moderately saline water.

In the South Marine Lake with Elevation Control Alternative, flooded saltgrass habitat is provided at the north end of the Sea with blended water from the Whitewater River and the South Sea as delivered in the channels, so the water quality could be up to about 15 PPT.

In the North Marine Lake with Elevation Control Alternative, flooded saltgrass plant substrate would be created at the delta areas of the New and Alamo Rivers, as freshwater habitats using river water.

In the No Marine Lake Alternative with Pumping Option, discharges from the channel south of Niland and of Salton City would form flooded saltgrass habitat, using blended water from the rivers and the Sea, for a moderately saline environment. In the No Marine Lake Alternative with No Pumping Option, flooded saltgrass would be provided with water from freshwater conveyance channels from the New and Alamo Rivers.

Suspended solids in the water are very low, as is the nutrient content, both being removed by physical and biological action in these ponds themselves. Eutrophication is therefore also low. Selenium concentration is medium (6-15 ppb), as it is not removed by the ponds themselves. If the water is blended with Sea water, selenium concentrations could be lower. The evaporation rate in these ponds would be about that of fresh water (5.6 feet per year), and the water would remain in any given pond for about 4-120 hours (5 days), depending on season and management practices. Wind fetch across the ponds would be of short length, and the ponds would in general border on similar habitat or other forms of waterfowl habitat, including wildlife sanctuaries.

Biological characteristics. This habitat would probably be rich in life, harboring bacteria, algae, and higher plants. The invertebrates present would be those characteristic of freshwater or moderately saline environments. Birds attracted to this area would be waterfowl and wading birds which feed on plants and invertebrates found in freshwater and moderately saline environments.

Function of the habitat type. These shallow ponds would provide important foraging, resting, and nesting habitat for waterfowl and wading birds. The ponds would evaporatively concentrate water for delivery to other habitat types downslope. The habitat would also be important for dust control, as it would occur on sediments exposed by the drying lake.

Environmental quality. The overall environmental quality of this habitat is judged to be fair. The habitat type was not specifically considered in the workshop, but if the habitat were seasonally flooded there would be concern with the re-mobilization of soluble forms of selenium from the sediments.

Fresh Water Waterfowl Fringe Habitat

Physical characteristics. This habitat is located near the shoreline in only the No Marine Lake with No Pumping Alternative, as this alternative has no options for blending of water to create upslope saline habitats. It would occur at elevations of about –220 to –240 feet, inside the margins of the current Sea. It is supplied with water directly out of the two river systems, via forebays and channels that deliver the

water to ponds constructed more or less on contour on exposed sediments or near-shore upland areas. Pond depth varies from 0.5 to 3 feet. The water is quite fresh, varying from about 2.5 to a maximum of 15 PPT TDS. When it exceeds 15 PPT TDS, it would be considered to be saline waterfowl fringe habitat.(#10). Suspended solids in the water are low, as they should have been removed by sedimentation basins upstream. Nutrient content, however, is high, especially in phosphorus. Eutrophication is therefore also high. Selenium concentration is medium (6-25 ppb). The evaporation rate in these ponds would be about that of fresh water (6.5 feet per year), and the water would remain in any given pond for about 1-10 days, depending on season. Wind fetch across the ponds would be of medium length, and the ponds would in general border on similar habitat or other forms of waterfowl habitat.

Biological characteristics. This habitat would probably be rich in life, harboring bacteria, algae, and higher plants. The invertebrates present would be those characteristic of freshwater environments, as would the fish. Birds attracted to this area would be waterfowl, fisheating, and wading birds which feed on plants, invertebrates, and fish found in freshwater environments.

Function of the habitat type. These shallow ponds would provide foraging, resting, and nesting habitat for waterfowl, fisheating, and wading birds. There would be a high rate of return for reducing any remaining suspended solids, nutrients, and selenium, as the habitat would tend to be low in oxygen. It would promote the growth of a variety of higher plants in a wetland setting. The ponds would evaporatively concentrate water for delivery to other habitat types downslope. The habitat would also be important for dust control, as it would occur on sediments exposed by the drying lake.

Environmental quality. The overall environmental quality of this habitat is judged to be fair. The main problem is selenium, which would be in concentration too high for good quality habitat.

Saline Waterfowl Fringe Habitat

Physical characteristics. This habitat is the one that was principally discussed during the workshop, and would be present in all alternatives. In would be located downslope of freshwater habitats if they exist, or at somewhat higher elevations if freshwater habitats are a lesser or absent part of a restoration scenario. It would occur at elevations of about –240 to –255 feet, well inside the margins of the current Sea. It is supplied with water either from conveyance channels following blending of river water with water pumped from the larger body of the Sea, or as the downslope recipient of water flowing through freshwater habitats upslope following evaporative concentration. It could also be developed with discharge water from the restored portion of a divided Sea, which is the biologically preferred scenario. Shallow ponds are constructed more or less on contour on the exposed sediments and vary in depth from 0.5 to 3 feet. The water is saline, varying from about 15-50 PPT TDS. Suspended solids in the water are low, as they would have been removed either by

sedimentation basins or by deposition in the Sea. Nutrient content is probably low-medium, as phosphorus may have been sequestered in the Sea sediments. Eutrophication is therefore also low to medium. Selenium concentration could be low (1-2 ppb), resulting from implementation with Salton Sea water which has acted as a selenium filter. The evaporation rate in these ponds would be slightly lower than that of fresh water (6.0 feet per year), and the water would remain in any given pond for about 1-4 weeks, depending on season. Wind fetch across the ponds would be of medium length, and the ponds would in general border on similar habitat or other forms of waterfowl habitat.

Biological characteristics. This habitat would probably be somewhat restricted in life form, harboring bacteria and algae, but largely excluding higher plants. The invertebrates present would be those characteristic of saline environments, as would the fish. Birds attracted to this area would be saltwater fisheating birds and wading birds which feed on the invertebrates and fish found in moderately saline environments.

Function of the habitat type. These shallow ponds would provide foraging, resting, and nesting habitat for waterfowl, fisheating, and wading birds. The ponds will evaporatively concentrate water for delivery to other habitat types downslope. The habitat would be important for dust control, as it would occur on sediments exposed by the drying lake.

Environmental quality. The overall environmental quality of this habitat is judged to be very good. If the habitat is implemented using only Salton Sea water, the selenium concerns are considerably ameliorated.

Shallow Flood Hyperbrine Concentrator Habitat

Physical characteristics. This habitat is located downslope of other saline habitats, or at somewhat higher elevations if water is pumped to them as part of a restoration scenario. It forms a part of all scenarios considered, and would occur at elevations of about –235 to –255 feet, well inside the margins of the current Sea. It is supplied with water either pumped directly from the larger body of the Sea, or as the downslope recipient of water flowing through saline habitats upslope following evaporative concentration. Shallow ponds are constructed more or less on contour on the exposed sediments and vary in depth from 0.5 to 4 feet. The water is hyper-saline, varying from about 50 to120 PPT TDS. Suspended solids in the water are low, as it will have been removed by either sedimentation basin or by deposition in the Salton Sea. Eutrophication is low to medium. Selenium concentration is low (1-2 ppb), having been removed by sequestration in the Salton Sea sediments. The evaporation rate in these ponds would be lower than that of fresh water (5.0 feet per year), and the water would remain in any given pond for only about 4-10 days, depending on season. Wind fetch across these small ponds would be of short length, and the ponds would in general border on similar habitat, salt flats, or other forms of waterfowl habitat.

Biological characteristics. This habitat would probably be somewhat restricted in life form, harboring bacteria and algae, but completely excluding higher plants. The invertebrates present are those characteristic of hyper-saline environments. There are no fish. Birds attracted to this area would be only wading birds which feed on the invertebrates found in these hyper-saline environments.

Function of the habitat type. These shallow ponds would provide foraging, resting, and possibly nesting habitat for certain wading birds. The ponds will evaporatively concentrate water for delivery to salt crystallizer and bittern ponds. The habitat would be important for the generation of brines for dust control, as it would occur on sediments exposed by the drying lake.

Environmental quality. The overall environmental quality of this habitat is judged to be fair. Specifics of the environmental benefits and liabilities [were?] discussed in the workshop.

A.10 Review of the Restoration Alternatives

In light of the results of the workshop on shallow habitat, the restoration alternatives can be discussed relative to their ability to provide the habitat qualities called out by the workshop participants. Although the workshop did not specifically evaluate each alternative in light of opportunities for shallow habitat, the workshop coordinators have taken the information generated by the workshop participants and undertaken the following conceptual analysis. We recognize that the actual configuration of the alternatives could be modified, but this discussion is intended to call out the advantages and disadvantages of each alternative as currently presented, as it relates to the shallow habitats discussed at the workshop.

South Marine Lake without Elevation Control. This alternative would provide minimal opportunities for diverting saline water into shallow shoreline habitats without pumping. With the barrier, the salinity of the water on each side of the barrier would be different, but the elevation would be essentially the same. Therefore, in order to provide saline water to shoreline habitats, pumping would be required. With pumping, however, there is ample opportunity to construct habitat near the shore and in proximity to existing refuge habitat on clay soils with shallow slope, in the south portion of the basin as well as near the Whitewater River at the north. An additional feature of this alternative is that almost all of the conveyance channels would be brackish water instead of fresh, and selenium could be diluted.

South Marine Lake with Elevation Control Alternative. This alternative would have fewer opportunities to develop shallow habitat on clay soils with shallow slope in the vicinity of existing preserve lands, as compared to the North Marine Lake with Elevation Control Alternative. The shoreline areas exposed in the north half of the Sea are generally steep and sandy, with the exception of the Whitewater River delta. The maintenance of the south lake at the elevation of the current Sea facilitates using the Sea water for shallow habitat near the shoreline with minimal pumping. If habitat

is to be developed associated with the Whitewater River, however, pumping would be required in order to deliver Sea brine to that wetland to dilute the selenium sufficiently.

North Marine Lake with Elevation Control Alternative. This alternative would have the ability to provide saline or at least brackish water habitat in areas that would be close to the shoreline and in the vicinity of existing refuge or preserve lands, and which could be constructed where clay soils and shallow slopes are present. With the North Lake held at the elevation of the current Sea, the delivery of saline water to the shallow habitats could be accomplished with a minimum of pumping. This alternative could be modified to minimize habitat utilizing the relatively selenium-rich river and drain water, all of which could be diverted to the North Lake via conveyance channels. From the point of view of shallow habitat, this alternative is quite viable.

No Marine Lake, with Pumping Option. This alternative has also provides no opportunities for developing shallow habitat with saline water without pumping, but pumping is specifically provided for in this alternative. Since the residual Sea would be hyper-saline in this alternative, however, blending with river or drain water would be required in order to target the desired salinity for the habitat. Blending was not a preferred method of supplying water, due to selenium concerns. If blending were not used, the shallow habitat would be hyper-saline, as is the Sea. This alternative does provide ample location for habitat construction on clay soils with shallow slopes near existing refuges both at the north and south portions of the basin.

No Marine Lake, No Pumping Option. This alternative provides no opportunity to create shallow habitat with saline water, as the brine in the residual Sea could not be diverted using gravity to shoreline areas for habitat development. Any shallow habitats, then, would have to begin with river or drain water, and could concentrate to more saline conditions. The selenium concentration in the river and drain water, however, makes this an unattractive option. Even though exposed shorelines with clay soils and shallow slopes are present, any habitat constructed in them would be of poor to unacceptable quality.

Overall, from the point of view of shallow habitat, a preferred alternative would have the following features:

- Construction opportunities at the south areas of the basin, on clay soils with shallow slopes adjacent to existing refuge and reserve lands. This requirement eliminates the South Marine Lake with Elevation Control alternative, but remains feasible with the other scenarios.

- Gravity delivery of water from a restored portion of the Sea, which would be low in selenium and of a salinity about that of ocean water. This requirement would be possible with a south or north marine lake.

- A pumped delivery of water from a restored portion of the Sea, which would be low in selenium and of a salinity about that of ocean water. This would be possible with all scenarios, but more pumping would be required with the barrier and the no barrier alternatives.

A.11 Next Steps

The following actions were suggested specifically by workshop participants. The workshop coordinators have proposed some possibilities for accomplishing these actions, which should be part of the ongoing restoration efforts for the Salton Sea.

1. A responsible monitoring program for the entire Salton Sea, including the river and drain inputs, should be designed, funded, and implemented. The Salton Sea Science Office is the logical lead for this effort, which should include comprehensive data on physical and chemical characteristics of the Sea, taken from more than a single point, and repeated at least quarterly at standardized sampling locations over the course of at least a year. Participation for design of the studies and technical review of the data should be sought from the participants in the water quality workshop. This monitoring program should be implemented as soon as possible, but certainly before the end of 2004.

2. Review the applicability of National Resource Conservation Service (NRCS) specifications for berms, dikes, and levees. The planning team headed by Tetra Tech is a logical lead for this effort. The review should include an informed participant from the NCS who has had on-the-ground experience with the infrastructure elements under evaluation. The review should return a report that details the conditions of salinity, moisture, texture, and exposure to wind fetch that can be expected to result in effective implementation of each infrastructure element evaluated. This review should be accomplished as part of the current contract for developing a preferred alternative for Salton Sea restoration.

3. Develop a data base that would include photos of each bird species of concern and its habitat requirements. This could be accomplished by consulting Birds of the Salton Sea and the text Cowardin's Wetland and Deepwater Habitats (Cowardin et al. 1979). The Salton Sea Science Office is a logical lead for this project, which could be usefully contracted to any qualified individual of team. The Science Office, in consultation with participants from the biology workshop, should determine the list of species to be included in the data base. As it includes a compilation of existing data, it is a task that should be accomplished before the end of 2004.

Appendix B
COST ANALYSIS OF THE PREFERRED PROJECT

B.1 Introduction

A preliminary cost assessment has been prepared for the preferred restoration project. This appendix provides an overview of the assumptions and factors used for developing the cost estimate of the preferred project. The overall cost summary is provided in Table B-1. An important component of the overall cost of the plan would be the central impoundment structure. Table B-1 includes cost estimates for two possible designs for the impoundment structure and two possible design elevations for the water surface of the marine lake. Lowering the design elevation would lower the cost of the impoundment structure and affect the cost of some other features.

B.2 Cost Elements

Each of the features included in the cost estimate are discussed briefly below:

Impoundment Structure/Causeway—Various conceptual designs have been considered for the central impoundment structure. These concepts along with cost estimates for each are described in URS (2204). A working group of 15 civil and geotechnical engineers was convened to review the feasibility of constructing a dike, or retention structure/causeway anywhere within the Salton Sea. The group reviewed data from the recent geotechnical investigation of the Sea and suggested alternative design concepts. Cost estimates were developed based on the concepts identified by this group. Cost estimates are very preliminary at this point, and, as of this writing, have not yet undergone review by the work group.

Of the concepts proposed by the work group, the most cost effective structure appears to be a blanketed rockfill design. This concept would consist of an embankment built in the water and entirely out of rock fills. To mitigate seepage through the dam, a blanket of fine material would need to be placed on the upstream slope. Conventionally, this is usually an asphalt or concrete pavement. However, the Sea level would preclude those for this concept. The upstream blanket for this concept would consist of depositing fine-grained soils on the upstream slope to "plug" the rockfill. Ten to 25 feet of the weak soils below the embankment would

Table B-1. Preliminary Cost Estimate for Preferred Alternative Concept

Item	Cost ($M) at El=-235' msl		Cost ($M) at El=-240' msl	
Initial Construction Costs	Blanketed Rockfill	Rockfill w Slurry Wall	Blanketed Rockfill	Rockfill w Slurry Wall
Mid-Sea Retention Structure/Causeway	$ 418	$ 489	$ 354	$ 418
Appurtenant Structures (Spillways, etc.)	21	24	18	21
Dredging to Communities & Island Creation	6	6	20	20
Greenbelt Channels to North Lake (Incl. 20 sed. basins, 2,500 ac wetland, 20% planted)	76	76	66	66
Recreational Lake (approx. 1,000 ac)	45	45	45	45
Torres Martinez Wetlands/Habitat	20	20	20	20
Upstream Wetlands (Top 5 sites, 1376 ac)	58	58	58	58
Shallow Water Habitat Initial Phase (2,000 ac)	8	8	8	8
Total Construction Costs (rounded)	**$ 650**	**$ 730**	**$ 590**	**$ 660**
Annual Costs	**Cost ($M/yr)**		**Cost ($M/yr)**	
Causeway, Channel & Appurtenance O&M	$ 5.1	$ 5.9	$ 4.4	$ 5.0
Add Shallow Habitat (500-1,000 ac/yr)	3.0	3.0	3.0	3.0
Habitat O&M	2.0	2.0	2.0	2.0
Total Annual O&M ($M/yr)	**$ 10.1**	**$ 10.9**	**$ 9.4**	**$ 10.0**
Present Value of Annual Costs ($M) - based on 30 yrs	$ 150	$ 160	$ 140	$ 140
Total Present Value Cost ($M)	**$ 800**	**$ 890**	**$ 730**	**$ 800**

Note: Does not include costs for development of recreational facilities, new highways, or new lakeside development.

be excavated and replaced with rock fills. This material could be used to provide the blanket. Alternatively, a bentonite slurry wall could be constructed through the dam along its crest to provide a seepage barrier. The slurry wall would add $60 to $75 million to the project. The conceptual design includes inclinations of 4:1 on the upstream slope and 7:1 on the downstream slope. The crest of the dam would be 30 feet wide and provide for 5 feet of freeboard above the lake.

Lower marine lake levels would require less embankment volume for the impoundment structure, and would cost less. Table B-1 presents the estimated costs for the Blanketed Rockfill structure for lake elevations of –235 and –240 feet relative to mean sea level (msl). This evaluation indicates that the mid-Sea dam would cost about $100 million less with a 5 foot drop in lake level below -235 feet msl. Conversely, if the structure were designed to maintain the current water elevation, the cost estimates would go up by about $150 million.

Appurtenant Structures—The cost of appurtenances such a spillways and other outlet, and the channels leading to shallow water have been factored in as five percent of the impoundment structure.

Table B-2. Preliminary Cost Estimates for Dredging for Lake Access to Communities.

Elevation (ft msl)	El Drop (ft)	Ave. Dredge Depth (ft)	Dredge Area (ac)	Dredge Access Area (ac)	Total Dredge Area (ac)	Dredge Volume (mcy)	Base Dredge Cost ($M)	+Mob & Unlisted ($M)	+Contin-gencies ($M)	+Non-Contract ($M)
227	0	0	0	0	0	0.0	$0.00	$0.00	$0.00	$0.00
228	1	2	5	0.5	5.5	0.0	$0.05	$0.06	$0.07	$0.10
229	2	4	10	1	11	0.1	$0.21	$0.24	$0.30	$0.38
230	3	6	15	1.5	16.5	0.2	$0.46	$0.53	$0.67	$0.87
231	4	8	20	2	22	0.3	$0.82	$0.95	$1.18	$1.54
232	5	10	25	2.5	27.5	0.4	$1.29	$1.48	$1.85	$2.40
233	6	12	30	3	33	0.6	$1.85	$2.13	$2.66	$3.46
234	7	14	37	4	41	0.9	$2.59	$2.98	$3.72	$4.84
235	8	14	45	5	50	1.1	$3.28	$3.77	$4.71	$6.12
236	9	15	55	6	61	1.4	$4.14	$4.76	$5.95	$7.73
237	10	15	75	8	83	2.0	$5.82	$6.70	$8.37	$10.89
238	11	16	105	10	115	2.9	$8.34	$9.59	$11.99	$15.58
239	12	16	125	12	137	3.5	$10.26	$11.79	$14.74	$19.17
240	13	17	145	14	159	4.2	$12.27	$14.12	$17.64	$22.94
241	14	17	185	18.5	203.5	5.6	$16.19	$18.61	$23.27	$30.25
242	15	18	225	22.5	247.5	7.0	$20.26	$23.30	$29.13	$37.87
243	16	18	265	26.5	291.5	8.5	$24.55	$28.23	$35.29	$45.88
244	17	19	325	32.5	357.5	10.7	$30.94	$35.59	$44.48	$57.83
245	18	19	385	38.5	423.5	13.0	$37.65	$43.29	$54.12	$70.35

Dredging to Communities and Island Creation—With lowered lake levels, existing Sea-side communities would be at some distance from the Sea. Dredging is proposed to maintain access to the Sea for these communities. Dredging could also create islands and peninsulas that would provide recreational and habitat value as well as create opportunities for development. Dredging cost estimates are based on preliminary estimates of the quantities that would need to be removed for different lake elevation targets. A raw unit cost of $2.9 million/million cubic yard (mcy) was then applied for dredging along with factors for mobilization, unlisted items, contingencies, and costs such as design and construction oversight.

The areal extent of dredging and the quantity of material to be removed were estimated by first evaluating the most extreme lower lake elevation of -245 feet msl. For this lake elevation, the length of channels needed to provide access to all current Sea-side communities was calculated as 16 miles. Dredging these channels would create several islands and peninsulas around the Sea that would be available for future development or for recreational or wildlife habitat uses. Using a channel width of 200 feet, about 385 acres of exposed sediments would need to be dredged to create the channels. It was assumed that this area would be dredged to a water depth of 10 feet in the reclaimed areas. In addition, adjacent areas still under water, but with water depths less than 10 feet, would need to be dredged to provide access.

Estimates for other lake elevations were developed by a series of scaling assumptions from the calculation for elevation -245 feet msl discussed above. The dredging cost estimates for a range of elevations from the current level of -227 feet msl down to -245 feet msl are provided in Table B-2.

Greenbelt Channels to the Lakes with Wetlands and Sedimentation Basins— The New and Alamo rivers would need to be extended to reach the north basin marine lake (Figure B-1). The cost of constructing a wetland greenbelt area around these river extensions has been included along with the cost of constructing 20 sedimentation basins. The Nolte (2002) report commissioned by the Citizens Congressional Task Force to evaluate potential wetland sites that could be developed in the New and Alamo river channels was used as an important source of cost information.

The wetland greenbelt for both channels was estimated at 2,500 acres and it was assumed that vegetation would be planted on 20 percent of this area. It was assumed that over time vegetation would grow to fill the area. The unit cost for vegetation was also taken from Nolte (2002). For purposes of providing costs of a preferred project, wetlands and sedimentation basins were assumed. However, if other biological or chemical treatments are found more effective some amount of wetlands or sedimentation basins could be replaced with such treatments.

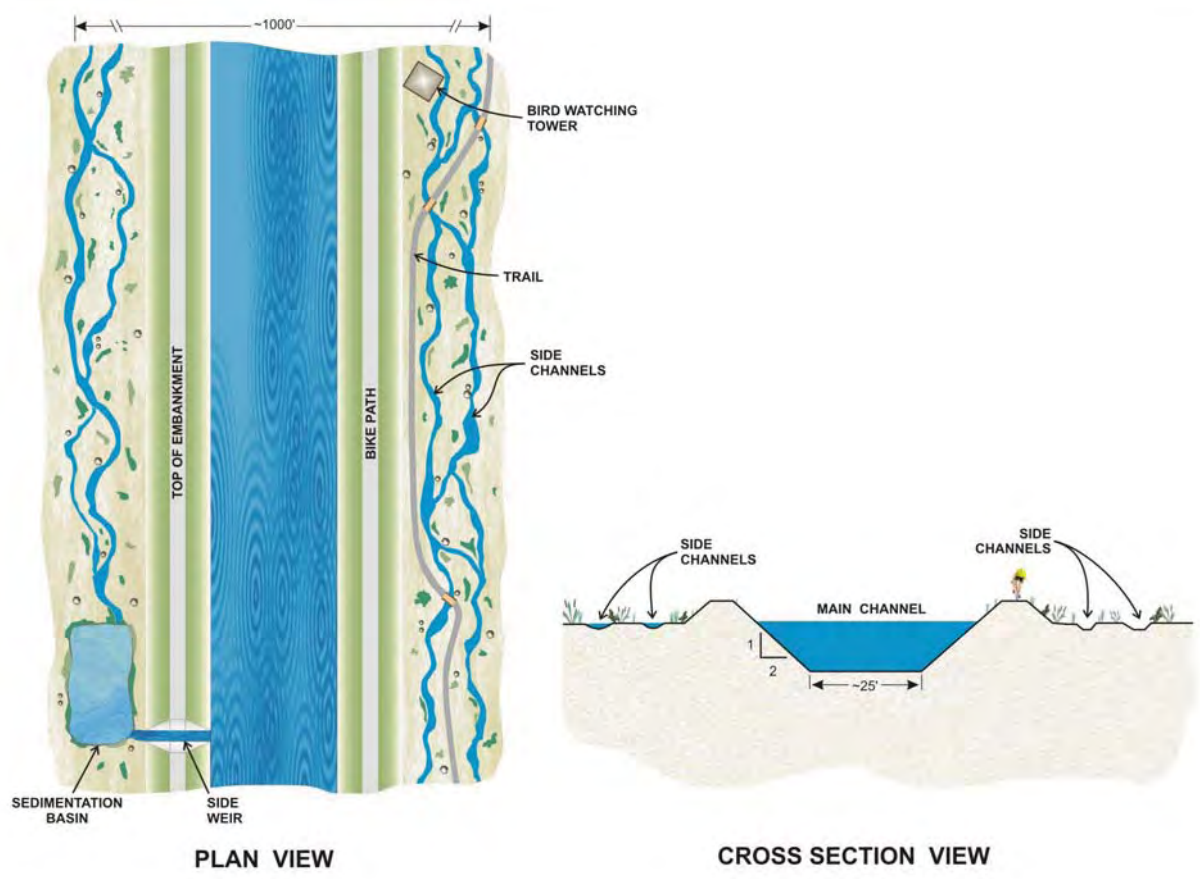

Figure B-1. Schematic of Greenbelt Channel Extension Concept.

Table B-3. Cost Estimate for Top 5 Wetland Sites from Nolte (2002).

Site	Ranking Score	Area (ac)	Cost Est.	Unit Cost ($/ac)
NR16	27	585	$24,640,000	$42,119.66
NR17	27	320	$13,380,000	$41,812.50
AR14	31	313	13,750,000	$43,929.71
NR32	33	93	$3,900,000	$41,935.48
NR26	34	65	$2,750,000	$42,307.69
Top 5 Sites		**1376**	**$58,420,000**	**$42,456.40**

The Nolte (2002) report identifies 4,276 acres of potential wetlands for a cost of $182 million. To achieve water quality targets, this report assumes 1,376 acres in the five highest rated sites of those wetlands could be constructed in the first phase of the proposed project (Table B-3).

For sedimentation basins, estimates were derived from the evaluation of plans to desalt the Alamo and/or New Rivers. US Filter, Black & Veatch and others have, in the past, suggested desalting the rivers in the Imperial Valley to provide product water for sale to urban or other communities. To properly operate such desalting plants, river water must be very clear. To reduce turbidity, a rule of thumb is often used that sedimentation basins should have an area of about 10 square feet for every gallon per minute of flow. That translates to a requirement of 110 acres of sedimentation basins to treat a flow of 800,000 acre-feet/year. The base cost for these was taken from the Nolte (2002) report on constructing wetlands on the New and Alamo Rivers, for a typical 5.5 acre sedimentation basin. Constructing 20 5.5 acre sedimentation basins will provide the total 110 acres needed for sedimentation.

Cost estimates for channel extensions including the greenbelt areas are provided in Tables B-4 and B-5, for marine lake elevations -235 feet msl and -240 feet msl, respectively. A lower marine lake elevation will allow for a greater channel slope, and thus a smaller cross section and lower construction costs. Channels were assumed to be excavated and unlined. Excavated material would be compacted and used to create embankments on either side of the channels.

Other Features—Preliminary cost estimates have been included for three other features: a 1,000 acre shallow recreational lake, a Torres Martinez wetlands/habitat feature, and an initial phase of shallow water habitat construction. Shallow habitat areas were assumed to be graded at a cost of about $2,000/acre as a base cost and $4,000/acre when all contingencies are included.

Operation and Maintenance Costs and Other On-Going Costs—Preliminary estimates have been provided for operation and maintenance of the various features. In addition, costs are included for future build-out of shallow water habitat which would be phased-in later. These areas would provide habitat for birds as well as help with dust suppression.

Table B-4. Channel Cost Estimate for Both River Extensions to North Lake
Lake Elevation = -235

Variable	New R	Alamo R	Totals
Q (AFY)	500,000	450,000	950,000
Q (cfs)	691	622	1,312
Ave. Side Slope (1:SS)	2	2	
Bottom Width (ft)	29	25	
Top Width (ft)	69	64	
Depth in Main Channel (ft)	10	10	
Ave. Depth (ft)	7	7	
Velocity (fps)	1.4	1.4	
Freeboard[1] (ft)	2.0	2.0	
Length (mi)	21.8	19.4	41.2
Length (ft)	115,104	102,432	217,536
Channel Excavation (cu yd)	2,757,618	2,187,292	4,944,910
Wetland Side Channel Area (%)	20%	20%	
Sinuosity	3.0	3.0	
Wetland Excavation (cu yd)	1,654,571	1,312,375	2,966,946
Total Excavation (cu yd)	4,412,189	3,499,667	7,911,856
Excavation Unit Cost ($/cu yd)	$2.35	$2.35	
Compact Embankment ($/cu yd)	$1.50	$1.50	
Channel Cost	**16,986,928**	**13,473,719**	**30,460,646**
Vegetation (ac/mi)	12	12	
Vegetation ($/ac)	$16,335	$16,335	
Vegetation Cost	**$4,273,236**	**$3,802,788**	**$8,076,024**
No. of Sedimentation Basins	10	10	
Sedimentation Basin Unit Cost	$114,422	$114,422	
Sedimentation Basin Cost	**$1,144,220**	**$1,144,220**	**$2,288,440**
Channel + Wetlands Base	$22,404,384	$18,420,727	$40,825,110
Mobilization (5%)	$1,120,219	$921,036	$2,041,256
Unlisted Items (+10%)	$2,240,438	$1,842,073	$4,082,511
Contingencies (25%)	$6,441,260	$5,295,959	$11,737,219
Noncontract Cost (30%)	$9,661,890	$7,943,938	$17,605,829
Total Cost	**$41,868,192**	**$34,423,733**	**76,291,925**
Evap. Losses in Channels (AFY)	1,101	907	2,008

[1] Additional freeboard would be provided by compacted embankments made from cut material.

Table B-5. Channel Cost Estimate for Both River Extensions to North Lake
Lake Elevation = -240

Variable	New R	Alamo R	Totals
Q (AFY)	500,000	450,000	950,000
Q (cfs)	691	622	1,312
Ave. Side Slope (1:SS)	2	2	
Bottom Width (ft)	15	23	
Top Width (ft)	59	58	
Depth in Main Channel (ft)	11	9	
Ave. Depth (ft)	7	6	
Velocity (fps)	1.7	1.7	
Freeboard[1] (ft)	2.0	2.0	
Length (mi)	21.8	19.4	41.2
Length (ft)	115,104	102,432	217,536
Channel Excavation (cu yd)	2,238,461	1,838,924	4,077,385
Wetland Side Channel Area (%)	20%	20%	
Sinuosity	3.0	3.0	
Wetland Excavation (cu yd)	1,343,076	1,103,354	2,446,431
Total Excavation (cu yd)	3,581,537	2,942,278	6,523,815
Excavation Unit Cost ($/cu yd)	$2.35	$2.35	
Compact Embankment ($/cu yd)	$1.50	$1.50	
Channel Cost	**13,788,919**	**11,327,770**	**25,116,689**
Vegetation (ac/mi)	12	12	
Vegetation ($/ac)	$16,335	$16,335	
Vegetation Cost	**$4,273,236**	**$3,802,788**	**$8,076,024**
No. of Sedimentation Basins	10	10	
Sedimentation Basin Unit Cost	$114,422	$114,422	
Sedimentation Basin Cost	**$1,144,220**	**$1,144,220**	**$2,288,440**
Channel + Wetlands Base	$19,206,375	$16,274,778	$35,481,153
Mobilization (5%)	$960,319	$813,739	$1,774,058
Unlisted Items (+10%)	$1,920,637	$1,627,478	$3,548,115
Contingencies (25%)	$5,521,833	$4,678,999	$10,200,831
Noncontract Cost (30%)	$8,282,749	$7,018,498	$15,301,247
Total Cost	**$35,891,913**	**$30,413,491**	**66,305,404**
Evap. Losses in Channel (AFY)	928	823	1,752

[1] Additional freeboard would be provided by compacted embankments made from cut material.

B.3 References

Nolte Beyond Engineering. 2002. Reconnaissance Inventory of Wetland and Sedimentation Basin Sites: New and Alamo Rivers Prepared for The Citizen's Congressional Task Force on the New River. May.

URS. 2004. Mid-Sea Dam and Barrier Concepts Salton Sea Study. Riverside and Imperial Counties, California. July.

Appendix C
PERFORMANCE

Reclamation, IID, and CVWD have studied historic and potential future inflows to Salton Sea in detail (Weghorst, 2001). This hydrology work has served as the basis for the development of the Salton Sea Accounting Model (Model) which is used to forecast future salinity and elevation in the Sea. The Model has been used to assess the performance of restoration alternatives, as well as to evaluate the effects water transfer agreements. The Model is a computer application used to simulate the response to historic and expected future inflows to the Salton Sea.

This appendix focuses on the performance of the recommended preferred project, the alternative that includes a marine lake in the north with elevation control. Discussions of the performance of other alternatives considered in the main report are also provided along with comparisons to some other alternatives considered in the past.

C.1 Historic Inflow, Salinity and Elevation

Inflows to the Salton Sea are not constant and have varied from a minimum of 1.19 million acre-feet per year in 1992 to a maximum of 1.50 million acre-feet/year in 1963. Figure C-1a depicts a history of inflows into the Salton Sea for the years 1950 to 1999 (Weghorst, 2001). The average annual inflow for this period was 1.34 million acre-feet/year. The historic salt load into the Salton Sea has also been variable. Figure C-1b presents a history of salt load to the Sea. A minimum load of 3.0 million tons occurred in 1950. A maximum salt load of 6.1 million tons occurred in 1977. The average annual salt load to the Salton Sea for the period 1950 to 1999 was 4.5 million tons per year (ton/yr). It appears that salt loading has leveled off at around 4 million ton/yr.

In 2000-2001, the Salton Sea had an average salinity level of about 44,000 milligrams per liter (mg/L) (Weghorst, 2001). Expectations are that salinity levels within the Sea will continue to increase as a result of evaporation and continuous inflows of salt-laden water from agricultural drainage water from irrigation districts around the Sea and from agricultural and municipal use in Mexico.

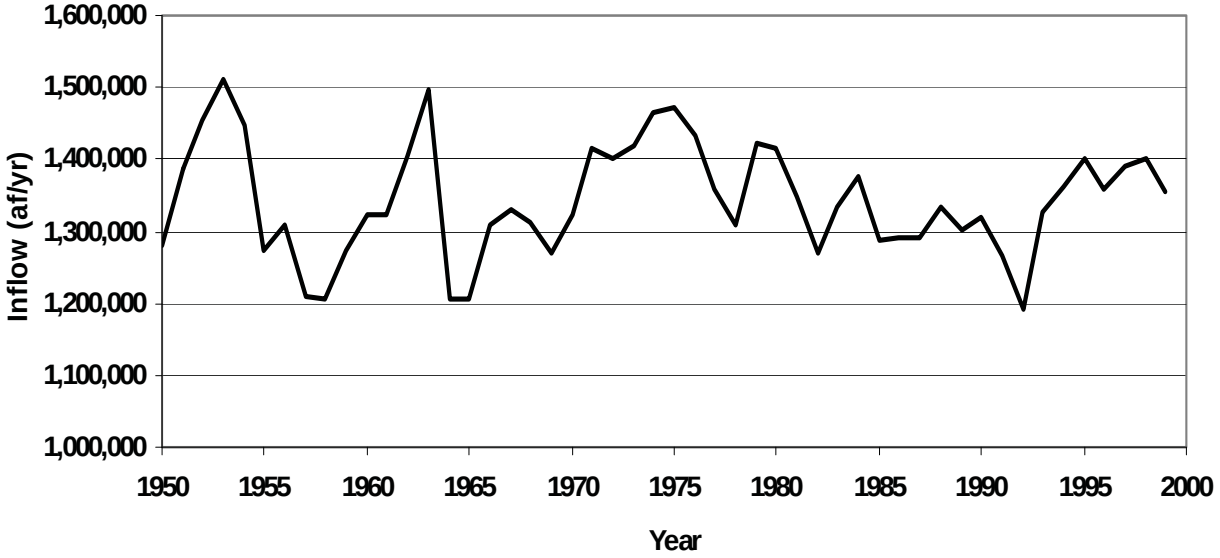

Figure C-1a. Total Historic Salton Sea Inflows (Source: Weghorst, 2001).

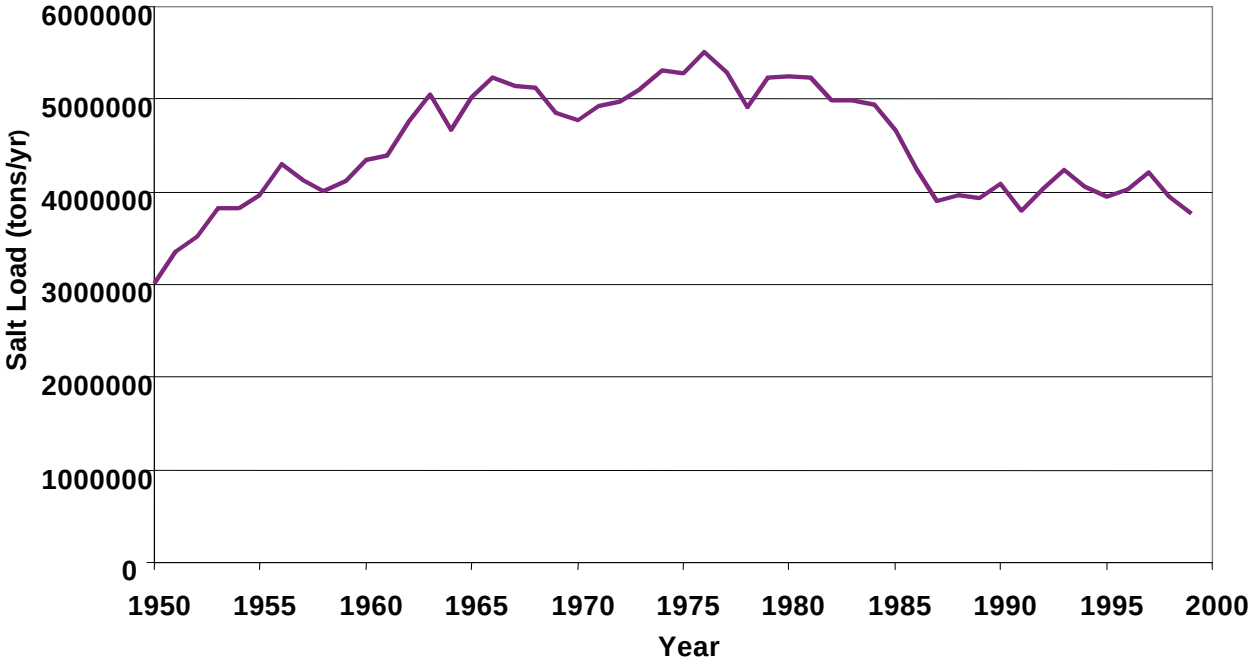

Figure C-1b. Total Historic Salton Sea Salt Load (Source: Weghorst, 2001).

IID estimates annual average salinity for the Sea from surface samples taken at Bertam Station, Desert Beach, Sandy Beach, and Salton Sea Beach. A historic record exists from 1950 through present, with data available up to 1999. Figure C-2a depicts historic Salton Sea salinity values through time. Beginning in 1992, the rate of salinity increase in the Sea began declining. A similar, but more pronounced, reduction in salinity occurred between 1972 and 1980. A much more dramatic reduction occurred from 1950 to 1955.

Inspection of the historic water surface elevations, presented in Figure C-2b, yields the conclusion that these early salinity changes occurred during periods of rising Sea elevations. Rising elevations were a result of increased inflows that provided significant dilution effects. When the elevation increases, salinity levels are observed to go down or level off. These trends were also observed during the post-1992 period where the trend indicated a leveling off of increases in salinity. However, the leveling of the increase in salinity from 1992 to 1999 was paired with only slight increases in elevation. This trend suggests that solids are precipitating or being biologically reduced from the Sea (Weghorst, 2001). This issue is discussed below.

The Sea's inverse relationship between salinity and water surface elevation is due to simple conservation of mass principles. Salinity can increase rapidly over a short period of time when evaporation exceeds inflows. Conversely, when inflows exceed evaporation, then dilution will occur and salinity will decrease. Under conditions of equal inflow and evaporation, only slight increases in salinity will occur due to salt loading from inflows.

C.2 Precipitation of Dissolved Solids

In December 2000, a Science Workshop was held in Riverside, California, to develop a joint opinion of scientists with knowledge in the field of salinity, salt precipitation, and biological reduction of sulfates within natural waters. It was concluded that dissolved solids are either being precipitated or biologically reduced within the Salton Sea as dissolved salts are added to Sea waters on an annual basis. It was concluded that, at a minimum, 0.7 million ton/yr of salts dissolved in inflow waters are being precipitated or reduced upon mixing in the Sea. It was also concluded that, at a maximum, 1.2 million ton/yr are either being precipitated and/or biologically reduced. If biologic reductions are occurring, then they could be reducing, for example, through actions of sulfate-reducing bacteria.

Given the wide range of possibilities that exist between 700,000 and 1.2 million ton/yr of salt loading, the Salton Sea Accounting Model was developed in a way so that this issue was handled as an uncertainty term. When the Model is operated in a stochastic mode, a different value for precipitation or reduction of dissolved solids is sampled from a uniform probability distribution defined by the above limits of 700,000 and 1.2 million ton/yr. The Model then reduces the salt load to the Sea on

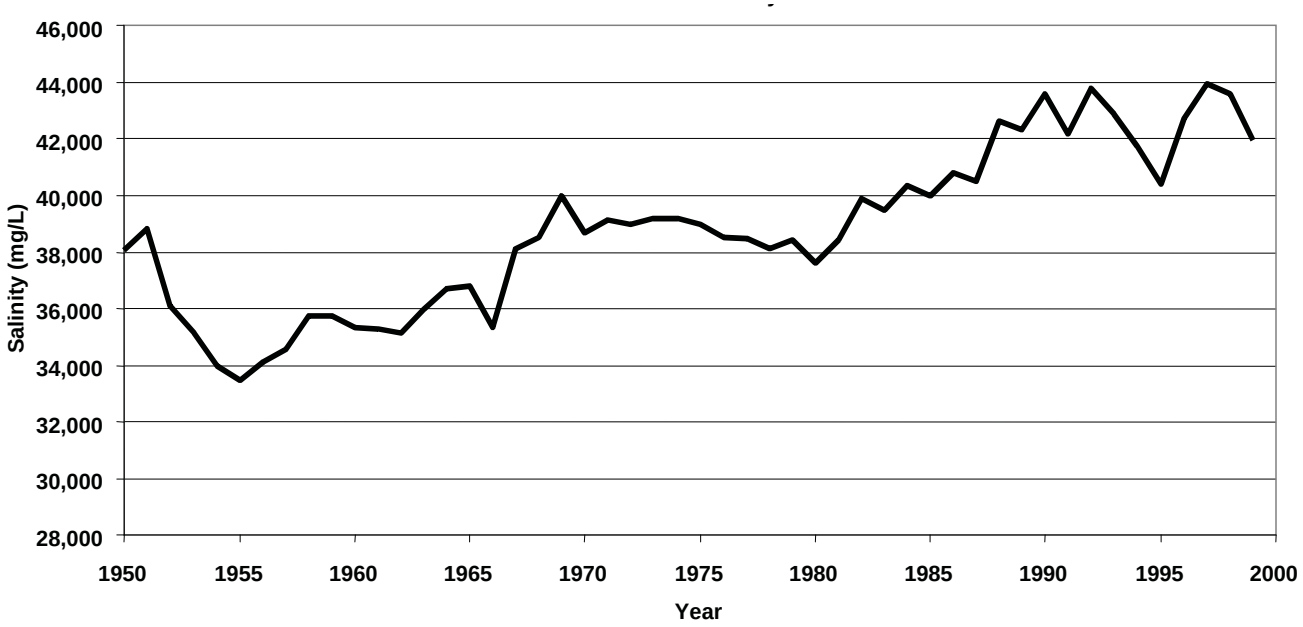

Figure C-2a. Historic Salinity Trend in the Salton Sea.

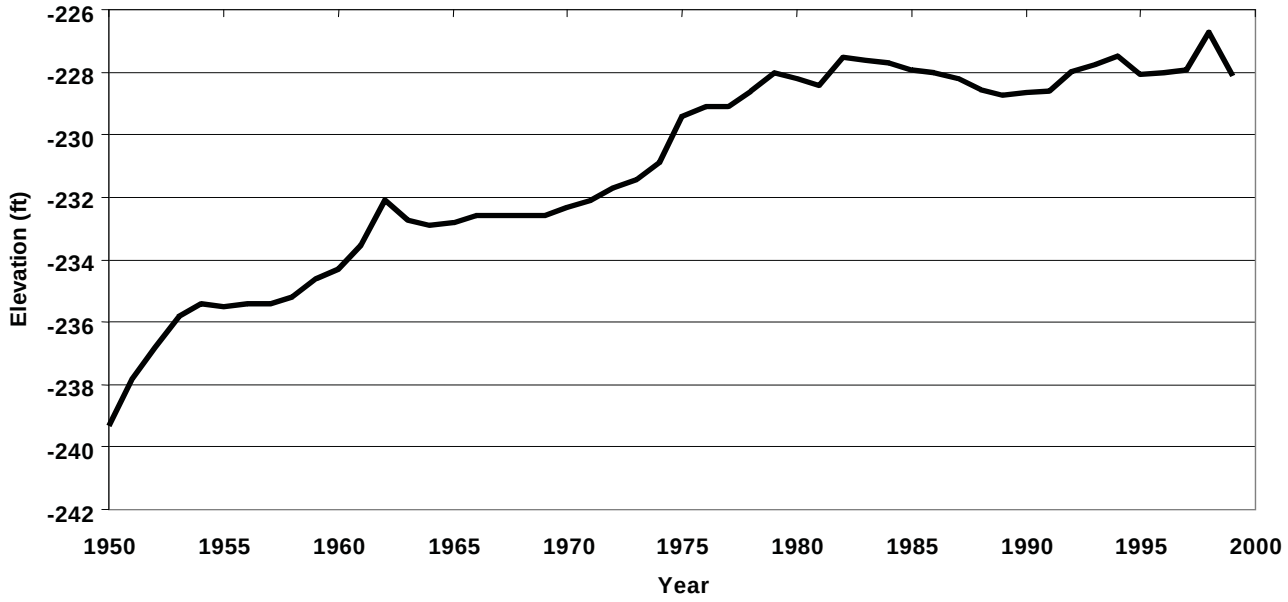

Figure C-2b. Historic Elevation Trend in the Salton Sea.

an annual basis by a corresponding amount to that which is sampled from the distribution. This results in Model simulations that account for the uncertainty of how dissolved solids are precipitating or reduced within the Salton Sea (Weghorst, 2001).

The Science Workshop participants were not able to come to any conclusions about whether or not the rate of precipitation and/or biological reduction would change at higher or lower salinities relative to current conditions. It was also not possible to ascertain whether or not salts that might have precipitated historically might be brought back into solution at lower salinities. There is good reason to believe that precipitation has not been occurring on a large scale and that biological processes are the dominate influence. Therefore if salts were to be re-dissolved at lower salinities then the amount available would be small. The Salton Sea Accounting Model therefore assumes that the uniform distribution used to stochastically simulate precipitation and/or reduction is applicable at both lower and higher salinities from current conditions.

C.3 Baseline Inflow Conditions

There are actions in place that are likely to affect, or have already affected, inflows to the Salton Sea. Included in these are a 4.4 million acre-feet/year normal year limited entitlement to Colorado River water for the State of California, increased salinity in the Colorado River, pre-existing conservation, historic aquifer pumping effects in the Coachella Valley, and activities in Mexico. The effects of these actions combined with meteorological, economic, and demand factors will define the near-term inflows. The exact effects of these historic actions are difficult to assess. For purposes of analysis in this report, the maximum future inflow conditions analyzed are similar to the baseline conditions used in the recently published Draft Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for the IID Water Transfer Program. The average future baseline inflow presented in this document is 1.23 million acre-feet/year.

The Model operates stochastically and, therefore, uses a different future sequence of inflows for each simulation. Figure C-3a presents a sample future inflow sequences with an average annual value of 1.23 million acre-feet/year.

The salt load to the Salton Sea is assumed to be equal to that forecasted by the water districts and presented by Weghorst (2001), which is consistent with an inflow of 1.23 million acre-feet/year. The average annual baseline salt load used in all simulations is 3.8 million ton/yr. Figure C-3b shows a sample stochastic sequence of inflowing salt load from the Model with an average annual value of 3.8 million tons/yr. The salt load is shown decreasing in the future because of Salton Sea water intrusion into the Coachella Aquifer.

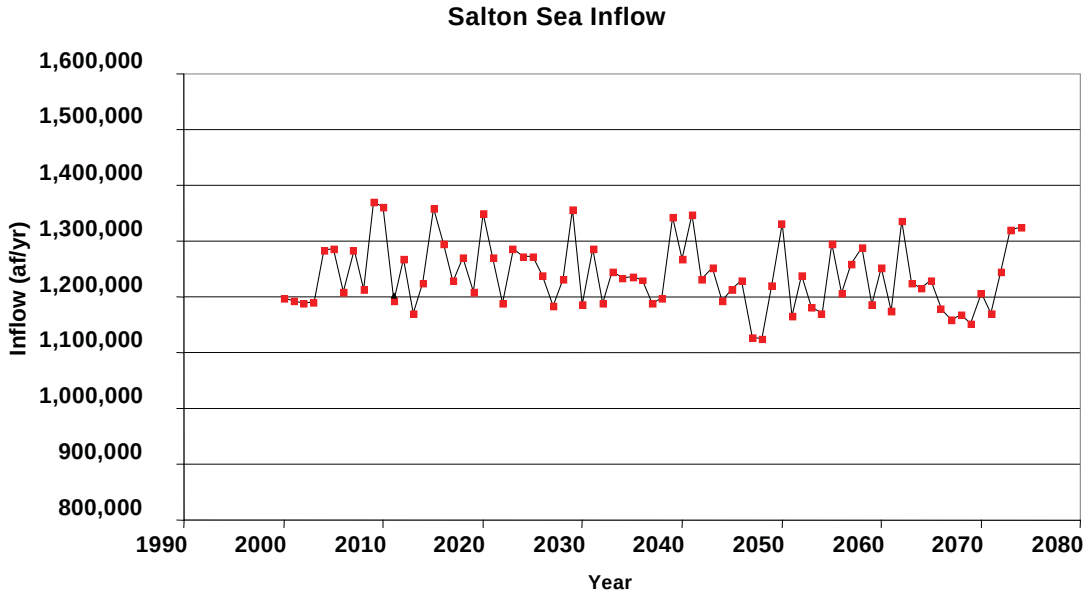

Figure C-3a. Forecasted Baseline Inflow Assumptions.

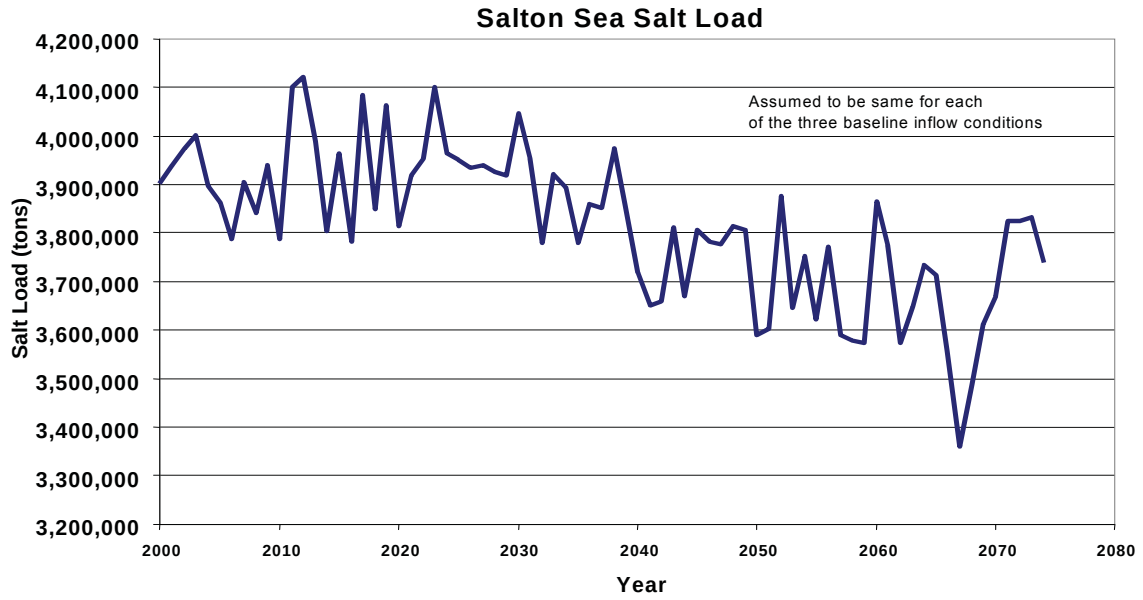

Figure C-3b. Forecasted Baseline Salt Load.

C.4 Future Inflow Projections

With implementation of the QSA, the average inflow to the Sea is expected to decrease over about 15 to 20 years from a baseline of 1.23 million acre-feet/year to an expected inflow of about 930,000 acre-feet/year. While the water transfer agreements contain predictable transfer schedules, there is an option for transferring up to 1.6 million acre feet of additional water if the water is not needed to mitigate effects to the Salton Sea. In addition, inflow to the New River from Mexico, where the flow originates, may also be subject to future reductions. For example, reductions in Colorado River flows to Mexico could, in turn, affect New River flows back across the border. It is also possible that the Coachella Valley groundwater management program would affect inflows. These variables translate to

an uncertainty with respect to actual Salton Sea inflows. Therefore, three inflow scenarios are considered in this report:

4. The anticipated QSA schedule that includes salinity management deliveries (mitigation water) to offset salinity effects to the Salton Sea over the next 15 years;

5. The QSA schedule with the salinity management water terminated in 2006 and sale of additional water to generate restoration funds; and

6. A schedule that would reduce average inflow to about 800,000 acre-feet/year.

The three inflow scenarios are illustrated in Figure C-4.

Under all three inflow scenarios, without restoration, salinity in the Sea would more than double over a period of 20 to 25 years, while the water surface elevation would decrease by about 20 feet over the same period.

C.5 Overview of Salton Sea Accounting Model

Assessment of the future of the Salton Sea is dependent on the ability to predict the hydrologic response of the Sea to changing conditions. Foreseeable changes include a range of water conservation programs within the Salton Basin, as well as possible restoration activities. Conservation programs would likely change inflows of both water and dissolved solids into the Sea. Predicting hydrologic response due to these possible changes requires a predictive computer model of the Salton Sea.

The Salton Sea Accounting Model was developed to predict hydrologic response to possible changes in the Sea (Weghorst, 2001). It allows the effective evaluation of historic, present, and future conditions within the Sea. Specifically, the Model

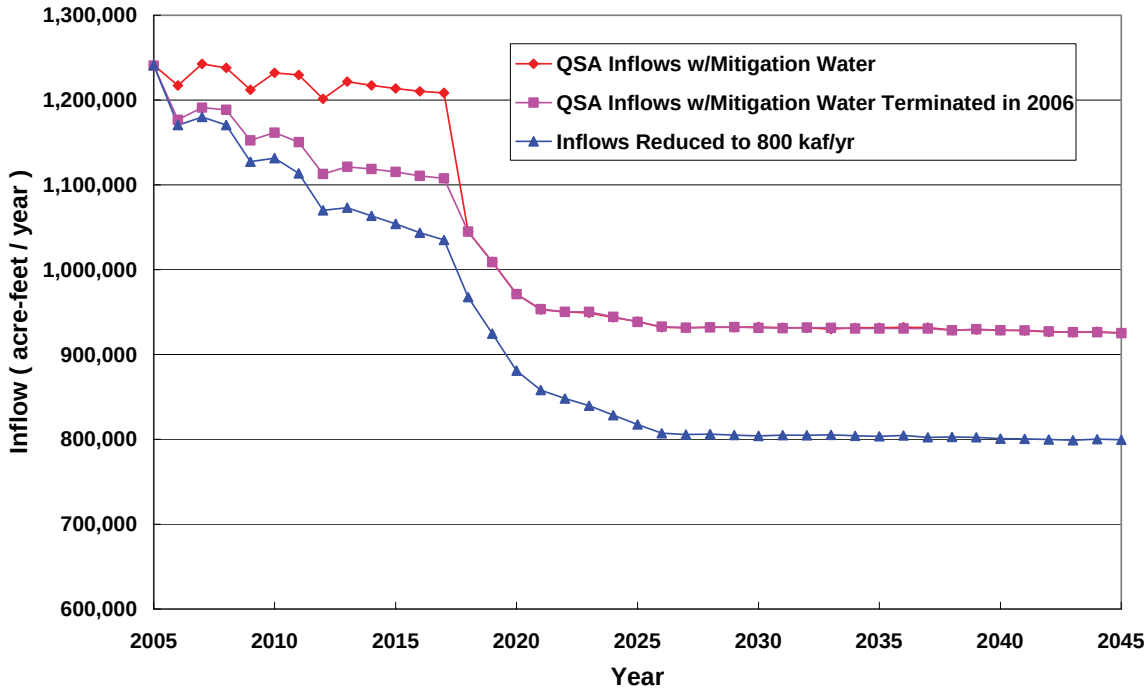

Figure C-4. Possible Future Salton Sea Inflow Scenarios Evaluated in this Report.

predicts changes in inflow, elevation, surface area, and salinity. Special operating requirements included the need to simulate:

- Future reductions in inflow
- Future changes in salt loads into the Sea
- Salt precipitation and/or biological reduction
- Imports of water
- Exports of water
- Dividing the Sea into two basins

The basics of the Model involve conservation of mass for both water and total dissolved solids (TDS). The Model maintains separate accounting of each and corresponding calculations of salinity. The Model follows the equations below for mass calculations (Weghorst, 2001):

- Water in Storage = Previous Water in Storage + Inflow – Evaporation + Rain

- Salt Content = Previous Salt Content + Salt Load – Precipitation (or reduction) of salts

The Salton Sea Accounting Model incorporates the ability to perform stochastic and deterministic simulations of Salton Sea conditions. The Model operates on an annual time step. Deterministic simulations of the Model assume that the hydrologic and salt load variability of the Sea will repeat in the future exactly in the same pattern each time the Salton Sea is simulated. Stochastic simulations imply that different hydrologic conditions are sampled and used in each simulation. Model results presented in this report are the result of stochastic simulations and represent mean futures for the Salton Sea. The term mean-future is used to represent the averaging of results from one thousand Model simulations. Therefore, any point removed from one of the simulation charts presented represents an average of one thousand simulations.

For the current modeling assessment, the full Salton Basin was divided into two basins with separate area-capacity tables for each. Inflows to the north end were optimized to achieve target water surface elevations and salinity in the shortest amount of time. Thereafter, inflows in the model were reduced to provide sufficient inflow to maintain Sea salinity close to the target value of 35,000 milligrams/liter. Any remaining inflows were diverted to the south basin and shallow habitat pond areas. Inflows to the south basin were a combination of diverted river flows and discharges from the north basin. In all model assessments it was assumed that the inflows were reduced as a result of evaporation or other losses in wetlands planned for development along the New and Alamo Rivers.

C.6 Salton Sea Accounting Model Results Without Project

Figures C-5a and C-5b illustrate the model results for the three inflow scenarios for salinity and elevation in the Salton Sea, respectively. Note that the QSA inflow case where mitigation water would be provided through 2018 is probably the most likely scenario for the no-project scenario. The model results for this case are also illustrated in Figure 2-3 in the main body of this report. The model results show that for this case, the salinity would double, reaching 90,000 mg/L in less than 25 years. For this inflow case, Figure C-5b shows that the elevation of the Sea is expected to drop about 20 feet.

C.7 Salton Sea Accounting Model Results for Preferred Project

The model was run by Reclamation for nine sets of conditions for the case where a causeway would be constructed across the central area of the Sea to divide it into north and south basins. The sets of runs were based on the three inflow scenarios shown in Figure C-4 and three possible design water surface elevations for the north marine lake: -230 feet above mean sea level (msl); -235 feet msl; and -240 feet msl.

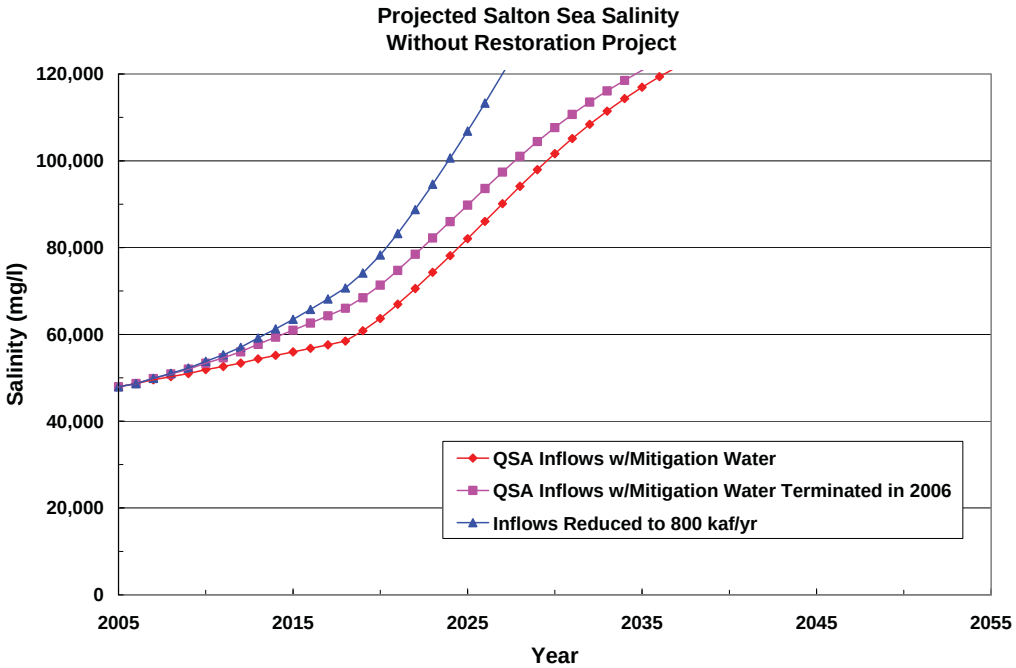

Figure C-5a. Projected Salinity in the Salton Sea for Three Inflow Scenarios, without the Restoration Project.

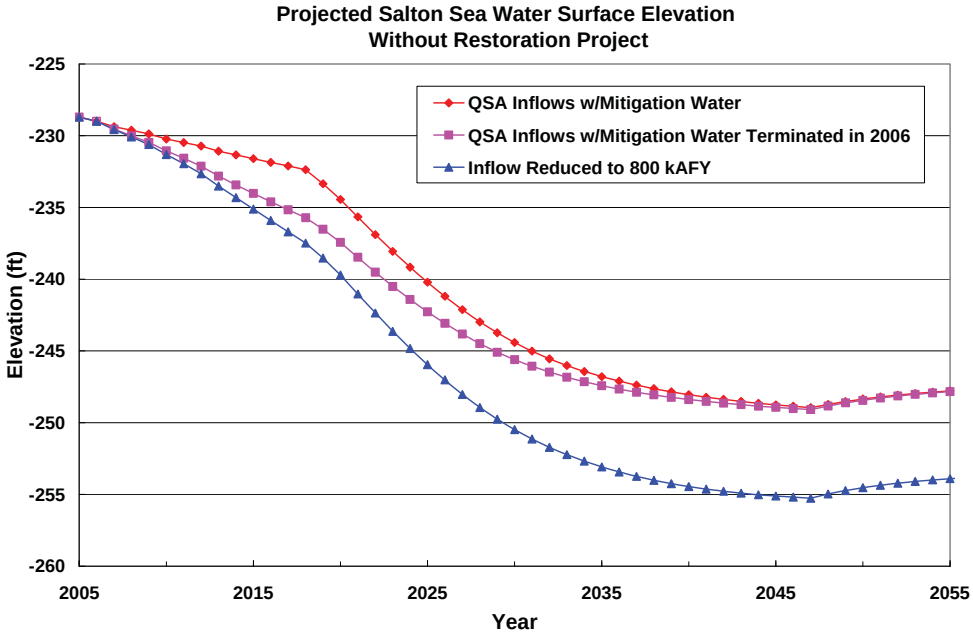

Figure C-5b. Projected Elevation in the Salton Sea for Three Inflow Scenarios, without the Restoration Project.

The simulations assume dam crests elevations of -225, -230, and -235 feet msl respectively with each assuming 5 feet of free board on the dam. Simulations of the -230 and -235 feet msl dam crests provide for salinity reduction benefits that would occur as a result of the dam crest surfacing after construction with an assumed spillway notch of 5 foot height. During this time salinity would begin to decrease in the north end even though the structure would not be acting as a dam. During this period, water would flow between both sides of the structure through the spillway notch. With greater inflows on the north end the salinity would reduce on the north end as saltier water that is displaced by these greater inflows migrates south. This temporary situation would not occur with a dam crest of -225 feet msl and an operating water surface elevation of -230 feet msl because by the time the dam was constructed the water surface elevation would already be at assumed spillway crest elevation of -230 feet.

In order to achieve the performance for the higher design lake elevations of -230 or -235 feet msl, based on the model assumptions discussed above, the extensions of the New and Alamo rivers would need to be constructed near or above the current lake shoreline. The channels would need to be constructed at or above the current water line to have sufficient slope to deliver water to the north with the lake at elevation -230 feet msl. For lower design lake elevations, the channel extensions could be accomplished within the existing lake footprint as the lake level would recede. Specific channel configurations and timings of water deliveries are details that would need to be developed during the feasibility design phase.

Figures C-6a, b and c illustrate the projected salinity in the north basin for the three inflow scenarios. Each chart shows the projected salinity profiles for the three design elevations for a given inflow scenario. Figure C-6a shows the projected salinity in the north basin for the scenario where mitigation water would be sold to help finance the project. Figure C-6b illustrates the most extreme inflow reduction case where all current inflows sources would be reduced to 800,000 acre-feet/yr (including flows into the south and north basins. Figure C-6c illustrates the case where mitigation water would not be sold, and thus this scenario would involve the greatest amount of inflowing water. Figures C-6a, b and c suggest that a north basin design elevation of either -230 feet msl or -235 feet msl, coupled with any of the inflow scenarios would provide the most reasonable times to achieve target salinity in the north basin. However, the lower the inflow, the faster the target salinity could be achieved.

Figure C-7 illustrates the projected salinity trends in the south basin for the scenario where mitigation water would be sold to help finance the project. This chart suggests that salinity in the south basin would reach saturation within 25 to 30 years. At this point salts would begin to crystallize. Similar trends would be seen with the other two inflow scenarios. Salinity projections above 250,000 to 300,000 mg/L are not considered accurate because the Model does not take into consideration salt

precipitation above saturation. The Model does not simulate the phase chemistry of Salton Sea brines.

Figures C-8 and C-9 illustrate the projected elevation in the north and south basins, respectively, for the scenario where mitigation water would be sold to help finance the project. Figure C-9 suggests that the south basin would stabilize at around -260 feet msl. As an example, for the case where the design elevation in the north basin would be -235 feet msl, the water surface on the north side of the central causeway would be 25 feet higher than on the south side. Again, similar trends would be seen with the other two inflow scenarios.

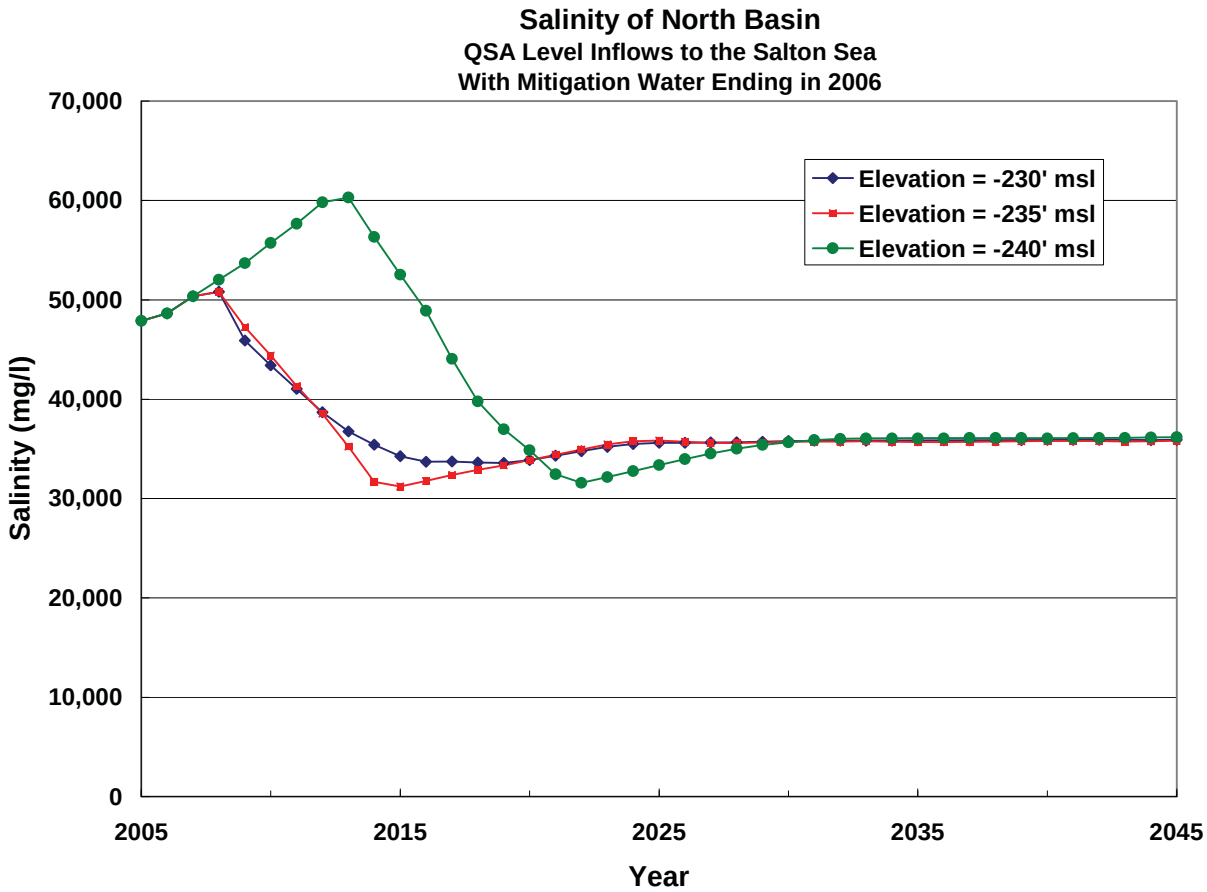

Figure C-6a. Projected Salinity in the North Basin for Three Target Lake Elevations, with Mitigation Water Ending in 2006.

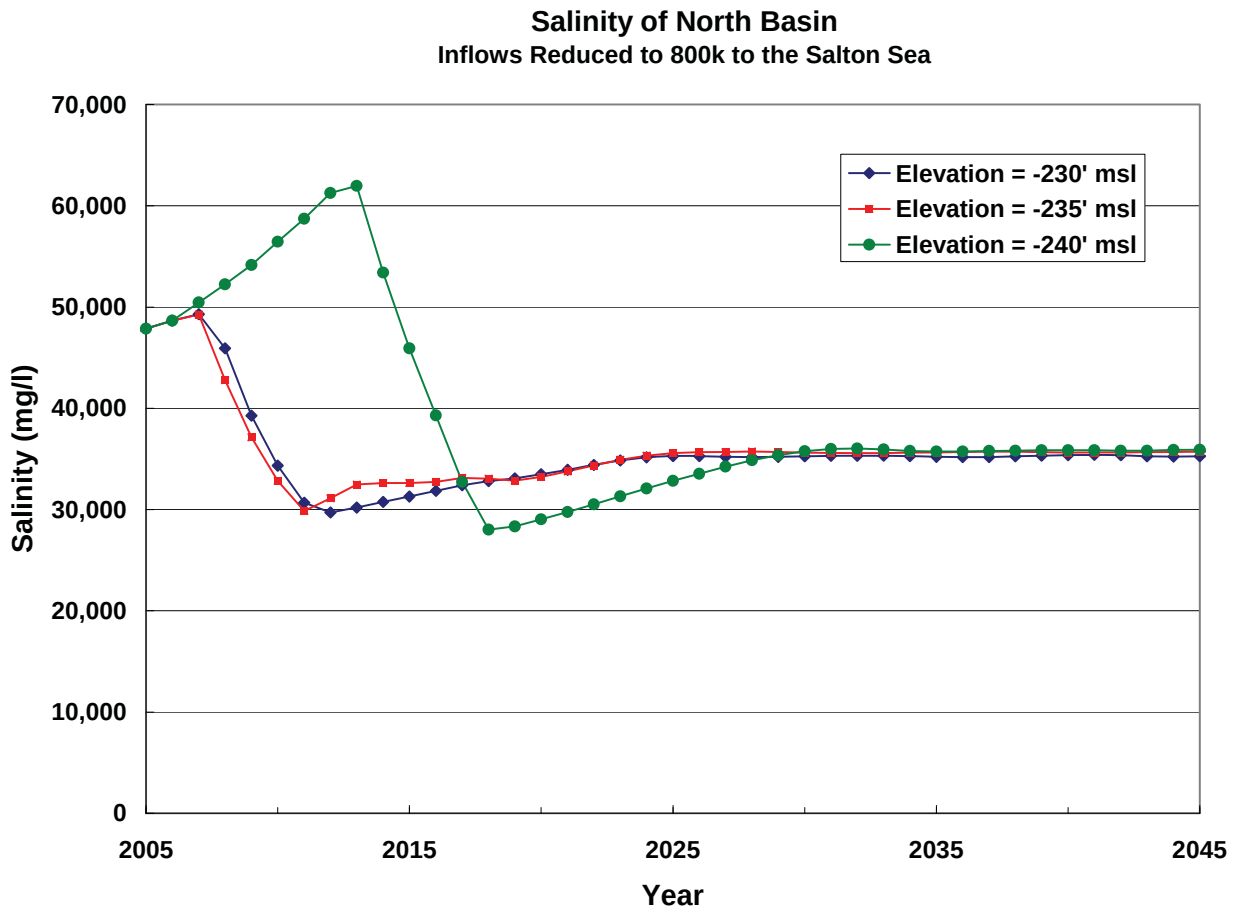

Figure C-6b. Projected Salinity in the North Basin for Three Target Lake Elevations, with Inflows Reduced to 800,000 Acre-Feet/Year.

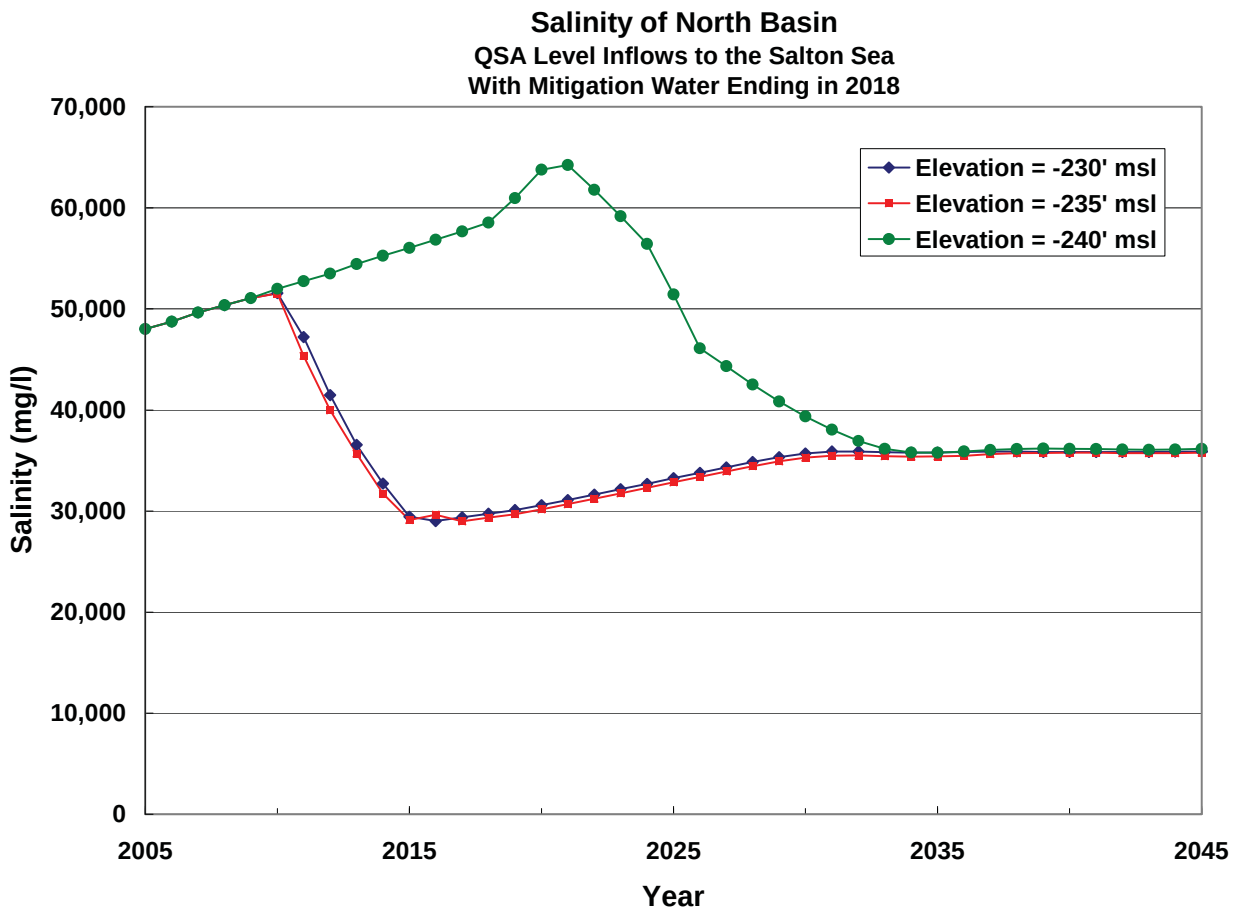

Figure C-6c. Projected Salinity in the North Basin for Three Target Lake Elevations, with Mitigation Water Ending in 2018.

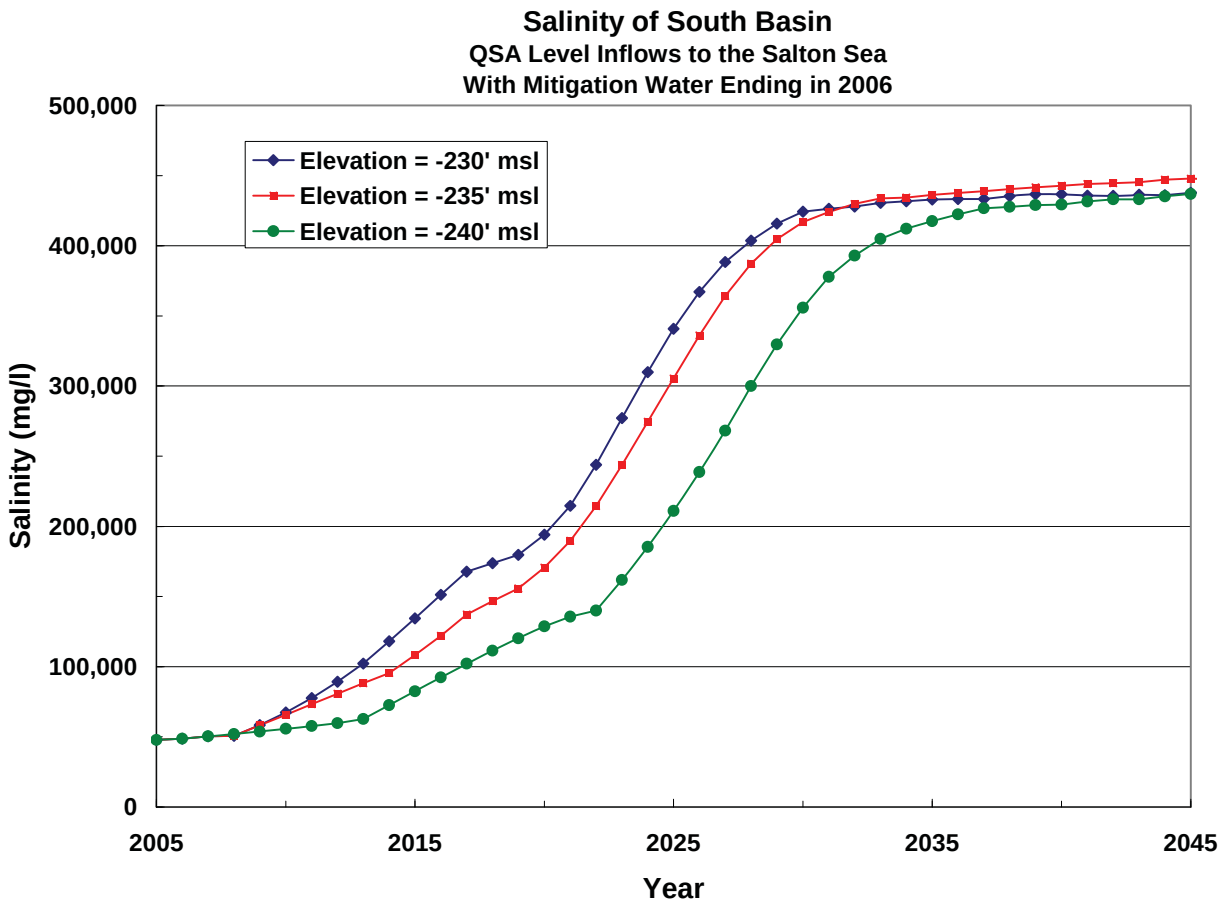

Figure C-7. Projected Salinity in the South Basin for Three Target Lake Elevations, with Mitigation Water Ending in 2006.

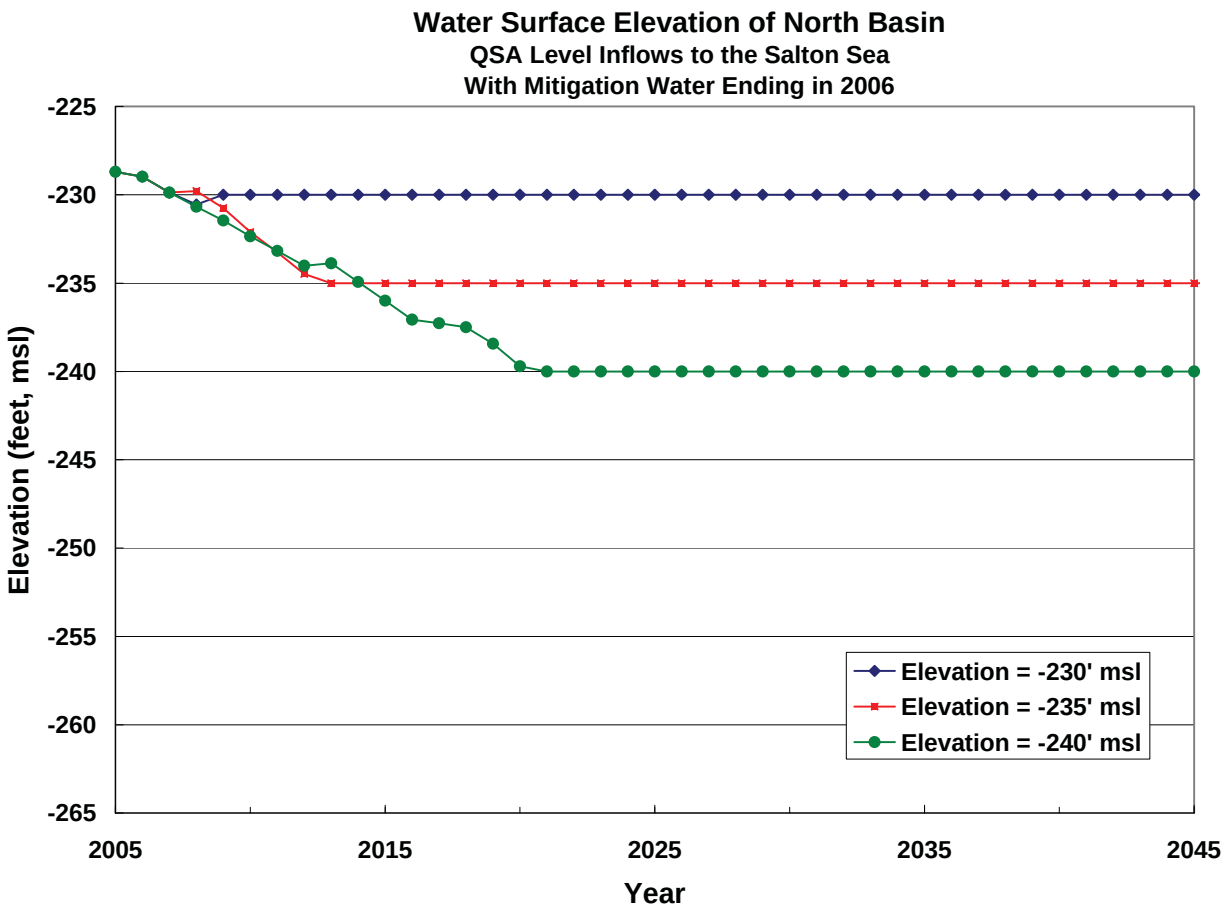

Figure C-8. Projected Elevation in the North Basin for Three Target Lake Elevations, with Mitigation Water Ending in 2006.

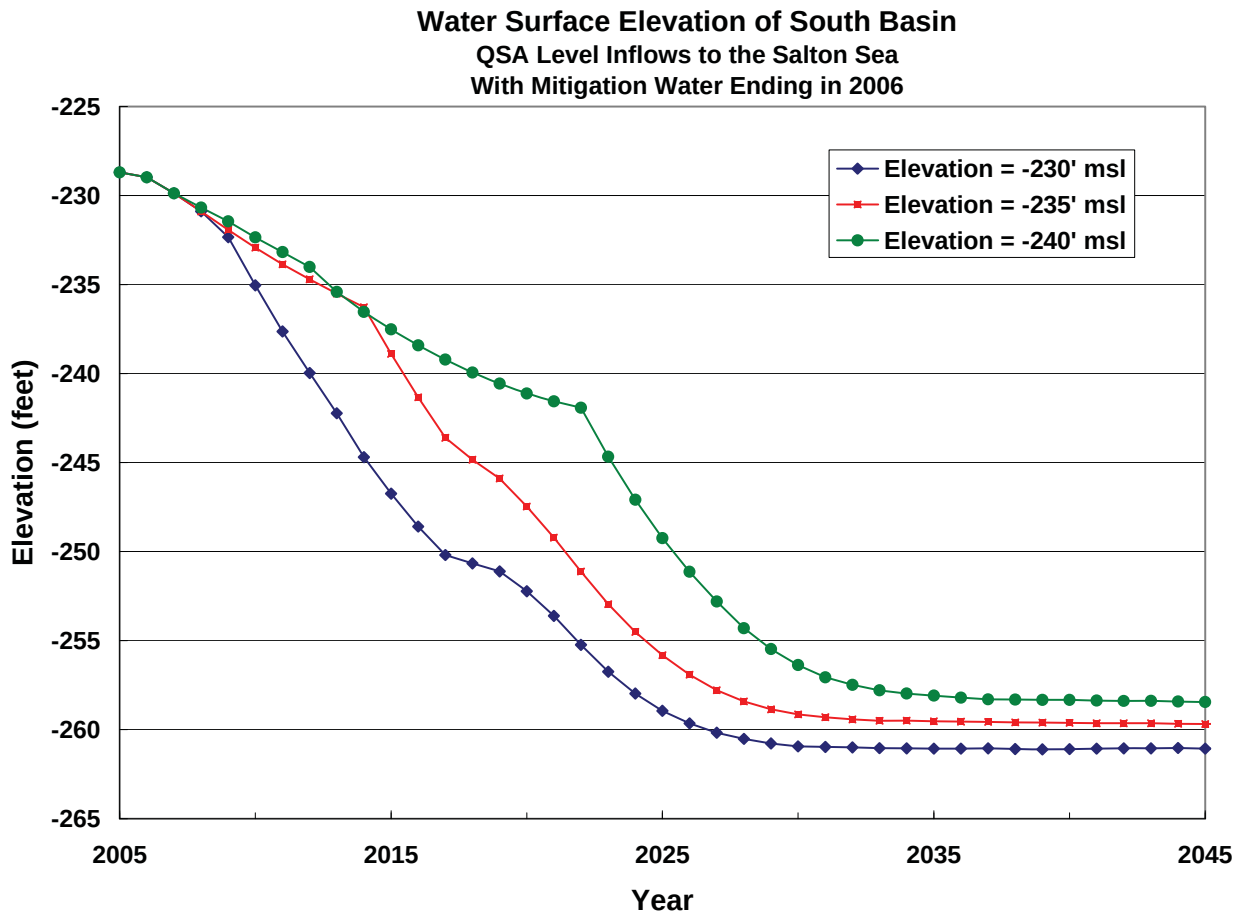

Figure C-9. Projected Elevation in the North Basin for Three Target Lake Elevations, with Mitigation Water Ending in 2006.

C.8 Performance of Other Project Alternatives

The performance of other alternatives discussed in the main body of this report is discussed below.

South Marine Lake without Elevation Control. Implementation of this alternative would involve a trade-off between saving on construction costs by waiting to build a smaller barrier after the Sea elevation receded, and over-designing the barrier to achieve objectives earlier. Regardless of how soon the barrier is constructed, the water elevation in both the north and south basins would be about the same at any given time and the trend would follow the no-project curves shown in Figure C-5b. A model run was prepared for the case where the barrier would be constructed with a crest elevation of -243 feet msl. This height was selected to be at a point where the elevation decline in the Sea would appear to begin to slow down.

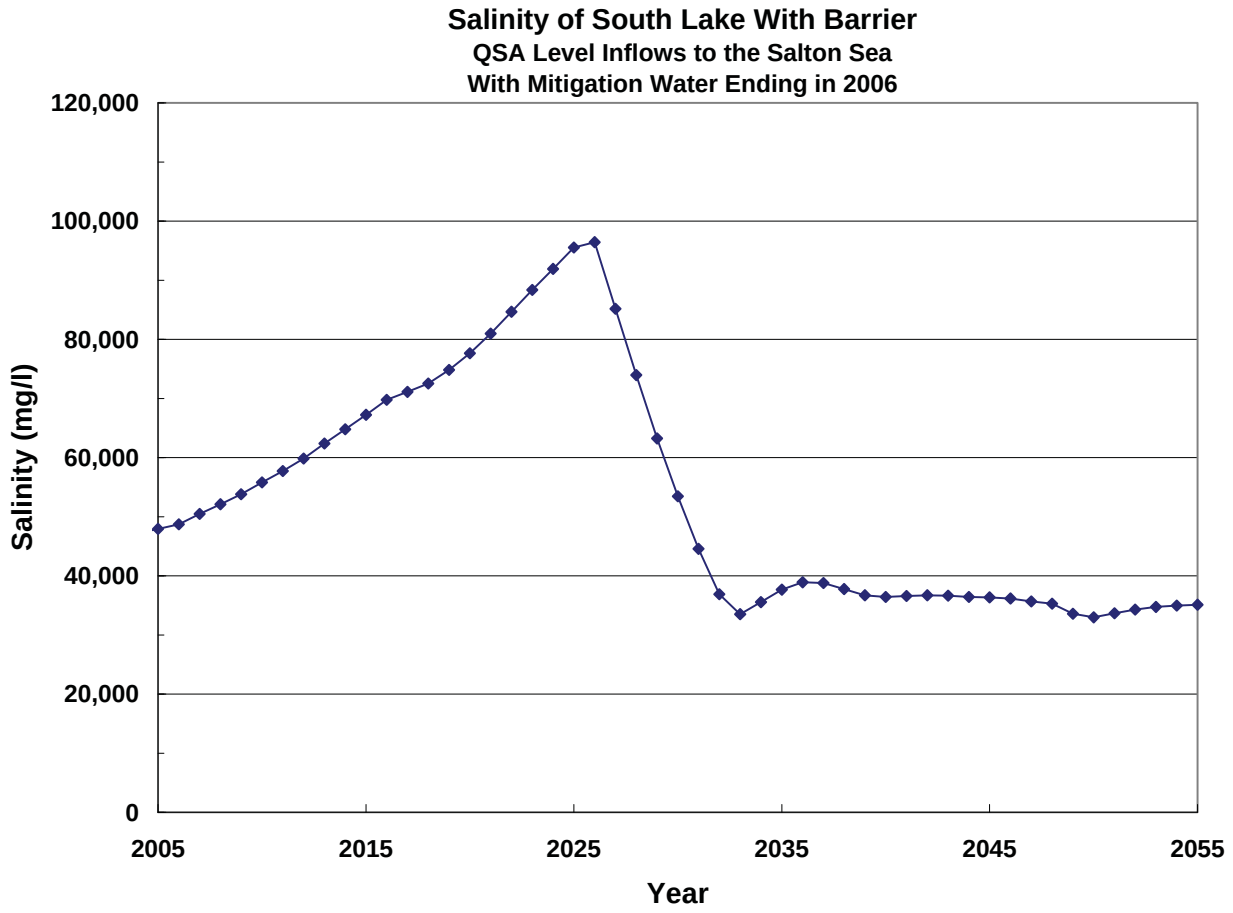

Figure C-10. Projected Salinity in the South Marine Lake without Elevation Control Alternative, for QSA Inflows with Mitigation Water Ending in 2006.

The salinity projections for this scenario are illustrated in Figure C-10 for the case of QSA inflows with mitigation water terminated in 2006.

South Marine Lake with Elevation Control. This alternative would have similar performance to the Preferred Project except that the results for north and south would be switched. The salinity in the south basin would be similar to that shown in Figures C-6a, b and c, and salinity in the north basin would be similar to the shown in Figure C-7. Elevation in the south and north basins would be similar to those shown in Figures C-8 and C-9, respectively.

No Marine Lake. The performance of the No Marine Lake alternative, either with or without brine pumping would be similar to the no project results shown in Figures C-5a and C-5b for salinity and elevation, respectively. However, depending on the degree to which wetland and other habitat features would be developed around the Sea, the elevation decline would be greater, perhaps decreasing and additional five feet. Likewise, the rise in salinity would be greater and more rapid.

C.9 Performance of Alternatives Considered in the Past

The only other known alternative considered in the past that would perform comparable the preferred project, but for a full Sea, would be a massive water exchange with the Gulf of California through the construction of pipelines and/or channels. Interior (2003) estimated that such an alternative could cost between $13 and $38 billion in total present value cost. In addition, while such a water exchange alternative could be used to control the elevation of the Sea, salinity could not be reduced below about 40,000 mg/L. This conclusion is based on the source if replenishing water being ocean water with a salinity of 35,000 mg/L. Even with very large exchange systems, evaporation in the Sea would cause the salinity to be greater than that value.

Interior also investigated the performance of alternatives that would export salt water without any replacement for water transferred out of the area. These would include on-land and in-Sea pond systems, enhanced evaporation systems, and desalination plants. For all of these alternatives, the elevation decline in the Sea would be similar to or more extreme than the no action case shown in Figure C-5b. In-Sea pond systems and desalination plants (with return of product water to the Sea) would have elevation trends similar to Figure C-5b. Whereas, on-land solar ponds and enhanced evaporation systems would tend to reduce elevation by an additional five to seven feet for any of the three inflow scenarios, for a total drop in the Sea's water surface of 25 to 30 feet. While all of these alternatives would ultimately control salinity, modeling by Interior showed salinity would peak around 60 mg/L and that it would take about 30 years for salinity in the Sea to be reduced to 40,000 mg/L.

C.10 References

Weghorst, Paul. A. 2001. Salton Sea Accounting Model, draft. Bureau of Reclamation, Lower Colorado Region, Boulder City, Nevada. November.

Department of Interior. 2003. Salton Sea Restoration Project Status Report, January.

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Appendix D
OUTDOOR RECREATION

In February 2004, the Authority appointed an Outdoor Recreation Advisory Task Force to evaluate recreational potential of a restored Salton Sea and present recommendations to the Authority Board. The Outdoor Recreation Advisory Committee presented their report to the Board on June 24, 2004. This Appendix provides the committee's report in its entirety.

With water transfers and the QSA resulting in a smaller sea, the Task Force was asked to address how to turn potential problems into potential opportunities. It was asked to create a new vision for the Sea that responds to the new water realities.

Its members included: John Benson, Victor Torres, Lea Anne O'Malley, Shirley Palmer, Christine Harris, Sue Giller, Bill Gates, Tim Kelley, Cliff Lawrence, Leon Lesicka, Roland Gaebert, Chris Schoneman, Jack Crayon, Vince Signorotti, Wayne Olesh, Jacob Ward, Fred Singh, Al Kalin, Jack Hart and Tom Raftican. Lea Anne O'Malley was appointed chairwoman.

The Task Force held its first meeting in March 29. Six subsequent meetings were held in West Shores (Salton City), Niland, Westmorland, Brawley and Calipatria.

D.1 A Vision for the Sea

The Task Force has found that the future for the Salton Sea can indeed be a bright one, even with diminished inflows. The Salton Sea will no longer be California's largest Lake, but, what is lost in quantity will be replaced by quality. For years, dreamers have envisioned economic development and a recreational Mecca around its shores. With proper funding and with the necessary political will at the Federal, State and local government levels, this lake will realize its potential.

Just visualize what can occur if this effort is successful.

In the next several decades, as inflows diminish and the shoreline recedes, new wetlands areas, shallow water ponds and Imperial County's largest fresh water lake will appear along the southern shores. Hunting and fishing, bird watching, hiking, equestrian trails and off-roading will attract thousands of visitors and local residents

annually. The old Salton Sea Navy Base will possibly become another Glamis—a Glamis with a lake view.

In the northern marine lake, a stabilized body of water will attract sports fishermen and recreational boating. The Imperial County communities of West Shores, Bombay Beach, Calipatria and Niland will receive major economic benefits and development from this renewed ecotourism. The community of North Shore will again become a place to visit.

D.2 Issues Evaluated

In analyzing the issues, the Task Force identified several broad categories, with specific questions to evaluate in each category. The questions are cited below.

Extension of New/Alamo Rivers and Wetland Creation

A. Should 2,000 to 4,000 acres of wetlands be created in the New and Alamo Rivers and their extensions under the Restoration Plan?

B. Should small, sedimentation basins be designed throughout the River systems or medium sized to large ones be placed in a few locations?

C. Should the design of wetlands in the extensions be much different than the design of wetlands in existing river courses?

Freshwater Lakes

A. Should the Restoration Plan include a large freshwater lake fed by Alamo River water at Red Hill Marina?

B. Should the Restoration Plan include a small ski lake fed by Alamo River water around Mullet Island?

C. Should a lake be designated as being specifically for bird watching (with no power boats allowed?

D. Should there be a channel/lake in Bombay Beach area?

Marine Lake North Basin

A. Are there features of the marine lake in the North part of the Sea that should be added or changed to encourage different forms of recreation?

Shallow Water Ponds

A. Should trails or other public access be provided to the network of shallow water wetlands?

B. What sort of public uses should be allowed in the shallow water ponds?

Agriculture

A. Should land previously flooded by the Sea be reclaimed for farming?

Geothermal

A. What are the most compatible uses of land near potential geothermal expansion areas?

Off Road Vehicle Use

A. Can some lands be utilized for off road vehicle use?

B. Should a large (10,000 acre) off road racing course be developed?

Ownership

A. Are there special considerations for lands under the jurisdiction of FWS?

B. Are there special considerations for lands under the jurisdiction of State Parks?

C. Are there special considerations for lands under the jurisdiction of IID?

D. Are there special considerations for lands under the jurisdiction of Reclamation?

E. Are there special considerations for lands under the jurisdiction of the Torres Martinez Tribe?

F. Are there special considerations for lands under the jurisdiction of other agencies?

Hunting and Fishing

A. Are there special design considerations to maximize hunting opportunities?

B. Are there special design considerations to maximize fishing opportunities?

Other Issues

A. Are there other recreational and economic development issues that ought to be included in the plan?

B. Where will communities along the Salton Sea shores get their water to accommodate the expected growth?

C. Should there be a road on the dike?

D.3 Findings

Extension of New/Alamo Rivers and Wetland Creation

The Task Force was in agreement that wetlands should be extended in both rivers—at least 4,000 acres. The Salton Sea Science Office and other experts should determine the questions regarding the size of sedimentation basins. The Task Force also agreed that the current design should be continued.

The Wetlands projects are very important to the restoration of the Sea because of their ecological value to the region. They are a key political selling point in the total restoration effort.

Freshwater Lakes

The Task Force extensively evaluated the potential of freshwater lakes fed by the Alamo and New rivers and is in agreement that such lakes are crucial to expanded recreation use for the Sea.

Members also expressed concern that allowances be made on the lakes for recreational boating as well as restricted areas for wildlife preservation and bird nesting. It was felt that it will be difficult in advance to determine the location of the best wildlife areas: that will be determined by the wildlife. However, it was also felt this could be a seasonal situation and could be controlled by posting—similar to procedures used at Lake Perris.

The committee felt a small recreational freshwater lake near Bombay Beach could not be economically justified. However, the Task Force also said a channel linking Bombay Beach to the northern lake would be important to serve residents there to prevent that community from becoming totally isolated from access to the new Salton Sea

Two different concepts for a single freshwater lake of up to 2,000 acres were discussed for the region around the current Red Hill Marina. It would be the largest

freshwater lake in Imperial County. Both concepts would have an extended channel running north to the main body of the northern lake—a drop of about eight feet over 15 miles. Additionally, dredging would probably be necessary to create the freshwater lake.

The first concept is a kidney-shaped body of water centered around Red Hill with an extended narrow channel running north to Bombay Beach. With this concept, there would be an option to continue Mullet Island as an island, but would leave much of the current wildlife refuge in a "dry" area.

The second concept is a longer and narrower lake that stretches from Obsidian Butte to Red Hill. It incorporates much of the current refuge. Additionally, Obsidian Butte and Red Hill are the only natural structures ("mountain peaks") for miles—incorporating them in the lake would add some beauty to the area. It also has a narrow channel extending to Bombay Beach. Mullet Island would become part of the dry area in this concept.

More evaluation is necessary on either concept, but the majority of the committee favored the "longer-narrow" option because it incorporates the current refuge area as well as the two "mountain peaks." However, the Fish and Wild Service expressed reservations regarding use of the refuge area and those must be considered.

Marine Lake: North Basin

The committee felt there would be many recreational opportunities in the northern marine lake, which will become very important as the region develops. It was also felt that a public access road across the dike dividing the North Sea and the salt settling pond would be a very valuable asset. The road could have turn-outs for parking and some extensions or piers to enhance fishing in the area.

Shallow Water Ponds

The Task Force felt a series of shallow water ponds around the southern portion of the current sea would be an excellent mitigation for the smaller sea. They not only would become excellent habitat for birds and other wildlife but also would offer extensive recreational opportunities.

Hiking and equestrian trails should be incorporated in the restoration plans as well as bike trails and a cultural component that will provide public education opportunities.

Agriculture

The Task Force thoroughly discussed whether land previously flooded by the Sea on its south end should be reclaimed for farming. The committee decided this is not a good option: shallow ponds are the best alternative.

Questions were raised over water availability to reclaim the land as well as whether the reclamation would be economically feasible.

Geothermal

Portions of the Salton Sea Geothermal Anomaly that are currently inundated by the Sea have high commercial potential for future development.

The potential expansion of the geothermal development near Obsidian Butte and Red Hill needs to be coordinated with the ultimate design of freshwater lakes.

Although market conditions and economics will play a large role in any future expansion of the development by CalEnergy, experts believe that areas with a high probability of having commercial quantities of geothermal resources are located under water in that area of the Sea.

Because of the prime Geothermal "hotspots" in the areas of the proposed freshwater lakes, it may be necessary to move the lakes somewhat to the east and north. If that means loss of one of the scenic "mountain peaks" in the lake (Red Hill and Obsidian Butte) another could possibly be constructed. While geothermal development is compatible with recreational uses, agriculture and the environment, it is less compatible with residential areas--such as mobile home parks or camp grounds that could develop near a lake.

Close coordination will be imperative between CalEnergy and the Authority regarding appropriate placement of the freshwater lakes to maximize the recreation/wildlife potential and not adversely impact potential geothermal development.

Off Road Vehicle Use

There are areas along the West Shore near the former Navy Test Base that could become excellent off road recreational areas. However, the Task Force had some concerns regarding development of an off road race track.

A Task Force member discussed this with some off road vehicle retailers in Imperial County to get opinions. The consensus was an off road area would serve people very well, but having an actual race track there would be difficult. Such tracks get very heavy use and require extreme amounts of maintenance, including mixing soils. The

only way a track could possibly succeed would be one constructed and operated by private enterprise.

An alternative to a race track would be development of a recreational vehicle "parking area", similar to Glamis. With the Sea as a back drop, it would become a popular recreational site. Families could use the dike for fishing, etc. and have off road access all the way to popular areas near the Ocotillo Wells Recreation area and Plaster City. Fees could be assessed for use of this area.

Land Ownership Issues

United States Fish and Wildlife Service: There would be a need for land swaps in the hyper saline areas to resolve management conflicts.

State Parks: There were no issues identified. The new features of the Salton Sea that are being discussed are compatible with the State Parks goals.

Imperial Irrigation District: Cal Energy's use of land under the Sea is also an IID issue. IID will be sensitive to land use and liability issues that effect the land it owns in and around the current Sea.

Bureau of Reclamation: There were no special ownership issues identified regarding Reclamation Land.

Torres Martinez: There are some restrictions regarding use of Indian Lands. These would have to be identified by the Torres Martinez Tribe and incorporated into the planning.

County of Imperial: Red Hill Marina is currently a county park. The county will need to be involved in any planning regarding a freshwater lake in that area.

Hunting and Fishing

This committee feels strongly that hunting and fishing needs should be factored in to any restoration plan and should be maximized. Wetlands, shallow water ponds and lakes under discussion are designed to enhance recreational opportunities. It is agreed that certain areas may be designed for specific uses in an effort to balance recreational uses with environmental concerns. As budgets are put together, sufficient funds should be requested to cover operations and maintenance to maximize the hunting and fishing potential.

In addition to hunting and fishing, other areas should be set aside for bird watching, hiking, bicycling, equestrian and other compatible uses.

Other Issues

Regional Cooperation between Economic Development agencies and organizations in Coachella and Imperial Valleys: It is imperative that economic development interests in the Coachella and Imperial valleys work together to realize the vision and potential of a restored Salton Sea. It is also imperative that this region work cooperatively with representatives and agencies at the federal and state level and that they, in turn, give substantial value to local input.

Agricultural Issues: The Salton Sea serves as a model of how the interrelationship between agricultural needs and environmental, recreational and economic benefits create a valuable ecosystem. The committee wants to recognize the significance agriculture plays in creating this valuable resource and does not want agriculture's contributions to be diminished.

Budget Issues: State and local budget reductions will have an impact on development and management of recreational areas at a restored Salton Sea. However, this is considered to be a short term problem. While there are few agency resources at present, thought should be given to develop strong volunteer programs to assist in development and management of hunting and fishing areas.

Water to Salton Communities: While there were no specific recommendations, the committee discussed the need to develop a reliable water supply to the West Shores communities that will be needed if they are to develop.

Road on Mid-Sea Retention Structure: The committee felt a public access road across the dike would be an excellent idea. It could be a source of possible income and a major economic benefit to the region. It also would enhance recreational access to the Sea. Costs permitting, pullouts for parking and fishing off the dike could be designed into the roadway. Access roads should also be designed to the shallow water lakes without adversely affecting sensitive areas.

Enterprise Zone: The committee recognized the need for an expanded Enterprise Zone in the southern portion of the Sea that is currently being sought by the cities of Calipatria, Brawley and Westmorland. Any Enterprise Zone endeavors must be compatible with environmental and recreational development in the area.

EXHIBIT 7

PubMed Health. A service of the National Library of Medicine, National Institutes of Health.

A.D.A.M. Medical Encyclopedia. Atlanta (GA): A.D.A.M.; 2011.

Valley fever

San Joaquin Valley fever; Coccidioidomycosis

Last reviewed: August 29, 2011.

Valley fever is an infection that occurs when the spores of the fungus *Coccidioides immitis* enter your body through the lungs.

Causes, incidence, and risk factors

Valley fever is a fungal infection most commonly seen in the desert regions of the southwestern United States, and in Central and South America. You get it by breathing in fungal particles from soil. The infection starts in the lungs.

Valley fever may also be called coccidioidomycosis.

Traveling to an area where the fungus is commonly seen raises your risk for this infection. You are also more likely to develop a serious infection if you have a weakened immune system due to:

- Anti-tumor necrosis factor (TNF) therapy
- Cancer
- Chemotherapy
- Diabetes
- Glucocorticoid medications (prednisone)
- Heart-lung conditions
- HIV
- Organ transplant
- Pregnancy (especially the first trimester)

People of Native American, African, or Philippine descent may also get more severe cases.

Symptoms

Most people with valley fever never have symptoms. Others may have cold- or flu-like symptoms or symptoms of pneumonia. If symptoms occur, they typically start 5 to 21 days after exposure to the fungus.

Common symptoms include:

- Ankle, feet, and leg swelling
- Chest pain (can vary from mild to severe)
- Cough, possibly producing blood-tinged phlegm (sputum)
- Fever and night sweats
- Headache
- Joint stiffness and pain or muscle aches
- Loss of appetite
- Painful, red lumps on lower legs (erythema nodosum)

Rarely, the infection spreads from the lungs through the bloodstream to involve the skin, bones, joints, lymph nodes, and central nervous system or other organs. This is called disseminated coccidioidomycosis.

People with this more widespread form may become very sick. Symptoms may also include:

- Change in mental status
- Enlarged or draining lymph nodes

- Joint swelling
- More severe lung symptoms
- Neck stiffness
- Sensitivity to light
- Weight loss

For information on skin rashes with this infection, see: Skin lesion of coccidioidomycosis.

Signs and tests

Tests done for milder forms of this disease include:

- Blood test to check for coccidioides infection (the fungus that causes Valley fever)
- Chest x-ray
- Sputum culture
- Sputum smear (KOH test)

Tests done for more severe or widespread forms of the infection include:

- Biopsy of the lymph node, lung, or liver
- Bone marrow biopsy
- Bronchoscopy with lavage
- Spinal tap (lumbar puncture) to rule out meningitis

Treatment

The disease almost always goes away without treatment. Your health care provider may recommend bedrest and treatment for flu-like symptoms until your fever disappears.

If you have a weakened immune system, you may need antifungal treatment with amphotericin B, fluconazole, or itraconazole. The best length of treatment with these medications has not been determined.

Sometimes surgery is needed to remove the infected part of the lung (for chronic or severe disease).

Expectations (prognosis)

How well you do depends on the form of the disease you have and your overall health.

The outcome in acute disease is likely to be good. With treatment, the outcome is usually also good for chronic or severe disease (although relapses may occur). People with disseminated disease have a high death rate.

Complications

Widespread coccidioidomycosis may cause:

- Collections of pus in the lung
- Lung abscesses
- Scarring of the lung

These problems are much more likely if you have a weakened immune system.

A chronic form of this infection can develop 20 or more years after first infection. Lung abscesses can form and rupture, releasing pus (empyema) between the lungs and ribs (pleural space).

Calling your health care provider

Call for an appointment with your health care provider if you have symptoms of coccidioidomycosis or if your condition does not improve with treatment.

Prevention

Taking care of your health will help keep the disease in the benign pulmonary form. Preventing AIDS or other

causes of immune system damage will usually prevent the more severe forms of the disease.

People with immune problems (such as AIDS patients and those who are on drugs that suppress the immune system) should avoid travel to areas where this fungus is found, if they want to reduce their risk of getting this rare, chronic disorder.

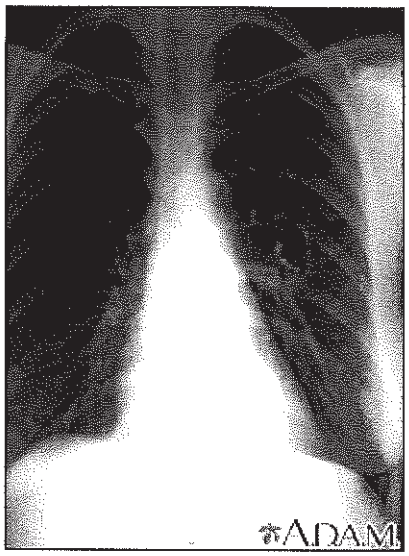
References

1. Galgiani JN. Coccidioidomycosis. In: Goldman L, Ausiello D, eds. *Cecil Medicine*. 24th ed. Philadelphia, Pa: Saunders Elsevier; 2011:chap 341.
2. Galgiani JN. *Coccidioides* species. In: Mandell GL, Bennett JE, Dolin R, eds. *Principles and Practice of Infectious Diseases*. 7th ed. Philadelphia, Pa: Elsevier Churchill Livingstone; 2009:chap 266.

Review Date: 8/29/2011.

Reviewed by: Jatin M. Vyas, MD, PhD, Assistant Professor in Medicine, Harvard Medical School, Assistant in Medicine, Division of Infectious Disease, Department of Medicine, Massachusetts General Hospital. Also reviewed by David Zieve, MD, MHA, Medical Director, A.D.A.M., Inc.

Figures



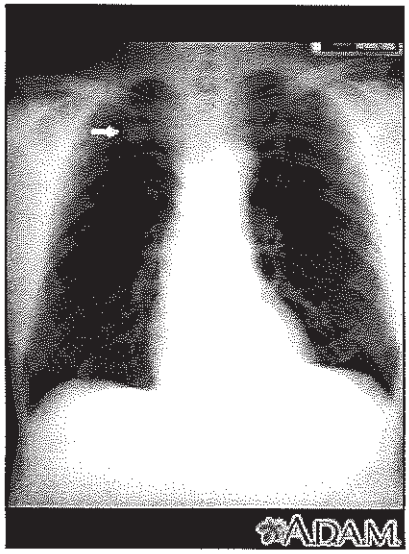
Coccidioidomycosis - chest x-ray

This chest x-ray shows the affects of a fungal infection, coccidioidomycosis. In the middle of the left lung (seen on the right side of the picture) there are multiple, thin-walled cavities (seen as light areas) with a diameter of 2 to 4 centimeters. To the side of these light areas are patchy light areas with irregular and poorly defined borders.

Other diseases that may explain these x-ray findings include lung abscesses, chronic pulmonary tuberculosis, chronic pulmonary histoplasmosis, and others.

Review Date: 8/29/2011.

Reviewed by: Jatin M. Vyas, MD, PhD, Assistant Professor in Medicine, Harvard Medical School, Assistant in Medicine, Division of Infectious Disease, Department of Medicine, Massachusetts General Hospital. Also reviewed by David Zieve, MD, MHA, Medical Director, A.D.A.M., Inc.



Pulmonary nodule - front view chest x-ray

This x-ray shows a single lesion (pulmonary nodule) in the upper right lung (seen as a light area on the left side of the picture). The nodule has distinct borders (well-defined) and is uniform in density. Tuberculosis (TB) and other diseases can cause this type of lesion.

Review Date: 6/5/2012.

Reviewed by: David C. Dugdale, III, MD, Professor of Medicine, Division of General Medicine, Department of Medicine, University of Washington School of Medicine. Yi-Bin Chen, MD, Leukemia/Bone Marrow Transplant Program, Massachusetts General Hospital. Also reviewed by David Zieve, MD, MHA, Medical Director, A.D.A.M. Health Solutions, Ebix, Inc.

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EXHIBIT 8

San Luis Obispo County Health Agency

Spring 2008

Public Health Bulletin

A Publication of the Public Health Department, Jeff Hamm, Health Agency Director
Craig McMillan, M.D., M.P.H., Interim Health Officer • www.slopublichealth.org
2191 Johnson Avenue • P.O. Box 1489 • San Luis Obispo, CA 93406 • (805) 781-5500 • (805) 781-5543 fax

More Complete Reporting on Death Certificates Needed

In the past year, San Luis Obispo County has changed its way of receiving and filing death certificates, moving from a paper-based system to Electronic Death Registration System (EDRS).

Now all parties involved in registering and filing a death certificate can do it electronically, so that there are no more delays as copies are mailed to various parties involved. If you would like more information regarding this new process, call the San Luis Obispo County Vital Statistics registrar Dee Villarreal at 781-5514.

Physicians might wonder whether we really, truly care about what gets put down as the cause of death on death certificates, and the answer is YES. The underlying cause of death on a death certificate is used to identify mortality patterns and determine changes over time, identify regional differences in death rates, and monitor trends in public health issues such as infant and maternal mortality, infectious diseases and accidents and suicides.

To understand what caused a death, sometimes more information is needed on a death certificate

continued on page 2 ☞☞☞

Craig McMillan, M.D., M.P.H.

CenCal Health Takes Over Medical Management of MediCal Clients

On March 1, 2008, the medical management of MediCal clients transitioned to CenCal Health (formerly Santa Barbara Health Authority). MediCal managed care models have been expanding into several counties throughout the state on a prescribed schedule through the State Office of Managed Care. The state and the federal government have decided on areas where managed care may be more cost effective and more beneficial to the population served than continuing with the straight, fee-for-service MediCal model of health care payments.

CenCal Health administers the MediCal population costs. They enrolled providers and have established a network of physicians and specialists and hospitals to provide services for persons with full-scope MediCal. The goal of their work is to improve the health status of persons who have MediCal. They plan to achieve that goal through extensive review of treatments prescribed and services that are delivered and through training of providers and members about ways to improve health status.

CenCal Health has already launched a program on obesity prevention and will continue to work with their providers to integrate information about obesity prevention and early intervention into their practice.

Valley Fever Recommendations

Recently, the Public Health Department was contacted by a construction worker, concerned that several persons on their work crew were having respiratory symptoms, with some having been diagnosed with pneumonia after doing some excavating at a worksite. The Public Health Department began an investigation which quickly grew to include the California Department of Public Health. Ultimately, it was discovered that 50% of the persons working at the site had contracted coccidioides immitis, or Valley Fever.

continued on page 3 ☞☞☞

Highlights in this Issue:

Shaken Baby Syndrome Simulator Now Available 2
Update on Merck and GSK Hepatitis A Vaccine 3
Communicable Disease Table 4

Public Health Department newsletters can also be accessed online at the Public Health Department Web site www.slopublichealth.org (click on *Public Health Bulletins* at the bottom of the home page).

Shaken Baby Syndrome Simulator Now Available

The San Luis Obispo County Child Abuse Prevention Council has purchased two Shaken Baby Syndrome simulators.

Shaking the life-sized infant simulator is disturbing. Watching the damage progress across the brain through illuminated LEDs is powerful. Hearing the piercing cry abruptly stop is devastating. There's no denying the instant and permanent effects of shaking a helpless baby when this electronic simulator is in your hands.

According to the Centers for Disease Control, approximately 25 percent of shaken baby victims die from their injuries. Shaken Baby Syndrome (SBS) is underreported because the effects on the brain aren't always immediately seen, the abuse may not be reported, and perpetrators often lie to medical personnel about the cause of a baby's injuries. Experts agree that awareness of SBS is critical for everyone who cares for an infant, responds to family emergencies, or trains future parents, babysitters and child care providers.

Materials included with the simulator describe the type and extent of injuries shaking can cause, list the many reasons babies cry, offer techniques to calm an inconsolable baby, and help participants establish a plan for managing those stressful times without harming an infant in their care.

Call the SLO-CAP office at 543-6216 to reserve this educational tool or visit www.slocap.org/.

Child Abuse Prevention Workshop May 30

Coastal Tri-Counties Child Abuse Prevention Coalition and the Santa Barbara County Child Abuse Prevention Council will present a *Building Parent Leadership, Involvement and Partnerships* workshop on May 30 at the Royal Scandinavian Inn in Solvang.

The day's activities include a parent leadership panel, researched based models of parent involvement, and engaging breakout sessions. Jerry Tello will be the keynote speaker.

Registration is required. Call Lisa Fraser at 543-6216 for more details.

Death Certificates (continued)

than the minimum. For example, listing "blunt force trauma" as the only cause of death, and marking it as an accident doesn't help much in understanding what happened to the person. Was it blunt force trauma to the head or chest? Was the person in a car, or hit by a car? Was it a fall from a ladder? Did something fall on the person? Any of these are of importance in determining trends in accidental deaths.

For the "immediate cause of death" on the death certificate, the terminal event (for example, cardiac arrest, asystole, or respiratory arrest) should not be used. If a terminal event seems most appropriate, then you always need to list its causes on the lines below (for example, cardiac arrest due to coronary artery atherosclerosis). Thirty-three percent of death certificates in San Luis Obispo County listed the terminal event as the "immediate cause of death" in 2007.

Sepsis seems to be an issue on death certificates in our county as well. When listing sepsis as a cause of death, make sure there is a trail to follow on what caused the sepsis. When urosepsis is the only listed cause of death, it is difficult to know why the person had a urinary tract infection. Healthy people generally will not die of a UTI. If a catheter is in place, it should be noted as well as to why the catheter was placed, such as "indwelling catheter for neurogenic bladder." A sequence such as "cardiopulmonary arrest" due to "sepsis" due to "renal failure" is similarly unrevealing. If possible, try to list an underlying medical condition that lead to this sequence of events.

The vital statistics registrar can now reject the electronic death certificates with insufficient underlying medical causes of death. In that case the mortuary will follow up, usually with the physicians signing the certificate, to attempt to get further medical information. This is done at the State's request, so try not to hate the messenger.

Just as the local registrar can reject a certificate, the State can reject the local filing as well. All we ask is that you try to list the underlying cause(s) that started the chain of events leading to the death.

For more details on filling out a death certificate, visit the Name Association of Medical Examiners Web site: www.thename.org/.

Update on Merck and GSK Pediatric and Adult Hepatitis A Vaccine

Merck & Co., Inc., is experiencing production delays for Pediatric and Adult hepatitis A vaccine (Pediatric & Adult VAQTA). Merck has temporarily discontinued accepting orders for Pediatric VAQTA and Adult VAQTA in the vial formulation. Based on current information, it is estimated that VAQTA will be available in early third quarter 2008 and Adult VAQTA in fourth quarter 2008.

GSK production and supply of their Pediatric and Adult hepatitis A vaccine (Pediatric & Adult Havrix) and their Adult hepatitis A/hepatitis B combination vaccine (Twinrix) are currently in ample supply to meet demand. GSK has initiated plans to increase production of Havrix and Twinrix, to help ensure an uninterrupted supply for the U.S. market.

Health Officer Notes (continued)

Out of this investigation came some recommendations for workers and companies doing work outdoors where dirt could be disturbed in San Luis Obispo County, especially in the North County region. These recommendations, along with descriptions of high risk activities are now posted on the Public Health Department's Web site, and we are providing a brief synopsis here.

Cocci is spread in the environment through dust that contains spores of the fungus. The spores are small enough to be inhaled deep into the lung, where they can cause infection. Construction workers have been found to be at increased risk of Valley Fever compared to agricultural or other workers. In particular, pipeline, highway, and utility construction often involves work in remote areas where the soil has not been disturbed and where pockets of cocci may exist. Preventative measures, notably dust control, can be effective in reducing the rate of infection. The following recommendations apply:

- Inhaling cocci spores may cause Valley Fever;
- Workers should be trained to recognize symptoms of Valley Fever;
- Provide HEPA-filtered air-conditioned enclosed cabs on heavy equipment;
- Provide National Institute for Occupational Safety and Health (NIOSH) approved respirators for workers without prior history of Valley Fever;
- Half-face respirators equipped with N-100 or P-100 filters should be used during digging;
- Prohibit eating and smoking at the worksite;
- Consider limiting outdoor construction during the fall to essential jobs only, as the risk of cocci infection is higher during this season;
- Post warnings onsite and consider limiting access to visitors.

Medical providers should also be aware of the increased risk of Valley Fever to certain occupational groups, and include some risk assessment questions when obtaining a history for respiratory illness. Please remember that Valley Fever is a reportable condition, and a confidential morbidity report can be obtained on the Public Health Department Web site, www.slocounty.ca.gov/health/publichealth.htm.

West Nile Virus:

To date in 2008, 43 birds have been called in to the West Nile Virus (WNV) dead bird hotline. Of these, 16 were suitable for testing. No positive results have been reported yet, but we would like to remind providers that WNV season is coming. Resources on WNV are on the Public Health Department Web site, as well as the CDC (www.cdc.gov) and California Department of Public Health Web sites (www.dhs.ca.gov).

Tuberculosis (TB)

Beginning in October, the Public Health Department began investigating a case of active TB affiliated with Paso Robles High School. We are happy to report that we have identified no further active cases of TB associated with that index case.

San Luis Obispo County Reported Cases of Selected Communicable Diseases - 2008

Disease	January	February	March	Total 2008	Total 2007
AIDS/HIV	0/2	0/0	1/3	1/5	9/27
Amebiasis	**0**	**0**	**0**	0	0
Brucellosis	0	0	0	0	0
Campylobacteriosis	**1**	**1**	**1**	**3**	**49**
Chlamydial Infections	42	49	79	170	629
Coccidioidomycosis	**2**	**6**	**9**	**17**	**113**
Cryptosporidiosis	0	0	0	0	18
E. Coli 0157:H7	**0**	**0**	**0**	**0**	**4**
Giardiasis	0	1	0	1	7
Gonorrhea	**1**	**5**	**8**	**14**	**48**
Hepatitis A	0	1	2	3	2
Hepatitis B	**4**	**5**	**2**	**11**	**28**
Hepatitis C Acute	0	0	0	0	3
Hepatitis C Chronic	**21**	**36**	**62**	**119**	**366**
Hepatitis, Unspecified	0	0	0	0	0
Listerosis	**0**	**0**	**0**	**0**	**0**
Measles (Rubeola)	0	0	0	0	0
Meningitis - Total	**0**	**0**	**5**	**5**	**9**
Meningitis - Viral	0	0	3	3	17
Meningitis, H-Flu	**0**	**0**	**0**	**0**	**1**
Meningococcal Disease	0	0	0	0	0
Pertussis	**0**	**0**	**2**	**2**	**16**
Rubella	0	0	0	0	0
Salmonellosis	**1**	**1**	**3**	**5**	**26**
Shigellosis	0	0	0	0	4
Syphilis - Total	**0**	**1**	**5**	**6**	**16**
Tuberculosis	0	0	0	0	2
West Nile Fever	**0**	**0**	**0**	**0**	**0**
W. Nile Virus Neuroinvasive	0	0	0	0	0

San Luis Obispo County
Public Health Department
P.O. Box 1489
San Luis Obispo, CA 93406

EXHIBIT 9

During the Fall of 2007, San Luis Obispo County Public Health Department investigated an outbreak of Valley Fever (*coccidioides immitis*) in construction workers in the North County region of the County. The California Department of Public Health participated in the investigation, and the following recommendations were issued to limit exposure to Valley Fever. Certain words were removed from the recommendations, to make the location of the outbreak more generic in order to protect confidentiality.

As you know, the California Department of Public Health has been conducting an epidemiological investigation of the outbreak of Valley Fever among a construction crew October 2007. Although this investigation is ongoing, we are writing to recommend interim measures to control worker exposure to species of Coccidioides (cocci), the fungal agent that causes Valley Fever. These recommendations are based on scientific information from the published literature.

Cocci is spread in the environment through dust that contains spores of the fungus. Geographic areas that are more likely to contain cocci spores in the soil (endemic areas) include the deserts of California, Nevada, Arizona, New Mexico, and Texas, as well as Mexico. The spores are small enough to be inhaled deep into the lung, where they can cause infection (Coccidioidomycosis or Valley Fever). Construction workers have been found to be at increased risk of Valley Fever compared to agricultural and other workers. In particular, pipeline, highway, and utility construction often involves work in remote areas where the soil has not been disturbed and where pockets of cocci may exist. When these pockets are disturbed, the dust raised can have a high concentration of spores. These pockets cannot be reliably predicted, but preventive measures, notably dust control, can be effective in reducing the rate of infection and the seriousness of epidemics.

Based on the most recent incident and on past incidents, we know that San Luis Obispo County is an endemic area for cocci. Workers exposed to dust may be considered at risk for developing Valley Fever. We recommend that you implement the following control measures to reduce the possibility of worker illness:

1. Reevaluate and update your Injury and Illness Prevention Program (IIPP, as required by Title 8, Section 3203), and ensure that safeguards to prevent Valley Fever are included.
2. Train all employees on the following issues:
   - The soil in San Luis Obispo County may contain cocci spores, especially in the North County region;
   - Inhaling cocci spores may cause Valley fever;
   - How to recognize symptoms of Valley Fever; these symptoms resemble common viral infections, and may include fatigue, cough, chest pain, fever, rash, headache, and body and joint ache;
   - Work with a medical professional with expertise in cocci as you develop this training. More information about cocci infection is available from the following websites

- http://www.lungusa.org/site/pp.asp?c=dvLUK9O0E&b=845369
- http://www.vfce.arizona.edu/VFIH-home.htm
- Workers must promptly report suspected symptoms of work-related Valley Fever to a supervisor;
- Workers are entitled to receive prompt medical care if they suspect symptoms of work-related Valley Fever; workers should inform the health care provider that they may have been exposed to cocci;
- To protect themselves, workers should use control measure as outlined in this document.

3. Control dust exposure:
   - Consult with local Air Pollution Control District Compliance Assistance programs and with California Occupational Safety and Health Administration (Cal/OSHA) Compliance program regarding meeting the requirements of Dust Control Plans and for specific methods of dust control. These methods may include wetting the soil while ensuring that the wetting process does not raise dust or adversely affect the construction process;
   - Provide HEP-filtered air-conditioned enclosed cabs on heavy equipment. Train workers on proper use of cabs, such as turning on air conditioning prior to using the equipment.
   - Provide communication methods, such as 2-way radios, for use in enclosed cabs;
   - Provide National Institute for Occupational Safety and Health (NIOSH)-approved respirators for workers without a prior history of Valley Fever.
   - Half-face respirators equipped with N-100 or P-100 filters should be used during digging. Employees should wear respirators when working near earth moving machinery.
   - Employees should be medically evaluated, fit-tested, and properly trained on the use of the respirators, and a full respiratory protection program in accordance with the applicable Cal/OSHA Respiratory Protection Standard (8 CCR 5144) should be in place;
   - Prohibit eating and smoking at the worksite, and provide separate, clean eating areas with hand-washing facilities;
   - Avoid outdoor construction operations during unusually windy conditions;
   - Consider limiting outdoor construction during the Fall to essential jobs only, as the risk of cocci infection is higher during this season.

4. Prevent transport of cocci outside endemic areas:
   - Thoroughly clean equipment, vehicles, and other items before they are moved off-site to other work locations;
   - Provide workers with coveralls daily, lockers (or other system for keeping work and street clothing and shoes separate), daily changing and showering facilities.
   - Clothing should be changed after work everyday, preferably at the work site;
   - Train workers to recognize that cocci may be transported offsite on contaminated equipment, clothing, and shoes; alternatively, consider installing boot-washing stations;

- Post warnings onsite and consider limiting access to visitors, especially those without adequate training and respiratory protection.

5. Improve medical surveillance for employees:

- Employees should have prompt access to medical care, including suspected work-related illnesses and injuries;
- Work with a medical professional to develop a protocol to medically evaluate employees who have symptoms of Valley Fever;
- Consider preferentially contracting with 1-2 clinics in the area and communicate with the health care providers in those clinics to ensure that providers are aware that Valley Fever has been reported in San Luis Obispo County, and especially the North County region. This will increase the likelihood that ill workers will receive prompt, proper and consistent medical care;
- Respirator Clearance should include medical evaluation for all new employees, annual re-evaluation for changes in medical status, and annual training, and fit-testing;
- Please note that skin testing is not recommended for evaluation of Valley Fever;
- If an employee is diagnosed with Valley Fever, a physician must determine if the employee should be taken off work, when they may return to work, and what type of work activities they may perform.

EXHIBIT 10

EPA United States Environmental Protection Agency

Diesel Particulate Matter

What is Diesel Particulate Matter?

Diesel particulate matter is part of a complex mixture that makes up diesel exhaust. Diesel exhaust is commonly found throughout the environment and is estimated by EPA's National Scale Assessment to contribute to the human health risk in New England. Diesel exhaust is composed of two phases, either gas or particle and both phases contribute to the risk. The gas phase is composed of many of the urban hazardous air pollutants, such as acetaldehyde, acrolein, benzene, 1,3-butadiene, formaldehyde and polycyclic aromatic hydrocarbons. The particle phase also has many different types of particles that can be classified by size or composition. The size of diesel particulates that are of greatest health concern are those that are in the categories of fine, and ultra fine particles. The composition of these fine and ultra fine particles may be composed of elemental carbon with adsorbed compounds such as organic compounds, sulfate, nitrate, metals and other trace elements. Diesel exhaust is emitted from a broad range of diesel engines; the on road diesel engines of trucks, buses and cars and the off road diesel engines that include locomotives, marine vessels and heavy duty equipment.

How Do I Get Exposed to Diesel Particulate Matter?

The most common exposure pathway is breathing the air that contains the diesel particulate matter. The fine and ultra fine particles are respirable which means that they can avoid many of the human respiratory system defense mechanisms and enter deeply into the lung. In the National Scale Assessment, there are several steps used to characterize public health risks. For diesel particulate matter, not all of the steps could be completed but a qualitative assessment was provided that provided modeling estimates of population exposures. The estimated population exposure concentrations for diesel particulate matter were the highest exposure concentrations in all of the New England states. EPA has medium confidence in the overall NATA estimate for diesel particulate exposure based on the emissions and exposure modeling.. Exposure to diesel particulate matter comes from both on road and off road engine exhaust that is either directly emitted from the engines or aged through lingering in the atmosphere.

How Can Diesel Particulate Matter Affect My Health?

Diesel exhaust causes health effects from both short term or acute exposures and also long term chronic exposures, such as repeated occupational exposures. The type and severity of health effects depends upon several factors including the amount of chemical you are exposed to and the length of time you are exposed. Individuals also react differently to different levels of exposure. There is limited information on exposure to just diesel particulate matter but there is enough evidence to indicate that inhalation exposure to diesel exhaust causes acute and chronic health effects.

Acute exposure to diesel exhaust may cause irritation to the eyes, nose, throat and lungs, some neurological effects such as lightheadedness. Acute exposure may also elicit a cough or nausea as well as exacerbate asthma. Chronic exposure in experimental animal inhalation studies have shown a range of dose dependent lung inflammation and cellular changes in the lung and there are also diesel exhaust immunological effects. Based upon human and laboratory studies, there is considerable evidence that diesel exhaust is a likely carcinogen. Human epidemiological studies demonstrate an association between diesel exhaust exposure and increased lung cancer rates in occupational settings.

At What Levels Should I Be Concerned?

EPA's National Scale Assessment uses several types of health hazard information to provide a quantitative "threshold of concern" or a health benchmark concentration at which it is expected that no adverse health effects occur at exposures to that level. Health effects information on carcinogenic, short and long term noncarcinogenic end points are used to establish selective protective health levels to compare to the modeled exposures levels. Unfortunately the exposure response data in human studies are considered too uncertain to develop a carcinogenic unit risk for EPA's use. There is a Reference Concentration (RFC) that is used as a health benchmark protective of chronic noncarcinogenic health effects but it is for diesel exhaust and not specifically set for diesel particulate matter which is what was modeled in NATA. The RFC for diesel exhaust, which includes diesel particulate matter is 5 ug/m3. This value is similar to the National Ambient Air Quality Standard established for fine particulate matter which is 15ug/m3.

What Can I Do To Minimize My Risk?

- Avoid idling if you have a diesel vehicle, this means turn off your engine when your vehicle is not in motion.
- Keep your diesel vehicle well tuned and maintained.
- If possible, retrofit diesel engines with pollution control devices.
- If purchasing trucks or buses, consider buying those that meet EPA's new standards ahead of schedule.

Sources of Information

Regional Information Regarding Diesel Exhaust

Health Assessment Document for Diesel Exhaust

EPA Inside IAQ "A Comparison of Indoor and Outdoor Concentrations of Hazardous Air Pollutants." EPA/600/N-98/002, Spring/Summer 1998, (PDF) (20 pp, 130K, about PDF)

Last updated on Friday, April 06, 2012

EXHIBIT 11

Health Effects of Diesel Exhaust

A fact sheet by
Cal/EPA's Office of Environmental Health Hazard Assessment and
The American Lung Association of California.

Diesel fuel is widely used throughout our society. It powers trucks that deliver products to our communities, buses that carry us to school and work, agricultural equipment that plants and harvests our food, and backup generators that can provide electricity during emergencies. It is also used for many other applications. Diesel engines have historically been more versatile and cheaper to run than gasoline engines or other sources of power. Unfortunately, the exhaust from these engines contains substances that can pose a risk to human health.

In 1998, the California Environmental Protection Agency's Office of Environmental Health Hazard Assessment (OEHHA) completed a comprehensive health assessment of diesel exhaust. This assessment formed the basis for a decision by the California Air Resources Board (ARB) to formally identify particles in diesel exhaust as a toxic air contaminant that may pose a threat to human health. The American Lung Association of California (ALAC) and its 15 local associations work to prevent lung disease and promote lung health. Since 1904, the American Lung Association has been fighting lung disease through education, community service, advocacy and research.

This fact sheet by OEHHA and ALAC provides information on health hazards associated with diesel exhaust.

Diesel exhaust contains more than 40 toxic air contaminants

What is diesel exhaust?

Diesel exhaust is produced when an engine burns diesel fuel. It is a complex mixture of thousands of gases and fine particles (commonly known as soot) that contains more than 40 toxic air contaminants. These include many known or suspected cancer-causing substances, such as benzene, arsenic and formaldehyde. It also contains other harmful pollutants, including nitrogen oxides (a component of urban smog).

How are people exposed to diesel exhaust?

Diesel exhaust particles and gases are suspended in the air, so exposure to this pollutant occurs whenever a person breathes air that contains these substances. The prevalence of diesel-powered engines makes it almost impossible to avoid exposure to diesel exhaust or its byproducts, regardless of whether you live in a rural or urban setting. However, people living and working in urban and industrial areas are more likely to be exposed to this pollutant. Those spending time on or near roads and freeways, truck loading and unloading operations, operating diesel-powered machinery or

working near diesel equipment face exposure to higher levels of diesel exhaust and face higher health risks.

What are the health effects of diesel exhaust?

As we breathe, the toxic gases and small particles of diesel exhaust are drawn into the lungs. The microscopic particles in diesel exhaust are less than one-fifth the thickness of a human hair and are small enough to penetrate deep into the lungs, where they contribute to a range of health problems.

Diesel exhaust and many individual substances contained in it (including arsenic, benzene, formaldehyde and nickel) have the potential to contribute to mutations in cells that can lead to cancer. In fact, long-term exposure to diesel exhaust particles poses the highest cancer risk of any toxic air contaminant evaluated by OEHHA. ARB estimates that about 70 percent of the cancer risk that the average Californian faces from breathing toxic air pollutants stems from diesel exhaust particles.

Diesel exhaust increases the risk of cancer...

In its comprehensive assessment of diesel exhaust, OEHHA analyzed more than 30 studies of people who worked around diesel equipment, including truck drivers, railroad workers and equipment operators. The studies showed these workers were more likely to develop lung cancer than workers who were not exposed to diesel emissions. These studies provide strong evidence that long-term occupational exposure to diesel exhaust increases the risk of lung cancer. Using information from OEHHA's assessment, ARB estimates that diesel-particle levels measured in California's air in 2000 could cause 540 "excess" cancers (beyond what would occur if there were no diesel particles in the air) in a population of 1 million people over a 70-year lifetime. Other researchers and scientific organizations, including the National Institute for Occupational Safety and Health, have calculated cancer risks from diesel exhaust that are similar to those developed by OEHHA and ARB.

Exposure to diesel exhaust can have immediate health effects. Diesel exhaust can irritate the eyes, nose, throat and lungs, and it can cause coughs, headaches, light-headedness and nausea. In studies with human volunteers, diesel exhaust particles made people with allergies more susceptible to the materials to which they are allergic, such as dust and pollen. Exposure to diesel exhaust also causes inflammation in the lungs, which may aggravate chronic respiratory symptoms and increase the frequency or intensity of asthma attacks.

... And it can cause coughs and aggravate asthma

Diesel engines are a major source of fine-particle pollution. The elderly and people with emphysema, asthma, and chronic heart and lung disease are especially sensitive to fine-particle pollution. Numerous studies have linked elevated particle levels in the air to increased hospital admissions, emergency room visits, asthma attacks and premature deaths among those suffering from respiratory problems. Because children's lungs and respiratory systems are still developing, they are also more susceptible than healthy adults to fine particles. Exposure to fine particles is associated with increased frequency of childhood illnesses and can also reduce lung function in children.

Like all fuel-burning equipment, diesel engines produce nitrogen oxides, a common air pollutant in California. Nitrogen oxides can damage lung tissue, lower the body's resistance to respiratory infection and worsen chronic lung diseases, such as asthma. They also react with other pollutants in the atmosphere to form ozone, a major component of smog.

What is being done to reduce the health risks from diesel exhaust?

Improvements to diesel fuel and diesel engines have already reduced emissions of some of the pollutants associated with diesel exhaust. However, diesel exhaust is still one of the most widespread and toxic substances in California's air.

ARB's Diesel Risk Reduction Plan, when fully implemented, will result in a 75 percent reduction in particle emissions from diesel equipment by 2010 (compared to 2000 levels), and an 85 percent reduction by 2020. The plan calls for the use of cleaner-burning diesel fuel, retrofitting of existing engines with particle-trapping filters, and the use in new diesel engines of advanced technologies that produce nearly 90 percent fewer particle emissions, as well as the use of alternative fuels.

Diesel exhaust contributes to smog and fine-particle pollution

The use of other fuels, such as natural gas, propane and electricity offer alternatives to diesel fuel. All of them produce fewer polluting emissions than current formulations of diesel fuel. As a result of ARB and local air-quality regulations, public transit agencies throughout California are using increasing numbers of passenger buses that operate with alternative fuels or retrofitted equipment.

For further information

Office of Environmental Health Hazard Assessment

1001 I Street, P.O. Box 4010, Sacramento, CA 95812-4010
(916) 324-7572
www.oehha.ca.gov

Air Resources Board

1001 I Street, Sacramento, CA 95814
(800) 363-7664
www.arb.ca.gov

American Lung Association of California

921 11th Street, Suite 700, Sacramento, CA 95814
(916) 442-4546
For your local office, call (800) LUNG-USA
www.californialung.org

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see OEHHA's web site at www.oehha.ca.gov/public_info.html.

EXHIBIT 12

Fact Sheet

EPA United States Environmental Protection Agency

Mandatory Reporting of Greenhouse Gases (40 CFR part 98)

Rule Overview

- On October 30, 2009, the U.S. Environmental Protection Agency (EPA) published a rule for the mandatory reporting of greenhouse gases (GHG) from large GHG emissions sources in the United States. Implementation of 40 CFR Part 98 is referred to as the Greenhouse Gas Reporting Program (GHGRP).

- This comprehensive, nationwide emissions data will provide a better understanding the sources of GHGs and will guide development of the policies and programs to reduce emissions. The publically available data will allow reporters to track their own emissions, compare them to similar facilities, and aid in identifying cost effective opportunities to reduce emissions in the future.

- 40 CFR part 98 applies to direct greenhouse gas emitters, fossil fuel suppliers, industrial gas suppliers, and facilities that inject CO2 underground for sequestration or other reasons. In general, the threshold for reporting is 25,000 metric tons or more of carbon dioxide (CO2) equivalent per year. Reporting is at the facility level, except for certain suppliers of fossil fuels and industrial greenhouse gases.

- An estimated 85-90 percent of the total U.S. GHG emissions from approximately 13,000 facilities are covered by this final rule.

- Most small businesses would fall below the 25,000 metric ton threshold and are not required to report GHG emissions to EPA.

- 40 CFR part 98 requires reporting by 41 industrial categories. For calendar year 2010, facilities in 29 categories are required to report. An additional 12 categories begin reporting for calendar year 2011 emissions.

- Reports are submitted annually and provide data collected during the previous calendar year (i.e., reporting year). Reports for reporting year 2010 are due on September 30, 2011. Reports for future years are due on March 31 for emissions in the previous calendar year.

- The annual reports are submitted to EPA electronically using an electronic greenhouse gas reporting tool (e-GGRT), which is accessed through the EPA web page listed at the end of this fact sheet.

- EPA will verify the data submitted and will not require third party verification. Prior to EPA verification, reporters will be required to self-certify the data they submit to EPA.

- The GHG reporting requirements for vehicle and engine manufacturers outside of the light-duty sector were incorporated into the long-standing conventional ("criteria") pollutant testing and reporting requirements under Title II of the Clean Air Act. Wherever possible, EPA based the new reporting requirements on existing measurement methods and plans to use existing data collection systems. EPA is not requiring reporting of mobile source emissions or activity data from fleet operators or state and local governments.

Subsequent Final Rule Revisions

Federal Register Publication Date	Rule Revision	Description	First Applicable Reporting Year[1]
07/12/2010	Mandatory Reporting of Greenhouse Gases from Magnesium Production, Underground Coal Mines, Industrial Wastewater Treatment, and Industrial Waste Landfills (Subparts T, FF, II, and TT)	Requires reporting of GHGs from magnesium production, underground coal mines, industrial wastewater treatment, and industrial landfills. The action includes EPA's final decision not to include ethanol production and food processing as distinct subparts in the rule, as well as the final decision not to include suppliers of coal in the rule at this time.	2011
09/22/2010	Corporate Parent and NAICS code (Subpart A)	Requires reporters to provide: the name, address, and ownership status of their U.S. parent company; their primary and all other applicable North American Industry Classification System (NAICS) codes; and an indication of whether or not any of their reported emissions are from a cogeneration unit.	2010
10/28/2010	Technical Corrections, Clarifying and Other Amendments to Certain Provisions of the Greenhouse Gas Reporting Rule (Subparts A, E, H, K, N, O, P, Q, S, V, Z, CC, EE,GG, HH, LL, MM, NN)	Corrects technical and editorial errors in several subparts and clarifies or updates provisions that have been the subject of questions from reporting entities. The subparts that were amended are: General provisions, adipic acid production, cement production, ferroalloy production, glass production, HCFC-22 production and HCFC-23 destruction, hydrogen production, iron and steel production, lime manufacturing, nitric acid production, phosphoric acid production, soda ash manufacturing, titanium dioxide production, zinc production, municipal solid waste landfills, suppliers of coal-based liquid fuels, suppliers of petroleum products, suppliers of natural gas and natural gas liquids.	2010
11/30/2010	Petroleum and Natural Gas Systems (Subpart W)	Requires reporting of fugitive and vented GHG emissions from petroleum and natural gas systems. The rulemaking requires emissions reporting from the following industry segments: Onshore petroleum and natural gas production, offshore petroleum and natural gas production, natural gas processing, natural gas transmission compressor stations, underground natural gas storage, liquefied natural gas (LNG) storage, LNG import and export terminals, and natural gas distribution.	2011
12/1/2010	Injection and Geological Sequestration of Carbon Dioxide (Subpart RR)	Requires reporting of CO2 injection and geologic sequestration of CO2.	2011
12/1/2010	Additional Sources of Fluorinated GHGs (Subparts I, L, DD, QQ, and SS)	Requires reporting of fluorinated GHG emissions from electronics manufacturing, production of fluorinated gases, the use of electrical transmission and distribution equipment, the manufacture or refurbishment of electrical equipment, and import and export of pre- charged equipment and closed cell foams.	2011

[1] The reporting year is the calendar year for which GHG data are collected. For example, reporting year 2010 emissions are reported on September 30, 2011.

Federal Register Publication Date	Rule Revision	Description	First Applicable Reporting Year[1]
12/17/2010	Revision of Certain Provisions of the Mandatory Reporting of Greenhouse Gases Rule (Subparts A, C, D, F, G, P, V, X, Y, AA, NN, OO, PP)	This rule primarily makes clarifying and technical changes to specific provisions that were unclear or did not have the intended effect. The subparts included in the rule are: General provisions, general stationary fuel combustion, electricity generation, aluminum production, ammonia manufacturing hydrogen production, nitric acid production, petrochemical production, petroleum refineries, pulp and paper manufacturing, suppliers of natural gas and natural gas liquids, suppliers of industrial greenhouse gases, suppliers of CO2.	All reporting years
04/26/11	Revision to Petroleum and Natural Gas Systems (Subpart W)	Extends the dates for use of best available monitoring methods for subpart W.	2011
05/26/2011	Confidentiality Determination for the Mandatory Greenhouse Gas Reporting Rule and Proposed Rule Amendment Specifying Procedures for Handling Part 98 Data (Subparts A,C,D, E, F, G, H, K, N, O, P, Q, R, S, U, V, X, Y, Z, AA, BB, CC, EE, GG, HH, LL, MM, NN, OO, PP)	Determines which data elements will be publicly available and which will be kept confidential. The subparts addressed in this rule are those subparts that are applicable in reporting year 2010: General provisions, general stationary fuel combustion, electric generation, adipic acid production, aluminum production, ammonia manufacturing, cement production, ferroalloy production, glass production, HCFC-22 production and HCFC-23 destruction, hydrogen production, iron and steel production, lead production, lime manufacturing, miscellaneous uses of carbonate, nitric acid production, petrochemical production, phosphoric acid production, pulp and paper manufacturing, silicon carbide production, titanium dioxide production, zinc production, municipal solid waste landfills, suppliers of coal-based liquid fuels, suppliers of petroleum products, suppliers of natural gas and natural gas liquids, suppliers of industrial greenhouse gases and suppliers of CO2.	All reporting years

Implementation of the GHG Reporting Program

To assist reporters in complying with this regulation, EPA has developed a suite of information and training resources including:

- An on-line applicability tool that will assist potential reporters to assess if they are required to report.
- A series of webinars, training slides, and other training opportunities on the reporting requirements of the rule, including the electronic GHG reporting tool (eGGRT).
- A hotline to answer technical questions on rule implementation and eGGRT.
- A variety of guidance documents for different audiences.
- Information sheets and monitoring checklists on reporting requirements for subparts.
- A searchable database of frequently asked questions.
- Technical background materials for the rule.

Implementation of the GHG Reporting Program

http://www.epa.gov/climatechange/emissions/ghgrulemaking.html.

This information is provided solely for informational purposes. It does not provide legal advice, have legally binding effect, or expressly or implicitly create, expand, or limit any legal rights, obligations, responsibilities, expectations, or benefits in regard to any person. The series of information sheets is intended to assist reporting facilities/owners in understanding key provisions of 40 CFR part 98

EXHIBIT 13

EPA United States Environmental Protection Agency

New Source Review

Fact Sheet -- Proposed Rule: Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule

ACTION

- On September 30, 2009, EPA announced a proposal that is focused on large facilities emitting over 25,000 tons of greenhouse gases a year. These facilities would be required to obtain permits that would demonstrate they are using the best practices and technologies to minimize GHG emissions.

- The rule proposes new thresholds for greenhouse gas emissions (GHG) that define when Clean Air Act (CAA) permits under the New Source Review (NSR) and title V operating permits programs would be required for new or existing industrial facilities.

- The proposed thresholds would "tailor" the permit programs to limit which facilities would be required to obtain NSR and title V permits and would cover nearly 70 percent of the national GHG emissions that come from stationary sources, including those from the nation's largest emitters—including power plants, refineries, and cement production facilities.

- Small farms, restaurants and many other types of small facilities would not be subject to these permitting programs.

- This proposal addresses the emissions of the group of six greenhouse gases (GHGs) that may be covered by an EPA rule controlling or limiting their emissions:
  1. Carbon dioxide (CO2)
  2. Methane (CH4)
  3. Nitrous oxide (N2O)
  4. Hydrofluorocarbons (HFCs)
  5. Perfluorocarbons (PFCs)
  6. Sulfur hexafluoride (SF6)

- EPA is proposing carbon dioxide equivalent (CO2e) as the preferred metric for determining GHG emissions rates for any combination of these six GHGs, but we are requesting comment in this proposal on alternatives. Emissions of greenhouse gases are typically expressed in a common metric, so that their impacts can be directly compared, as some gases are more potent (have a higher global warming potential or GWP) than others. The international standard practice is to express GHGs in CO2e. Emissions of gases other than CO2 are translated into CO2 equivalents by using the gases' global warming potentials.

- Under the Title V operating permits program, EPA is proposing a major source emissions applicability threshold of 25,000 tons per year (tpy) of carbon dioxide CO2e for existing industrial facilities. Facilities with GHG emissions below this threshold would not be required to obtain an operating permit.

- Under the Prevention of Significant Deterioration (PSD) portion of NSR—which is a permit program designed to minimize emissions from new sources and existing sources making major modifications—EPA is proposing a:
  1. Major stationary source threshold of 25,000 tpy CO2e. This threshold level would be used to determine if a new facility or a major modification at an existing facility would trigger PSD permitting requirements.
  2. Significance level between 10,000 and 25,000 tpy CO2e. Existing major sources making modifications that result in an increase of emissions above the significance level would be required to obtain a PSD permit. EPA is requesting comment on a range of values in this proposal, with the intent of selecting a single value for the GHG significance level.

- Operating permits contain air emissions control requirements that apply to a facility, such as national emissions standards for hazardous air pollutants, new source performance standards, or best available control technologies required by a PSD permit. In general, since there are currently no such air emission control requirements, existing facilities with GHG emissions greater than 25,000 tons per year that already have operating permits would not need to immediately revise them. At the end of a 5-year period when the operating permit must be renewed, these facilities would be required to include estimates of their GHG emissions in their permit applications. Facilities may use the same data reported to EPA under the Mandatory Reporting Rule to fulfill this requirement.

- New or modified facilities with GHG emissions that trigger PSD permitting requirements would need to apply for a revision to their operating permits to incorporate the best available control technologies and energy efficiency measures to minimize GHG emissions. These controls are determined on a case-by-case basis during the PSD process.

- Under the proposed emissions thresholds, EPA estimates that 400 new sources and modifications would be subject to PSD review each year for GHG emissions. Less than 100 of these would be newly subject to PSD. In total, approximately 14,000 large sources would need to obtain operating permits for GHG emissions under the operating permits program. About 3,000 of these sources would be newly subject to CAA operating permit requirements as a result of this action. The majority of these sources are expected to be municipal solid waste landfills.

- Municipal solid waste landfills are the second largest source of human-related methane emissions in the United States, accounting for approximately 23 percent of these emissions in 2007. Landfill methane, a powerful greenhouse gas, can be captured, converted, and used as an energy source, reducing emissions and providing an important renewable energy source.

- The current thresholds for criteria pollutants such as lead, sulfur dioxide and nitrogen dioxide, are 100 and 250 tons per year (tpy). These thresholds are in effect now, and are appropriate for criteria pollutants. However, they are not feasible for GHGs. Without the tailoring rule, these lower thresholds would take effect automatically for GHGs with the adoption of any EPA rule that controls or limits GHG emissions.

- The proposed thresholds would continue to preserve the ability of the NSR and title V operating permit programs to achieve and maintain public health and environmental protection goals while avoiding an administrative burden that would prevent state and local permitting authorities from processing CAA permits

efficiently.

- EPA will accept comment on this proposal for 60 days after publication in the *Federal Register*.

NEXT STEPS

- The final emissions thresholds for GHG emissions under the federal PSD and operating permits programs will take effect immediately upon promulgation of the final rule. At that time, EPA will put the new thresholds into effect in state, local and tribal agency programs that run PSD and Title V operating programs under EPA approval. Those agencies will continue to have the option to seek EPA approval for lower thresholds if they demonstrate that they can adequately implement the PSD program at the lower thresholds.

- EPA intends to evaluate ways to streamline the process for identifying GHG emissions control requirements and issuing permits. This will reduce costs and increase efficiency for both sources and for state permitting agencies, which in most cases are responsible for issuing the permits.

- Under the proposal, EPA must also re-evaluate the final GHG emissions thresholds after an initial phase, during which PSD and Title V permitting authorities will gain experience in issuing permits to GHG sources. By the end of the first phase, which is proposed to last five years, the Agency is proposing to complete a study to evaluate whether it is administratively feasible for PSD and Title V permitting authorities to adequately administer their programs at lower GHG thresholds.

- After reviewing the study results, EPA will complete a follow-on regulatory action, within one year (six years following promulgation of this rule). The follow-on rule will establish thresholds during the second phase, by either:
  1. Confirming the need to retain the GHG permitting thresholds for PSD and/or Title V at the levels promulgated with this rulemaking; or
  2. Establishing different GHG threshold levels that more accurately reflect the administrative capabilities of permitting authorities to address GHGs.

- EPA believes that a five-year duration for the first phase is appropriate but the Agency requests comment on alternative time periods.

- EPA also plans to develop supporting information to assist permitting authorities as they begin to address permitting actions for GHG emissions for the first time. The guidance would first cover source categories that typically emit GHGs at levels exceeding the thresholds established through this rulemaking.

- Although EPA has not yet identified specific source categories, the Agency plans to develop sector- and source-specific guidance that would help permitting authorities and affected sources better understand GHG emissions for the selected source categories, methods for estimating those emissions, control strategies for GHG emissions, and available GHG measurement and monitoring techniques.

- This guidance also will include approaches for making Best Available Control Technology determinations as required for a PSD permit.

BACKGROUND

- On April 2, 2007, the Supreme Court found that GHGs, including carbon dioxide, are air pollutants covered by the CAA. *Massachusetts v. EPA*, 549 U.S. 497 (2007).

- The Supreme Court found that EPA was required to determine whether or not emissions of GHGs from new motor vehicles cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare, or whether the science is too uncertain to make a reasoned decision. In April 2009, EPA responded to the Court by proposing a finding that greenhouse gases contribute to air pollution that may endanger public health or welfare.

- EPA expects soon to take final action on the finding. The agency also expects to issue regulations under the Clean Air Act to control GHG emissions from light duty vehicles (proposal signed 9/15/09). Such an action will trigger Clean Air Act permitting requirements under the Prevention of Significant Deterioration (PSD) and Operating Permit (title V) programs for GHG emissions. This will be the first time GHGs would be subject to either of these Clean Air Act permitting programs.

- Congress established the NSR program as part of the 1977 Clean Air Act Amendments and modified it in the 1990 Amendments. NSR is a preconstruction permitting program that serves two important purposes:
  1. Ensures the maintenance of air quality standards or, where there are not air quality standards, it ensures that air quality does not significantly worsen when factories, industrial boilers, and power plants are modified or added. In areas that do not meet the national ambient air quality standards, NSR assures that new emissions do not slow progress toward cleaner air. In areas that meet the standards, especially pristine areas like national parks, NSR assures that new emissions fall within air quality standards.
  2. Ensures that state-of-the-art control technology is installed at new plants or at existing plants that are undergoing a major modification.

- New major stationary sources and major modifications at existing major stationary sources that meet emissions applicability thresholds outlined in the Clean Air Act and in existing PSD regulations must obtain a PSD permit outlining how they will control emissions. The permit requires facilities to apply best available control technology (BACT), which is determined on a case-by-case basis taking into account, among other factors, the cost and effectiveness of the control.

- The Clean Air Act Amendments of 1990 required that all states develop operating permit programs. Under these programs, known as Title V operating permits programs, every major industrial source of air pollution (and some other sources) must obtain an operating permit. The permits, which are reviewed every five years, contain all air emission control requirements that apply to the facility, including the requirements established as part of the preconsturction permitting process.

HOW TO COMMENT

- EPA will accept comment on the proposal for 60 days after publication in the Federal Register. Comments, identified by Docket ID No. EPA-HQ-OAR-2009-0517, may be submitted by one of the following methods:
  - www.regulations.gov: Follow the online instructions for submitting comments.

- E-mail: Comments may be sent by electronic mail (e-mail) to a-and-r-docket@epa.gov.
- Fax: Fax your comments to: (202) 566-9744.
- Mail: Send your comments to: EPA Docket Center, EPA West (Air Docket), Attention Docket ID No. EPA-HQ-OAR-2009-0517, U.S. Environmental Protection Agency, Mailcode: 2822T, 1200 Pennsylvania Avenue, NW, Washington, DC 20460.
- Hand Delivery or Courier: Deliver your comments to: .S. Environmental Protection Agency, EPA West (Air Docket), 1301 Constitution Avenue, Northwest, Room 3334, Washington, DC 20004, Attention Docket ID No. EPA-HQ-OAR-2009-0517. Such deliveries are only accepted during the Docket's normal hours of operation, and special arrangements should be made for deliveries of boxed information

FOR MORE INFORMATION

- To download a copy of this notice, go to EPA's Web site at: http://www.epa.gov/nsr.
- Today's proposed action and other background information are also available electronically at http://www.regulations.gov, EPA's electronic public docket and comment system. The docket number for this action is Docket ID No. EPA-HQ-OAR-2009-0517.
- For more information on the final rule, contact Joseph Mangino at (919) 541-9778 or mangino.joseph@epa.gov.

Last updated on Friday, July 22, 2011

EXHIBIT 14

DRAFT

COUNTY OF SAN DIEGO

INTERIM GUIDELINES FOR DETERMINING SIGNIFICANCE AND REPORT FORMAT AND CONTENT REQUIREMENTS

CLIMATE CHANGE

LAND USE AND ENVIRONMENT GROUP

Department of Planning and Land Use
Department of Public Works

Circulated for Public Review
October 23, 2008 to November 21, 2008

APPROVAL

I hereby certify that these **Interim Guidelines for Determining Significance and Report Format and Content Requirements for Climate Change** are a part of the County of San Diego, Land Use and Environment Group's Guidelines for Determining Significance and Technical Report Format and Content Requirements and were considered by the Director of Planning and Land Use, in coordination with the Director of Public Works on the __th day of _____, 2008.

_____
ERIC GIBSON
Director of Planning and Land Use

_____
JOHN SNYDER
Director of Public Works

I hereby certify that these **Interim Guidelines for Determining Significance and Report Format and Content Requirements for Climate Change** are a part of the County of San Diego, Land Use and Environment Group's Guidelines for Determining Significance and Technical Report Format and Content Requirements and have hereby been approved by the Deputy Chief Administrative Officer (DCAO) of the Land Use and Environment Group on the __th day of _____, 2008. The Director of Planning and Land Use is authorized to approve revisions to these Guidelines for Determining Significance and Report Format and Content Requirements for Climate Change, except any revisions to the Guidelines for Determining Significance presented in Chapter 4.0 must be approved by the Deputy CAO.

Approved, Month XX, 2008

_____
CHANDRA WALLAR
Deputy CAO

DRAFT

COUNTY OF SAN DIEGO

INTERIM GUIDELINES FOR DETERMINING SIGNIFICANCE

CLIMATE CHANGE

LAND USE AND ENVIRONMENT GROUP

Department of Planning and Land Use
Department of Public Works

Circulated for Public Review
October 23, 2008 to November 21, 2008

EXPLANATION

These Interim Guidelines for Determining Significance for Climate Change and the information presented herein shall be used by County staff for the review of discretionary projects and environmental documents pursuant to the California Environmental Quality Act (CEQA). These Guidelines present a range of quantitative, qualitative, and performance levels for particular environmental effects. Normally, (in the absence of substantial evidence to the contrary), an affirmative response to any one Guideline will mean the project will result in a significant effect, whereas effects that do not meet any of the Guidelines will normally be determined to be "less than significant." Section 15064(b) of the State CEQA Guidelines states:

> "The determination whether a project may have a significant effect on the environment calls for careful judgment on the part of the public agency involved, based to the extent possible on factual and scientific data. An ironclad definition of significant effect is not always possible because the significance of an activity may vary with the setting."

The purpose of these Guidelines is to provide for a consistent and objective evaluation of significant effects. These Guidelines are not binding on any decision-maker and do not substitute for the use of independent judgment to determine significance or the evaluation of evidence in the record. The County reserves the right to modify these Guidelines in the event of scientific discovery or alterations in factual data that may alter the common application of a Guideline.

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List of Acronyms

APCD	Air Pollution Control District
AB 32	Assembly Bill 32 Global Warming Solutions Act of 2006
AG	Attorney General
ARB	Air Resources Board
ASTM	American Society of Testing and Material
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resource Board
CAT	Climate Action Team
CCAP	Center for Clean Air Policy
CCAR	California Climate Action Registry
CDFA	California Department of Food and Agriculture
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CF	Connectivity Factor
CH4	Methane
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
CNG	Compressed Natural Gas
CPUC	California Public Utilities Commission
CUFR	California Urban Forestry
DGS	Department of General Services
DOE	U.S. Department of Energy
DOF	Department of Finance
DPF	Diesel Particulate Filter
DWR	Department of Water Resources
E85	85% Ethanol
EEA	Massachusetts Executive Office of Energy and Environmental Affairs
EERE	Energy Efficiency and Renewable Energy
EIR	Environmental Impact Report
EPA	U.S. Environmental Protection Agency
EV	Electric Vehicles
FAR	Floor Area Ratio
GHG	Greenhouse Gas
GGEP	Greenhouse Gas Emissions Policy
GGRP	Greenhouse Gas Reduction Plan
GP	General Plan
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
IT	Information Technology
ITE	Institute of Transportation Engineers
LEED	Leadership in Energy and Environmental Design
LNG	Liquefied Natural Gas
MMT	Million Metric Tons
MW	Megawatts

N_2O	Nitrous Oxide
NO_X	Oxides of Nitrogen
NREL	National Renewable Energy Laboratory
OPR	State Office of Planning and Research
PFC	Perfluorocarbon
PM	Particulate Mater
ROG	Reactive Organic Gas
RPS	Renewable Portfolio Standards
RTP	Regional Transportation Plan
S-3-05	Executive Order S-3-05
SB	Senate Bill
SDCGHGI	San Diego County Greenhouse Gas Inventory
SO_x	Sulfur Oxides
SP	Service Population
SRI	Solar Reflectance Index
SWP	State Water Project
TAC	Toxic Air Contaminants
THC	Total Hydrocarbon
ULEV	Ultra Low Emission Vehicle
UNFCCC	United Nations Framework Convention on Climate Change
URBEMIS	Urban Emissions Model
USGBC	U.S. Green Building Council
VMT	Vehicle Miles Traveled

INTRODUCTION

This document provides guidance for evaluating the adverse environmental effects that a proposed land development project may have on global climate change (GCC) due to its emissions of greenhouse gases (GHGs). Most scientists believe that GCC is caused by GHGs, or gases that trap heat in the atmosphere. New development typically results in increased emissions of GHGs due to additional vehicular use, energy use, and other resource use. To help reduce GHG emissions in California, the California Global Warming Solutions Act of 2006 (AB 32) mandates significant reductions in GHGs. Senate Bill 97, enacted in 2007, amends the CEQA statute and clearly establishes that GHG emissions and the effects of GCC are appropriate subjects for CEQA analysis. It directs the State Office of Planning and Research (OPR) to develop draft CEQA Guidelines "for the mitigation of greenhouse gas emissions or the effects of greenhouse gas emissions" by July 1, 2009 and directs the Resources Agency to certify and adopt the revised CEQA Guidelines by January 1, 2010. As additional guidance from the State is provided, these Guidelines will be updates as needed.

Although most projects have some potential to generate GHGs, these guidelines present screening criteria to identify the types of projects that will be required to prepare a Climate Change Analysis. Projects that would generate 900 metric tons or more of GHGs will be required to prepare a Climate Change Analysis and demonstrate that the project would not conflict with the goals and strategies established in AB 32 to reduce GHG emissions to 1990 levels by the year 2020. This screening criterion is based on the California Air Pollution Control Officers Association (CAPCOA) white paper which considered various methods of evaluating and addressing greenhouse gas emissions under CEQA to assist local governments in creating significance thresholds. According to the CAPCOA white paper, 900 metric tons of GHG emissions are generally produced by a 50 unit subdivision, a 35,000 square foot commercial or office center, or 11,000 square feet of retail.

In addition to analyzing project level GHG emissions, CEQA also requires that decision makers consider the potential impacts of Climate Change on a project. For example, a project located in a low lying coastal area may be inundated if the ocean levels continue to rise. However, due to the project specific nature of the potential effects of climate change on proposed projects, this document does not create a guideline for determining significance for the potential impact of Climate Change on a project. The Climate Change Report Format and Content Requirements require that the climate change analysis include a discussion of the potential impacts of Climate Change on the project.

1.0 GENERAL PRINCIPLES AND EXISTING CONDITIONS

GHGs have been at the center of a widely contested political, economic, and scientific debate surrounding GCC. Although the conceptual existence of GCC is generally accepted, the extent to which GHGs contribute to it remains a source of debate. The State of California has been at the forefront of developing solutions to address GCC. GCC refers to any significant change in measures of climate, such as average temperature, precipitation, or wind patterns over a period of time. Climate change may result from natural factors, natural processes, and/or human activities that change the composition of the atmosphere and alter the surface and features of the land. The accumulation of GHG emissions in the atmosphere has been associated with global warming, or an average increase in the temperature of the atmosphere near the Earth's surface. GHGs trap heat in the atmosphere, which in turn heats the surface of the Earth. Some GHGs occur naturally and are emitted to the atmosphere through natural processes, while others are created and emitted solely through human activities. The emission of GHGs through the combustion of fossil fuels (i.e., fuels containing carbon), in conjunction with other human activities, appears to be closely associated with global warming.

State law defines GHG as being any of the following compounds: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6) (Health and Safety Code, section 38505(g).) Carbon dioxide, followed by methane and nitrous oxide, are the most common GHGs that result from human activity.

1.1 Sources and Global Warming Potentials of GHG

The State of California GHG Inventory performed by the California Air Resources Board (CARB), compiled statewide anthropogenic GHG emissions and sinks. It includes estimates for CO_2, CH_4, N_2O, SF_6, HFCs, and PFCs. The current inventory covers the years 1990 to 2004 (Table 1 and 2). Data sources used to calculate this GHG inventory include California and federal agencies, international organizations, and industry associations. The calculation methodologies are consistent with guidance from the Intergovernmental Panel on Climate Change (IPCC). The 1990 emissions level is the sum total of emissions and removals from all sectors and categories in the inventory. The inventory is divided into seven broad sectors of economic activity within California. These sectors include: Agriculture; Commercial; Electricity Generation; Forestry; Industrial; Residential; and, Transportation.

Table 1 – State of California GHG Emissions by Sectors in 1990* (433 $MMTCO_2e$ Gross Emissions)

Sector	Total Emissions ($MMTCO_2e$)	Percent of Total Emissions
Agriculture	23.4	5%
Commercial	14.4	3%
Electricity Generation	110.6	26%
Forestry (excluding sinks)	0.2	<1%
Industrial	103.0	24%
Residential	29.7	7%
Transportation	150.7	35%
Forestry Sinks	-6.7	--

* The remaining 1.3 $MMTCO_2e$ are from unspecified fuel combustion which could not be attributed to an individual sector. Percents may not total 100 due to rounding.

Table 2 – State of California GHG Emissions by Sectors in 2004* (484 $MMTCO_2e$ Gross Emissions)

Sector	Total Emissions ($MMTCO_2e$)	Percent of Total Emissions
Agriculture	27.9	6%
Commercial	12.8	3%
Electricity Generation	119.8	25%
Forestry (excluding sinks)	0.2	<1%
Industrial	96.2	20
Residential	29.1	6%
Transportation	182.4	38%
Forestry Sinks	-4.7	--

* The remaining 16.0 $MMTCO_2e$ are from unspecified fuel combustion which could not be attributed to an individual sector. Percents may not total 100 due to rounding.

When accounting for GHGs, all types of GHGs emissions are expressed in CO_2 equivalents (CO_2e) and are typically quantified in metric tons (MT) or millions of metric tons (MMT). Each GHG has variable Global Warming Potential (GWP) and atmospheric lifetime. GWP is a measure of how much a given mass of greenhouse gas is estimated to contribute to global warming over a specific time interval. The time interval is defined by the atmospheric lifetime of the GHG, or the average time the

molecule stays stable in the atmosphere. The GWP is based on the atmospheric lifetime and the CO_2e which compares the gas in question to that of the same mass of carbon dioxide, which as a GWP of 1. The GWP and atmospheric lifetimes of common GHGs is provided in Table 3.

Table 3 - Global Warming Potentials and Atmospheric Lifetimes of Basic GHGs

GHG	Formula	100-year global warming potential*	Atmospheric lifetime (yrs)
Carbon dioxide	CO_2	1	Variable
Methane	CH_4	21	12 ± 3
Nitrous oxide	N_2O	310	120
Sulphur hexafluoride	SF_6	23,900	3 200

* The warming effects over a 100-year time frame relative to other greenhouse gases. (USEPA 2006)

In addition to the State of California GHG Inventory, a more specific regional GHG inventory was prepared by the University of San Diego School of Law Energy Policy Initiative Center[2]. This San Diego County Greenhouse Gas Inventory (SDCGHGI) is a detailed inventory that takes into account the unique characteristics of the region in calculating emissions. The GHG inventory calculated GHG emissions for 1990, 2006 and projected out for 2020. Based on this inventory and the emissions projections for the region, the study found that emissions of GHGs must be reduced by 33 percent below business as usual in order for San Diego County to achieve 1990 emissions levels by the year 2020. Businesses as usual, or forecasted emissions, are defined as the emissions that would have occurred in the absence of AB 32's mandated reductions. Construction of buildings using only Title 24 building standards (or simply relying on the 2006 version of the County Building Code) would create GHG emissions as forecasted.

Areas where feasible reductions can occur and the strategies for achieving these reductions are outlined in the SDCGHGI study and are used as the basis for determining whether a project would conflict with the goals of AB 32 in accordance with the interim guideline for determining significance established in this document. A summary of the various sectors that contribute to GHGs in San Diego County, total emissions, and the percent contribution for each sector is provided in Table 4.

[2] The document is titled, "San Diego County Greenhouse Gas Inventory: An Analysis of Regional Emissions and Strategies to Achieve AB 32 Targets" and is available online at http://www.sandiego.edu/epic/ghginventory/.

Table 4 – San Diego County GHG Emissions by Category (2006)*

Sector	Total Emissions (MMTCO2e)	Percent of Total Emissions
On-Road Transportation	16	46%
Electricity	9	25%
Natural Gas Consumption	3	9%
Civil Aviation	1.7	5%
Industrial Processes & Products	1.6	5%
Other Fuels / Other	1.1	4%
Off-Road Equipment & Vehicles	1.3	4%
Waste	0.7	2%
Agriculture/Forestry/Land Use	0.7	2%
Rail	0.3	1%
Water-Borne Navigation	127,000 metric tons	0.4%

* Energy Policy Initiative Center, University of San Diego School of Law

The sources of GHG emissions, GWP, and atmospheric lifetime of GHGs are all important variables to be considered in the process of calculating CO_2e for discretionary land use projects that require a climate change analysis.

2.0 EXISTING REGULATIONS AND POLICIES

All levels of government have some responsibility for the protection of air quality, and each level (Federal, State, and regional/local) has specific responsibilities relating to air quality regulation. GHG emissions and the regulation of GHGs is a relatively new component of air quality.

2.1 National and International Efforts

International and Federal legislation have been enacted to deal with climate change issues. In 1988, the United Nations and the World Meteorological Organization established the IPCC to assess the scientific, technical, and socioeconomic information relevant to understanding the scientific basis for human-induced climate change, its potential impacts, and options for adaptation and mitigation. The most recent reports of the IPCC have emphasized the scientific consensus that real and measurable changes to the climate are occurring, that they are caused by human activity, and that significant adverse impacts on the environment, the economy, and human health and welfare are unavoidable.

In October 1993, President Clinton announced his Climate Change Action Plan, which had a goal of returning GHG emissions to 1990 levels by the year 2000. This was to be accomplished through 50 initiatives that relied on innovative voluntary partnerships between the private sector and government aimed at producing cost-effective reductions in GHG emissions. On March 21, 1994, the United States joined a number of countries around the world in signing the United Nations Framework Convention on Climate Change (UNFCCC). Under the Convention, governments agreed to gather and share information on GHG emissions, national policies, and best practices; launch national strategies for addressing greenhouse gas emissions and adapting to expected impacts, including the provision of financial and technological support to developing countries; and cooperate in preparing for adaptation to the impacts of climate change. Recently, the United States Supreme Court declared in the court case of Massachusetts et al. v. Environmental Protection Agency et al., 549 C.S. 497 (2007) that the EPA does have the ability to regulate GHG emissions. In addition to the national and international efforts described above, many local jurisdictions have adopted climate change policies and programs.

2.2 State Regulations and Standards

Assembly Bill 32, the California Climate Solutions Act of 2006[3]

In September 2006, Governor Arnold Schwarzenegger signed AB 32, the California Climate Solutions Act of 2006, into law. In general, AB 32 directs the CARB to do the following:

- Make publicly available a list of discrete early action GHG emission reduction measures that can be implemented prior to the adoption of the statewide GHG limit and the measures required to achieve compliance with the statewide limit;
- Make publicly available a GHG inventory for the year 1990 and determine target levels for 2020;
- On or before January 1, 2010, adopt regulations to implement the early action GHG emission reduction measures;
- On or before January 1, 2011, adopt quantifiable, verifiable, and enforceable emission reduction measures by regulation that will achieve the statewide GHG emissions limit by 2020, to become operative on January 1, 2012, at the latest. The emission reduction measures may include direct emission reduction measures, alternative compliance mechanisms, and potential monetary and non-monetary incentives that reduce GHG emissions from any sources or categories of sources that CARB finds necessary to achieve the statewide GHG emissions limit; and
- Monitor compliance with and enforce any emission reduction measure adopted pursuant to AB 32.

Regarding the first two bullets, CARB has already made available a list of discrete early action GHG emission reduction measures. CARB has also published a staff report titled

[3] Health and Safety Code Section 38500 *et seq.*

California 1990 Greenhouse Gas Emissions Level and 2020 Emissions Limit that determined the statewide levels of GHG emissions in 1990. CARB identified 427 million metric tons of CO2 as the total statewide aggregated greenhouse gas 1990 emissions level and 2020 emissions limit.

Senate Bill 97
Senate Bill 97, enacted in 2007, amends the CEQA statute to clearly establish that GHG emissions and the effects of GHG emissions are appropriate subjects for CEQA analysis. It directs OPR to develop draft CEQA Guidelines "for the mitigation of greenhouse gas emissions or the effects of greenhouse gas emissions" by July 1, 2009 and directs the Resources Agency to certify and adopt the CEQA Guidelines by January 1, 2010.

Executive Order #S-3-05
Executive Order #S-3-05, signed by Governor Schwarzenegger on June 1, 2005, calls for a reduction in GHG emissions to 1990 levels by 2020 and for an 80 percent reduction in GHG emissions by 2050. Executive Order #S-3-05 also calls for the California EPA (CalEPA) to prepare biennial science reports on the potential impact of continued global warming on certain sectors of the California economy. The first of these reports, "Our Changing Climate: Assessing Risks to California", and its supporting document, "Scenarios of Climate Change in California: An Overview" (herein referred to as the Climate Scenarios report), was published by the California Climate Change Center in 2006.

State Standards Addressing Vehicular Emissions
Regulations aimed at on-road transportation emissions will be the primary source of emission reductions of GHGs by the year 2020. To this end, AB 1493, or the Pavley Bill, set the standard for new light-duty passenger vehicles. Once implemented, emissions from these vehicles are expected to be reduced in San Diego County by 21 percent by 2020. The federal Corporate Average Fuel Economy (CAFE) standard determines the fuel efficiency of certain vehicle classes in the United States. The current standard has remained largely unchanged since 1990. In 2007, as part of the Energy and Security Act of 2007, CAFE standards were increased for new light-duty vehicles to 35 miles per gallon by 2020. These increases in fuel efficiency translate into reductions of GHG emissions. In addition, the Low Carbon Fuel Standard (LCFS) was included in a California Governor's Executive Order that was promulgated in January 2007. This strategy addresses the type of fuel used in vehicles. Efficiency standards affect the total amount of fuel used, whereas the low-carbon fuel standard seeks to reduce the carbon content of the fuel, therefore reducing GHG emissions even if total fuel consumption is not reduced. The Low-Carbon Fuel Standard has been approved by CARB as a discrete early action item under AB 32 and implementing regulations are currently under development. It is assumed that the effects of the Low-Carbon Fuel Standard would be a 10% reduction in GHG emissions from fuel use by 2020.

2.3 Local Regulations and Standards

The County is working to develop a comprehensive strategy that will enhance the sustainability of County business operations and communities, building on the many energy efficient and environmentally sound practices already in place in County departments. Additionally, the County is working on a General Plan Update. The update is based on smart growth and land planning principles that will reduce Vehicle Miles Traveled (VMT), and thus result in a reduction of GHGs. This will be accomplished by locating future development within and near existing infrastructure. The General Plan Update will result in an implementation plan, with respect to the reduction of GHGs, which will include the following actions:

- Prepare a climate change action plan with a baseline inventory and emissions reduction targets for greenhouse gas emissions from all sources;
- Develop regulations and procedures to encourage the design and construction of new buildings in accordance with "green building" programs; and
- Develop regulations that encourage the use of energy recovery, as well as photovoltaic and wind energy in appropriate areas;

Currently, the County has a number of aggressive outreach and small business assistance programs that promote ways to reduce air and water pollution. This includes a Green Building Program which is designed to educate builders and provide incentives for the incorporation of green building standards (http://www.sdcounty.ca.gov/dplu/greenbuildings.html). Additionally, there are outreach programs that focus on the importance of reducing air quality impacts (lawn mower trade-in program) and reducing solid waste by recycling (compost bin give always and transfer station events).

The County is also making its own effort to reduce its carbon footprint. The County has various internal policies in place to reduce GHG emissions from County operations. The County Board of Supervisor's Policy B-67 requires that preference be given to products which conform to the Minimum Recycled Content Standards. This includes purchases and is used by the County of San Diego, its contractors, and its grantees in its procurement practices. Similarly, the County has established design standards (Board Policy G-15) for County facilities that set forth appropriate techniques, materials, and technology to improve public accessibility, energy performance, resource utilization, and the work environment. In the recent past, several county facilities have either been built to LEED standards or have incorporated renewable energy resources such as photovoltaics.

3.0. TYPICAL ADVERSE EFFECTS AND CLIMATE CHANGE ANALYSIS SCREENING CRITERIA

3.1 Typical Adverse Effects

The Climate Scenarios report, published in 2006 by the California Climate Change Center, uses a range of emissions scenarios developed by the IPCC to project a series of potential warming ranges (i.e., temperature increases) that may occur in California during the 21st century. Three warming ranges are identified: lower warming range [3.0 to 5.5 degrees Fahrenheit (°F)]; medium warming range (5.5 to 8.0°F); and higher warming range (8.0 to 10.5°F). The Climate Scenarios report then presents an analysis of the future projected climate changes in California under each warming range scenario.

According to the report, substantial temperature increases would result in a variety of impacts to the people, economy, and environment of California. These impacts would result from a projected increase in extreme conditions, with the severity of the impacts depending upon actual future emissions of GHGs and associated warming. These impacts are described below.

Public Health

Higher temperatures are expected to increase the frequency, duration, and intensity of conditions conducive to air pollution formation. For example, days with weather conducive to O_3 formation are projected to increase by 25 to 35 percent under the lower warming range and 75 to 85 percent under the medium warming range. In addition, if global background O_3 levels increase as is predicted in some scenarios, it may become impossible to meet local air quality standards. An increase in wildfires could also occur, and the corresponding increase in the release of PM2.5 (which can travel long distances depending on wind conditions) could further compromise air quality. The Climate Scenarios report indicates that large wildfires could become up to 55 percent more frequent if GHG emissions are not significantly reduced.

In addition, under the higher warming scenario, Los Angeles and Sacramento, by the year 2100, could experience as many as 100 more days per year with temperatures above90°F and95°F respectively. This is a large increase over historical patterns and approximately twice the increase projected if temperatures remain within or below the lower warming range. Rising temperatures will increase the risk of death from dehydration, heat stroke/exhaustion, heart attack, stroke, and respiratory distress caused by extreme heat.

Water Resources

A vast network of reservoirs and aqueducts capture and transport water throughout the State from northern California rivers and the Colorado River. The current distribution system relies on Sierra Nevada mountain snowpack to supply water during the dry spring and summer months. Rising temperatures, potentially compounded by decreases in precipitation, could severely reduce spring snowpack, increasing the risk of summer water shortages.

If GHG emissions continue unabated, more precipitation may fall as rain instead of snow, and the snow that does fall will melt earlier, reducing the Sierra Nevada spring snowpack by as much as 70 to 90 percent. Under the lower warming scenario, snowpack losses are expected to be only half as large as those expected if temperatures were to rise to the higher warming range. How much snowpack will be lost depends in part on future precipitation patterns, the projections for which remain uncertain. However, even under the wetter climate projections, the loss of snowpack would pose challenges to water managers, hamper hydropower generation, and could eliminate all skiing and other snow-related recreational activities.

The State's water supplies are also at risk from rising sea levels. An influx of saltwater would degrade California's estuaries, wetlands, and groundwater aquifers. Saltwater intrusion caused by rising sea levels is a major threat to the quality of water within the southern edge of the Sacramento/San Joaquin River Delta. The Delta accounts for a portion of San Diego County's water supply and is a major source of water for the State as a whole.

Agriculture

Increased GHG emissions are expected to cause widespread changes to the agriculture industry, reducing the quantity and quality of agricultural products statewide. Significant reductions in available water supply to support agriculture will impact production. Although higher CO_2 levels can stimulate plant production and increase plant water-use efficiency, California's farmers will face greater water demand for crops and a less reliable water supply as temperatures rise. Crop growth and development will change, as will the intensity and frequency of pest and disease outbreaks. Rising temperatures will likely aggravate O_3 pollution, which will in turn make plants more susceptible to disease and pests and interfere with plant growth.

Plant growth tends to be slow at low temperatures and increase up to a certain point with rising temperatures. Faster growth, however, can result in less-than-optimal development for many crops, thus decreasing the quantity and quality of yield for a number of California's agricultural products. Products likely to be most affected include wine grapes, fruits and nuts, and milk.

Ecosystems/Habitats

Continued global warming will likely shift the ranges of existing invasive plants and weeds, thus altering competition patterns with native plants. Range expansion is expected in many species while range contractions are less likely in rapidly evolving species with significant populations already established. Should range contractions occur, it is likely that new weed species will fill the emerging gaps. Continued global warming is also likely to increase the populations of many pests, lead to the emergence of new types of pests, and increase pathogen growth rates amongst these pests. The effects of these changes on ecosystems are largely unknown. The potential exists, however, for these changes to have significant impacts on the health of the various ecosystems located in the County and the State.

Moreover, continued global warming will alter natural ecosystems and biological diversity within the State. For example, alpine and sub-alpine ecosystems are expected to decline by as much as 60 to 80 percent by the end of the century as a result of increasing temperatures. The productivity of the State's forests is also expected to decrease as a result of global warming.

Wildland Fires

Global warming is expected to increase the risk of wildfire and alter the distribution and character of natural vegetation. If temperatures rise into the medium warming range, the risk of large wildfires in California could increase by as much as 55 percent, which is almost twice the increase expected if temperatures stay in the lower warming range. However, since wildfire risk is determined by a combination of factors including precipitation, winds, temperature, and landscape and vegetation conditions, future risks will not be uniform throughout the State. For example, an increase in precipitation (a potential result of a rise in temperatures) could lead to a 30 percent increase in southern California wildfires by the end of the century. In contrast, precipitation decreases could increase wildfires in northern California by as much as 90 percent.

Rising Sea Levels

Rising sea levels, more intense coastal storms, and warmer water temperatures will increasingly threaten the State's coastal regions. Under the higher warming scenario, sea level is anticipated to rise 22 to 35 inches by 2100. Elevations of this magnitude would inundate coastal areas with salt water, accelerate coastal erosion, threaten vital levees and inland water systems, and disrupt wetlands and natural habitats.

3.2 Climate Change Analysis Screening Criteria

Discretionary (non-industrial) projects that are greater than or equal to the project sizes listed in Table 5 must perform a climate change analysis. The project sizes shown below represent the project sizes that are estimated to emit approximately 900 metric tons of GHGs. These emissions levels are based on the amount of vehicle trips each project type would generate, the typical energy and water use associated with these projects, and other factors. The need for a climate change analysis for project types not listed in Table 5 will be evaluated on a case-by-case basis, using the 900 metric ton figure as a general gauge for determining which projects will require an analysis.

The 900 metric ton screening threshold for determining when an air quality analysis is required was chosen based on available guidance from the CAPCOA white paper (http://www.capcoa.org/) on addressing greenhouse gas emissions under CEQA. The CAPCOA white paper references a 900 metric ton guideline as a conservative threshold for requiring further analysis and mitigation.

This approach ensures that new development with the potential to make cumulatively considerable contributions to climate change, will incorporate appropriate mitigation measures and not result in a conflict with the goals of AB 32.

Table 5 – Project Type Examples* that Require Climate Change Analysis and Mitigation Measures

Project Type	Project Size that Generates Approximately 900 metric Tons of GHGs per Year
Single Family Residential	50 units
Apartments / Condominiums	70 units
General Commercial Office Space	35,000 square feet
Retail Space	11,000 square feet
Supermarket / Grocery Space	6,300 square feet

* A determination on the need for a climate change analysis for project types that do not fit the categories in this table (mixed use/industrial) will be made on a case-by-case basis, based on whether a project could generate 900 metric tons or more of GHGs.

4.0 GUIDELINE FOR DETERMINING SIGNIFICANCE

The guideline for determining significance discussed below has been developed from AB 32. This guideline addresses the potential cumulative impacts that a project's GHG emissions could have on Climate Change. Since Climate Change is a global phenomenon, no direct impact would be indentified for an individual land development project. For projects that exceed the screening criteria detailed in Section 3.2, an affirmative response to the following Guideline will generally be considered a significant impact to climate change as a result of project implementation, in the absence of scientific evidence to the contrary:

- ***The project will conflict with the goals and strategies of AB 32 to reduce GHGs to 1990 levels by 2020.***

Projects that meet the criteria for conducting a climate change analysis will be required to perform a GHG inventory to determine GHG emissions associated with project implementation and operation under business as usual conditions. As stated earlier, business as usual is defined as the emissions that would have occurred in the absence of the mandated reductions. Based on the significance guideline, applicable projects will have to demonstrate how project design measures and/or mitigation measures will reduce GHG emissions to enable the region to reduce GHG emissions to 1990 levels by the year 2020. The SDCGHGI has prepared the most comprehensive assessment of the regions GHG emissions and has outlined an approach that will allow the region to achieve the 1990 levels by the year 2020.

According to the SDCGHGI, the region must reduce its GHG emissions by 33 percent from business as usual to achieve 1990 emissions levels by the year 2020. In order for projects to demonstrate that they do not conflict with the goals and policies of AB 32, those that exceed the screening criteria will need to prepare a climate change inventory

and demonstrate that the construction, operational, and vehicular emissions associated with the project will be reduced by 33 percent from business as usual emissions levels. According to the SDCGHGI, a majority of the region's emissions are attributable to on-road transportation. Similarly, a majority of emissions resulting from land development projects will often be attributable to on-road transportation emissions. According to the SDCHGHI study, the emissions reductions for on-road transportation will be achieved in a variety of ways, including through regulations aimed at increasing fuel efficiency standards and decreasing vehicle emissions.

5.0 STANDARD MITIGATION AND PROJECT DESIGN CONSIDERATIONS

In order to meet emissions reduction targets, the region will need to reduce VMT by 10 percent. Therefore, individual development projects will be required to demonstrate that project emissions associated with VMT will meet the 10 percent reduction while operational and construction emissions would need to be reduced by 33 percent below business as usual. Table 6 provides a summary of these general emissions reductions requirements for individual projects.

Table 6 – Required Emissions Reductions for Projects that Require Preparation of a Climate Change Analysis

	Construction and Operational Emissions	*On-road vehicular emissions*
Required Emissions Reductions	33 Percent of total Construction and Operational Emissions	10 Percent of total VMT

The Climate Change Report Format and Content Requirements further detail the methodologies, modeling and other requirements for a climate change analysis.

The following project design or mitigation measures are examples that may be applied to a project to reduce GHG emissions to at least 33% below BAU. Project mitigation or design measures will vary depending on the type project, the type of GHG emissions, and various other factors that would be detailed in the climate change analysis. It is not intended that each mitigation measure identified in this section be applied to every project or that the mitigation be written exactly as presented herein. Similarly, a project may require mitigation that is not specifically identified in this document. Table 16 in Appendix B of the CAPCOA white paper is devoted to mitigation measures[4] and is an excellent resource for additional mitigation measures. A non-exclusive list of mitigation measures are described below.

[4] See http://www.capcoa.org/ceqa/CAPCOA%20White%20Paper%20-%20CEQA%20and%20Climate%20Change.pdf for the CAPCOA White Paper and refer to Appendix B, Mitigation Measure Summary.

5.1 Generally Applicable Measures

Energy Efficiency

- Design buildings to be energy efficient. Site buildings to take advantage of shade, prevailing winds, landscaping and sun screens to reduce energy use.
- Install efficient lighting and lighting control systems. Use daylight as an integral part of lighting systems in buildings.
- Install light colored "cool" roofs, cool pavements, and strategically placed shade trees.
- Provide information on energy management services for large energy users.
- Install energy efficient heating and cooling systems, appliances and equipment, and control systems.
- Install light emitting diodes (LEDs) for traffic, street and other outdoor lighting.
- Limit the hours of operation of outdoor lighting.
- Use solar heating, automatic covers, and efficient pumps and motors for pools and spas.
- Provide education on energy efficiency.

Renewable Energy

- Install solar and wind power systems, solar and tankless hot water heaters, and energy-efficient heating ventilation and air conditioning. Educate consumers about existing incentives.
- Install solar panels on carports and over parking areas.
- Use combined heat and power in appropriate applications.

Water Conservation and Efficiency

- Create water-efficient landscapes.
- Install water-efficient irrigation systems and devices, such as soil moisture-based irrigation controls.
- Use reclaimed water for landscape irrigation in new developments and on public property. Install the infrastructure to deliver and use reclaimed water.
- Design buildings to be water-efficient. Install water-efficient fixtures and appliances.
- Use greywater. (Greywater is untreated household waste water from bathtubs, showers, bathroom wash basins, and water from clothes washing machines.) For example, install dual plumbing in all new development allowing greywater to be used for landscape irrigation.
- Restrict watering methods (e.g., prohibit systems that apply water to non-vegetated surfaces) and control runoff.
- Restrict the use of water for cleaning outdoor surfaces and vehicles.
- Implement low-impact development practices that maintain the existing hydrologic character of the site to manage storm water and protect the

environment. (Retaining storm water runoff on- site can drastically reduce the need for energy-intensive imported water at the site.)

- Devise a comprehensive water conservation strategy appropriate for the project and location. The strategy may include many of the specific items listed above, plus other innovative measures that are appropriate to the specific project.
- Provide education about water conservation and available programs and incentives.

Solid Waste Measures

- Reuse and recycle construction and demolition waste (including, but not limited to, soil, vegetation, concrete, lumber, metal, and cardboard).
- Provide interior and exterior storage areas for recyclables and green waste and adequate recycling containers located in public areas.

Land Use Measures

- Include mixed-use, infill, and higher density in development projects to support the reduction of vehicle trips, promote alternatives to individual vehicle travel, and promote efficient delivery of services and goods.
- Incorporate public transit into project design.
- Preserve and create open space and parks. Preserve existing trees, and plant replacement trees at a set ratio.
- Include pedestrian and bicycle-only streets and plazas within developments. Create travel routes that ensure that destinations may be reached conveniently by public transportation, bicycling or walking.

Transportation and Motor Vehicles

- Use low or zero-emission vehicles, including construction vehicles.
- Promote ride sharing programs e.g., by designating a certain percentage of parking spaces for ride sharing vehicles, designating adequate passenger loading and unloading and waiting areas for ride sharing vehicles, and providing a website or message board for coordinating rides.
- Promote car sharing programs. Accommodations for such programs include providing parking spaces for the car share vehicles at convenient locations accessible by public transportation.
- Establish local "light vehicle" networks, such as neighborhood electric vehicle (NEV) systems.
- Provide the necessary facilities and infrastructure to encourage the use of low or zero-emission vehicles (e.g., electric vehicle charging facilities and conveniently located alternative fueling stations
- Provide on-site a transportation center where various public transportation modes intersect.
- Provide shuttle service to public transit.
- Provide public transit incentives such as free or low-cost monthly transit passes.
- Promote "least polluting" ways to connect people and goods to their destinations.

- Incorporate bicycle lanes and routes into street systems, new subdivisions, and large developments.
- Incorporate bicycle-friendly intersections into street design.
- For commercial projects, provide adequate bicycle parking near building entrances to promote cyclist safety, security, and convenience. For large employers, provide facilities that encourage bicycle commuting, including, e.g., locked bicycle storage or covered or indoor bicycle parking.
- Create bicycle lanes and walking paths directed to the location of schools, parks and other destination points.
- Work with the school district to restore or expand school bus services.

6.0 REFERENCES

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Title 42; Chapter 55; National Environmental Policy Act. As amended http://www4.law.cornell.edu/uscode/42/ch55.html.
Title 42, Chapter 85, Subchapter 1,The Clean Air Act. http://www.epa.gov/oar/oaq_caa.html

United States Environmental Protection Agency. National Emission Standards For Hazardous Air Pollutants. Code of Federal Regulations. Title 40; Chapter 1; Part 6

THE METROPOLITAN WATER DISTRICT
OF SOUTHERN CALIFORNIA

Office of the General Manager

August 23, 2012

Via Electronic & U.S. Mail

Jeffery Childers, Project Manager
California Desert District Office
U.S. Bureau of Land Management
22835 Calle San Juan de Los Lagos
Moreno Valley, California 92553-9046.

Dear Mr. Jeffery Childers:

Notice of Availability of the
Draft Plan Amendment and Environmental Impact Statement for the
Proposed McCoy Solar Energy Project (MSEP), Riverside County, CA

The Metropolitan Water District of Southern California (Metropolitan) reviewed the McCoy Solar Energy Project (MSEP) Draft Plan Amendment and Environmental Impact Statement (EIS). The U.S. Bureau of Land Management Palm Springs/South Coast Field Office, Palm Springs, California (BLM) prepared the Draft and EIS related to McCoy Solar, LLC's right-of-way (ROW) application for the McCoy Solar Energy Project (MSEP), a 750-megawatt (MW) photovoltaic (PV) solar electricity generation project, which may include an amendment to the California Desert Conservation Area Plan (1980 as amended).

Metropolitan is pleased to submit comments for consideration by BLM during the public comment period for the EIS. In sum, Metropolitan provides these comments to ensure that any potential impacts on its facilities or properties in the vicinity of the Project and on Colorado River water resources are adequately addressed. Metropolitan is pleased to submit these comments for consideration in preparing the final EIS.

Background

Metropolitan is a public agency and regional water wholesaler. It is comprised of 26 member public agencies serving more than 19 million people in six counties in Southern California. One of Metropolitan's major water supplies is Colorado River water, conveyed via Metropolitan's Colorado River Aqueduct (CRA). Metropolitan holds an entitlement to water from the Colorado River. The CRA consists of tunnels, open canals and buried pipelines. CRA-related facilities also include above and below ground reservoirs and aquifers, access and patrol roads, communication facilities, and residential housing sites. The CRA, which can deliver over 1.2 million acre-feet of water annually to the southern California coastal plain, extends 242 miles

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from the Colorado River, through the Mojave Desert to Lake Mathews. Metropolitan has five pumping plants located along the CRA, which consume approximately 2,400 gigawatt-hours of energy when the CRA is operating at full capacity.

Concurrent with its construction of the CRA in the mid-1930s, Metropolitan constructed 305 miles of 230 kilovolt (kV) transmission lines that run from the Mead Substation in Southern Nevada, head south, then branch east to Parker, California, and then west along Metropolitan's CRA. Metropolitan's CRA transmission line easements lie on federally-owned land, managed by BLM. The transmission lines were built for the sole and exclusive purpose of supplying power from the Hoover and Parker projects to the five pumping plants along the CRA.

Metropolitan's ownership and operation of the CRA and its 230 kV transmission system is vital to its mission to provide Metropolitan's 5,200 square mile service area with adequate and reliable supplies of high-quality water to meet present and future needs in an environmentally and economically responsible way.

Project Understanding

The Applicant proposes to construct, operate, maintain, and decommission the MSEP in a location approximately 13 miles northwest of the City of Blythe, California, 32 miles east of Desert Center, and 6 miles north of Interstate Freeway-10 (I-10). The MSEP solar plant site would be developed on approximately 4,315 acres of public land administered by BLM and on approximately 477 acres of private land subject to Riverside County's (County's) land use jurisdiction.

The key components of the Project are:

1. The solar plant site, i.e., all facilities that create a footprint in and around the field of solar panels, including: the solar field (consisting of up to two solar power plants identified as Unit 1 and Unit 2), up to two on-site substations (the Unit 1 and Unit 2 substations), an operations and maintenance (O&M) facility to be shared by Unit 1 and Unit 2 (if constructed); and related infrastructure and improvements;
2. A double-circuit, overhead 230 kV gen-tie line;
3. A 230 kV switchyard located near the Colorado River Substation (CRS);
4. Two telecommunications lines;
5. A Southern California Edison (SCE)-owned and operated distribution line; and
6. An access road providing access to the solar plant site.

The Project would operate year-round, and would generate electricity during daylight hours when electricity demand is at its peak. The MSEP would generate and deliver solar-generated power to the regional electrical grid through an interconnection at the CRS.

The MSEP would be constructed in up to two units. Unit 1 is expected to have a 250 MW capacity comprising an estimated 125 complete or equivalent partial 2 MW blocks. Unit 2 would have an up to 500 MW capacity consisting of up to 250 complete or equivalent partial 2 MW blocks. The construction of Unit 1 would include the access road, water treatment system, initial gen-tie line (consisting of the support towers and first circuit), O&M building, parking area, and the first 125 complete or equivalent partial 2 MW blocks. Proposed facilities on private and County-owned land would be limited to solar arrays and inverters, and a portion of the access road, gen-tie line, distribution line, and telecommunication line. Of the total Project, approximately 50 MW is expected to be developed on private land.

In the substation of each Unit, the voltage would be stepped up to 230 kV to match the voltage of the gen-tie line that would interconnect MSEP generation output with the SCE CRS. The MSEP gen-tie line route would extend south from the solar plant site along the eastern and south-eastern border of the Blythe Solar Energy Project (BSEP) site as proposed, or if a different route alternative is selected, either through the center of the BSEP site or along the western border of the BSEP site before turning south to cross the I-10 and west toward the CRS south of I-10. The MSEP gen-tie line route is estimated to be approximately 12.5 to 15.5 miles long, including 2 miles within the solar plant site boundary.

No water service is available at the proposed site. Groundwater in the area is contained within the Palo Verde Mesa Groundwater Basin (PVMGB) of the Colorado River Hydrologic Region. The Applicant does not propose to extend municipal water or sewer service to the Project site. Water in sufficient quantity and quality to serve Project needs is expected to be available from two or three primary wells and a sufficient number of back-up wells, which would be used in the event the primary wells are shut down for maintenance. All wells would be constructed and operated within the solar plant site at the eastern end of Unit 1; the precise location of the well field would be defined during the detailed design phase. If possible, one of the wells would be located near the proposed water treatment system area. As currently planned, the wells would pump groundwater from the PVMGB, where the water table has been measured at or near 254 feet amsl.

Construction-related water use would support site preparation (including operation of a portable batch plant, if needed) and grading activities. During earthwork for the grading of access roads, foundations, equipment pads, and other components, the primary uses of water would be for compaction and dust control. Smaller quantities would be required for preparation of the concrete required for building foundations and other minor uses. Subsequent to the earthwork activities, the primary water use would be for dust suppression. Based on similar projects, the Applicant estimates that the average water usage rate during construction would be approximately 180 to 200 gallons per minute. The total water usage during construction of Unit 1

is estimated to be approximately 450 acre-feet (AF), based on similar projects. The water demand associated with the construction of Unit 2 would be reduced relative to Unit 1, because elements common to the units would have been installed as part of Unit 1. The total water usage during construction of Unit 2 is estimated to be approximately 200 to 300 AF.
Drinking (potable) water would be supplied for construction workers on-site, and is estimated to be approximately 10,000 gallons per month (approximately 0.5 acre-foot per year (AFY)), varying seasonally and by work activities. The potable water could be brought to the solar plant site by tanker truck, or groundwater could be used with a package water treatment system to treat the water to meet potable standards.

Based on the anticipated uses (including drinking water, showers, restroom facilities, panel washing, dust suppression, and 3,000-gallon dedicated fire supply, among other uses), the estimated quantity of water needed for operation and maintenance of the MSEP would be approximately 15 to 22 AFY per Unit, plus a total of 1 AFY of potable water (31 to 45 AFY for the entire Project). The primary use of water during operation and maintenance-related activities would be for panel washing and dust control (the proposed PV technology requires no water for the generation of electricity).

Land Use Issues: Potential Impacts on Metropolitan Facilities

Although Metropolitan has not yet identified any direct impacts, the Project is in the general vicinity of Metropolitan facilities, perhaps as close as 8 miles. As described above, Metropolitan currently has a significant number of facilities, real estate interests, and fee-owned rights-of-way, easements, and other properties (Facilities) located on or near BLM-managed land in southern California that are part of our water conveyance system. A map of the Project in relation to Metropolitan's Facilities is enclosed for reference. Metropolitan is concerned with potential direct or indirect impacts that may result from the construction and operation of any proposed solar energy project on or near our Facilities. In order to avoid potential impacts, Metropolitan requests that the final EIS include an assessment of potential impacts to Metropolitan's Facilities with proposed measures to avoid or mitigate significant adverse effects. 15-1

Water Resources: Potential Impacts on Water Supplies

Metropolitan is concerned about the Project's potential direct and cumulative impacts on water supplies, specifically potential impacts on Colorado River supplies. As noted above, Metropolitan holds an entitlement to imported water supplies from the Colorado River. Water from the Colorado River is allocated pursuant to federal law and is managed by the Department of the Interior, Bureau of Reclamation. In order to lawfully use Colorado River water, a party must have an entitlement to do so. See Boulder Canyon Project Act of 1928, 43 U.S.C. §§ 1501, et seq.; *Arizona v. California* (Consolidated Decree), 547 U.S. 150 (2006). 15-2

The Project proposes to use up to 750 acre-feet of water during construction and up to 45 acre-feet per year for long-term operations, from wells located on site. The total MSEP water usage

would be 1,650 acre-feet apportioned over the 33-year life of the project. The entire project site overlies the "Accounting Surface" area designated by U.S. Geological Survey (USGS) Scientific Investigation Report 2008-5113. The Accounting Surface is defined to represent the elevation and slope of the static water table in the river aquifer outside the flood plain and the reservoirs of the Colorado River that would exist if the water in the river aquifer were derived only from the river. The accounting surface extends outward from the edges of the flood plain or a reservoir to the subsurface boundary of the river aquifer. The USGS Report indicates that the aquifer underlying the lands is considered to be hydraulically connected to the Colorado River and groundwater withdrawn from wells located on these lands would be replaced by Colorado River water, in part or in total. Wells that have a static water-level elevation near (within ± 0.84 feet at the 95-percent confidence level), equal to, or below the elevation of the Accounting Surface are presumed to yield water that will be replaced by water from the Colorado River. Wells that have a static water-level elevation above the elevation of the Accounting Surface are presumed to yield water that will be replaced by water from precipitation and inflow from tributary valleys. This means that if it is determined that these wells are, in fact, pumping water that will be replaced by water from the Colorado River, the use of such water would need to be accounted for as consumptive use of Colorado River water as required under the Consolidated Decree in *Arizona v. California*. In addition, page 4-20.4 of the Draft EIS states that model results indicated that there would be a total change of about 128 acre-feet in the Palo Verde Irrigation District (PVID) drain mass balance at the end of the operation and maintenance period. If this were to result in a reduction in PVID return flows to the Colorado River over the construction or operation period, Metropolitan's Colorado River water supply would be reduced. 15-2 (cont.)

All of California's apportionment to use of Colorado River water during normal, shortage, and Intentionally Created Surplus conditions is presently contracted, meaning that no new water entitlements are available for uses in California during these conditions. The project proponent would have to obtain imported water supplies from an existing contract holder or other non-Colorado River resource.

Recognizing the limitations on alternate water supplies, Metropolitan is willing to consider terms and conditions of a water sale agreement to furnish supplemental water to the proponent. Section 131(b) of the Metropolitan Water District Act provides Metropolitan with authority to enter into contracts to provide water to any private corporation or public agency for use in connection with generation of electric power at plants located outside of Metropolitan so long as a major portion of the power is used within Metropolitan's service area in Southern California. Any supplemental water sold for this Project would be an exchange of non-Colorado River water available to Metropolitan for Colorado River water available to Metropolitan. 15-3

Metropolitan requests that it be copied on all groundwater monitoring and reports for the Project because of the potential impacts to Metropolitan's supplies from use of water that would be replaced by Colorado River water. 15-4 Finally, on page 3.20-17, the distance from the MSEP for site numbers 4, 5, and 6 shown in Table 3.20-10 should be revised. Rather than 14 miles from the MSEP, these sites are much further away, located near the Arizona-Sonora boundary. 15-5

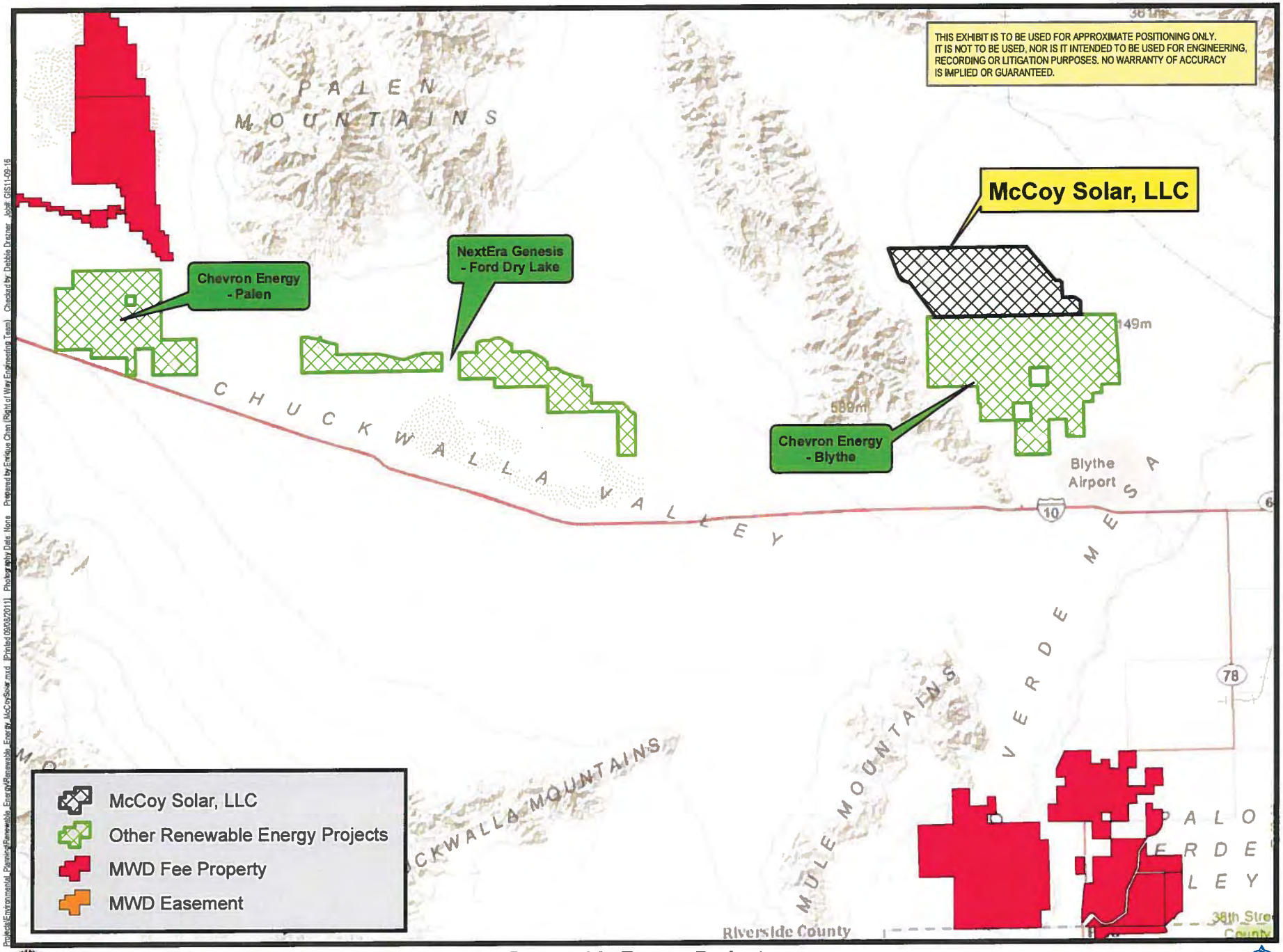
We appreciate the opportunity to provide input to your planning process and we look forward to receiving future environmental and related documentation on this project. If we can be of further assistance, please contact Mr. Michael Melanson at (916) 650-2648.

Very truly yours,

Deirdre West
Manager, Environmental Planning Team

LIM/lim
(J:\Environmental Planning Team\COMPLETED JOBS\August 2012\Job No. 2012082301)

Enclosure: 1) Map – Renewable Energy Projects



The Metropolitan Water District of Southern California
Engineering Services Group

Renewable Energy Projects
McCoy Solar, LLC

Miles 0 1 2

Comment Letter 16

Perkins Coie

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August 23, 2012

Jeff Childers
Project Manager
Bureau of Land Management
U.S. Department of the Interior
1201 Bird Center Drive
Palm Springs, CA 92262-8001
VIA EMAIL: jchilders@blm.gov

RE: Comments on Draft Plan Amendment / Environmental Impact Statement for the McCoy Solar Energy Project

Dear Mr. Childers:

I am submitting this comment on behalf of our client, Renewable Resources Group, Inc., (RRG). We appreciate the opportunity to comment on the Draft Plan Amendment / Environmental Impact Statement (PA/EIS) for the McCoy Solar Energy Project (MSEP), dated May 2012.

RRG owns and manages agricultural land throughout California, including land in eastern Riverside County near the MSEP. On some portions of its land, RRG facilitates development of solar energy generation facilities. As a landowner, RRG works with solar companies to sell them the land up-front or to engage in partnerships whereby RRG obtains necessary entitlements from governmental agencies and then transfers the land to them.

I am writing to provide the BLM with accurate information regarding lands that RRG owns, which are addressed in the Draft PA/EIS analysis of alternatives and cumulative impacts. The Draft PA/EIS describes a project labeled "X" and "CUP03677," and indicates that ownership is not known. (See Figure 4.1-1 and Table 4.1-4 in the cumulative analysis.) RRG owns these lands. 16-1

The northern section of the land labeled project CUP03677 in the Draft PA/EIS is incorrectly described as being developed for solar energy generation. RRG is not pursuing solar energy development of that northern piece. The large, contiguous southern piece is intended to be 16-2

developed for solar energy development. Since RRG does not have a solar company technology partner for that land, RRG is seeking entitlements to allow a solar photovoltaic energy plant to be built and operated on that site, either as a stand-alone project called the "Palo Verde Mesa Solar Project" (PVMS), or to be combined with another nearby solar project if that project has undergone environmental review. (See the enclosed maps of the PVMS lands.)

The PVMS lands are comprised of 3,250 acres of private, contiguous and previously disturbed parcels. The site can support up to 486 megawatts of solar photovoltaic energy generation and lies near the Colorado River Substation. RRG acquired control of these lands between June 2010 and January 2011. Pursuant to its customary business plan, RRG has been actively and openly seeking a buyer or solar company technology partner to develop the PVMS lands for solar energy generation.

16-2 (cont.)

For the purposes described above, RRG has submitted an application to Riverside County for a conditional use permit for a solar generation facility (EIR No. 532/Conditional Use Permit No. 3684/Public Use Permit No. 916/Palo Verde Mesa Solar Project). Cultural and biological surveys, for both wildlife and plants, have already been conducted on the PVMS lands, and draft studies are being reviewed by appropriate agencies. If those studies (or other information) would assist the BLM in its analysis of cumulative impacts or alternatives, RRG will provide them.

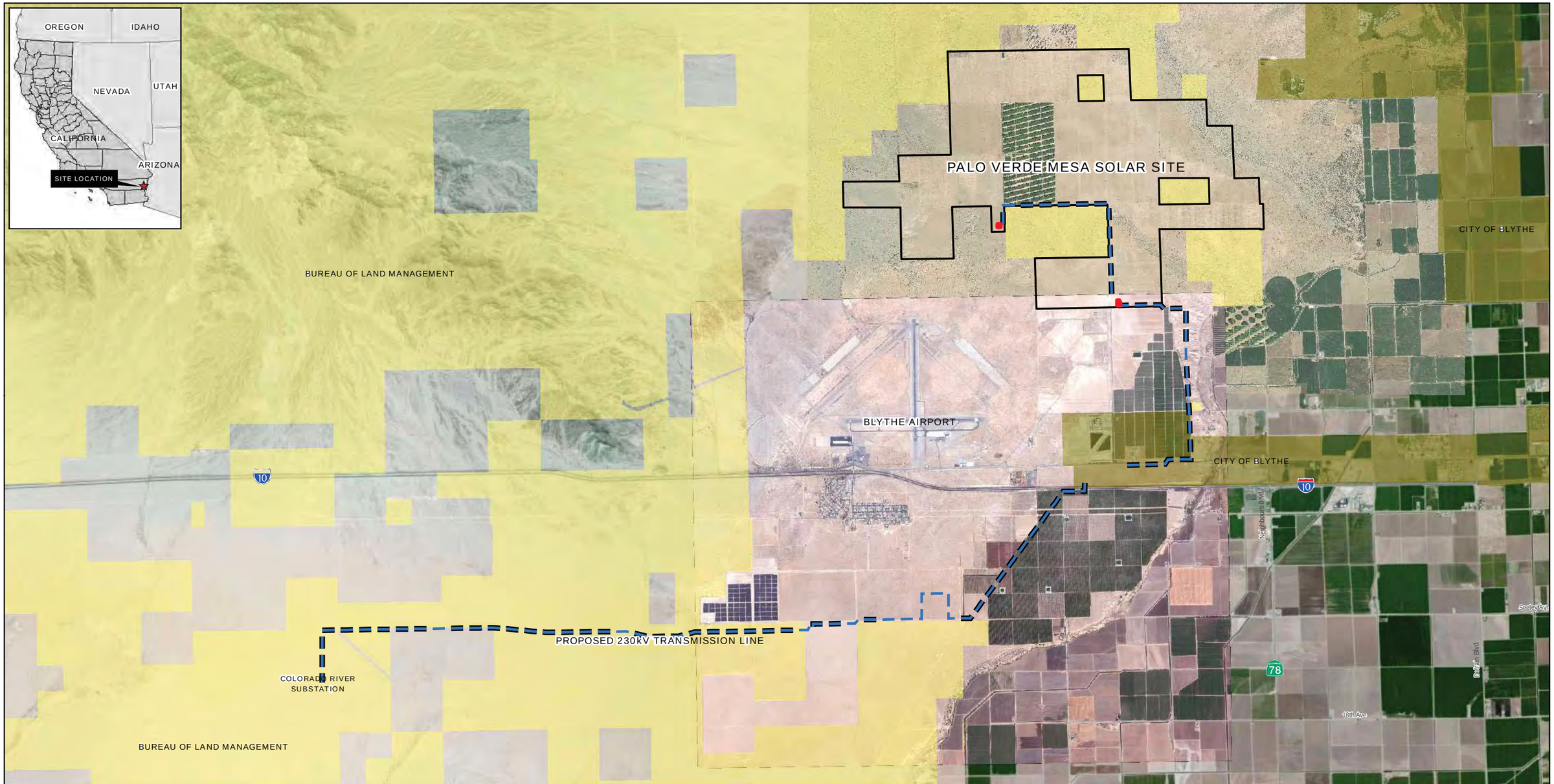
More than 90 percent of the PVMS site has already been disturbed by agricultural activities, so its development for solar energy generation would avoid or reduce impacts compared with development of undisturbed lands. Biological surveys completed to date have detected no federal or state threatened or endangered species on PVMS lands. For example, no desert tortoises or their sign have been observed on the site. Additionally, no kit fox were detected on the site. The surveys revealed that the site does not include Lands with Wilderness Characteristics, microphyll woodlands, or unavoidable federal or state jurisdictional waters.

If you have additional questions, please do not hesitate to contact me.

Sincerely,

Barbara J. Schussman
Attachments

LEGAL24464285.5



Legend

- Substation
- Proposed Palo Verde Mesa 230kV Transmission Line
- Site Boundary
- Colorado River Substation
- City of Blythe
- USDI Bureau of Land Management

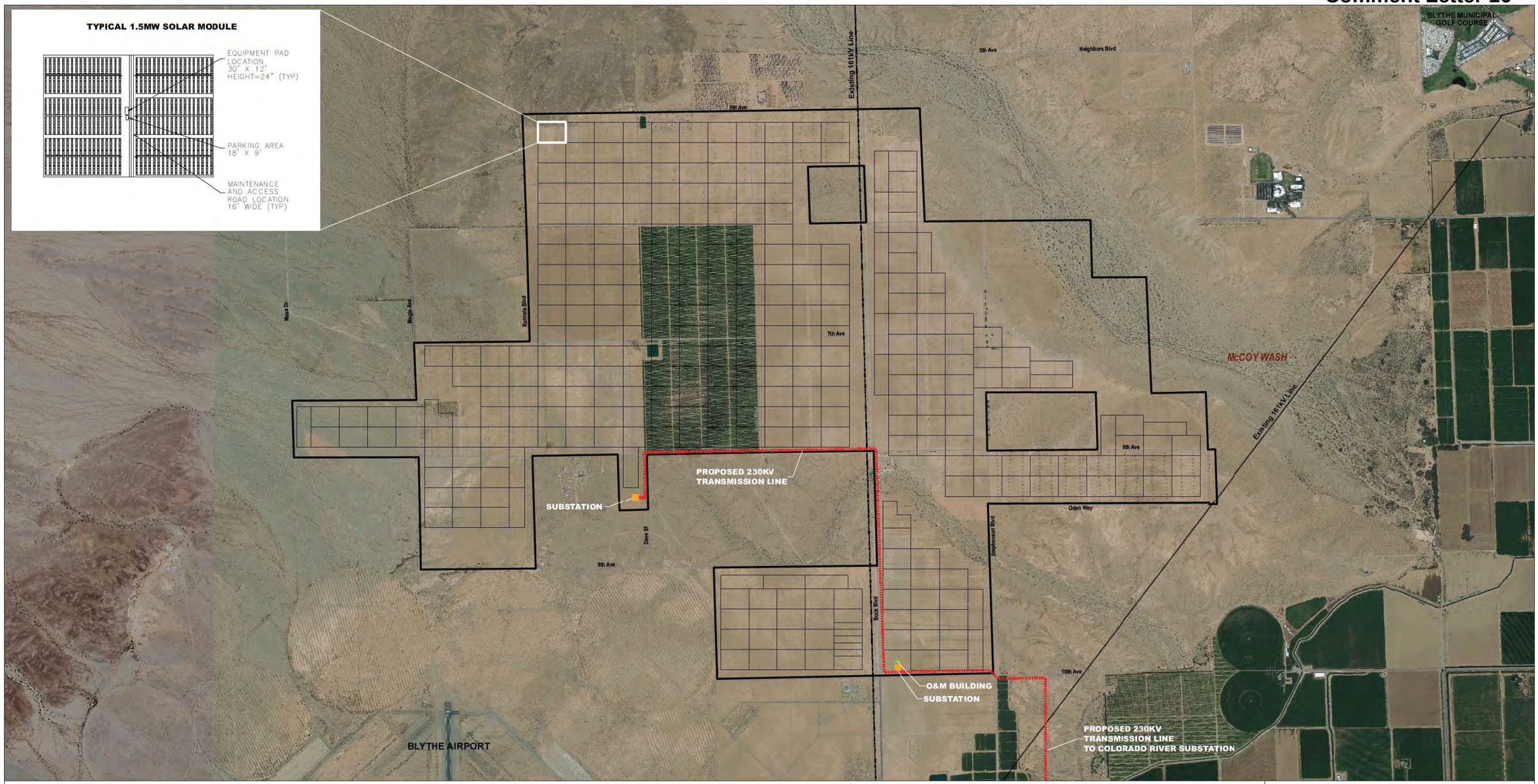
0 1 2
Miles
1:60,000

STUDY AREA

PALO VERDE MESA SOLAR SITE

POWER ENGINEERS RENEWABLERESOURCESGROUP

Source: GeoEye Imagery, 2011. ArcGIS Online, Bing Aerials, 2010.



Legend

- Site Boundary
- 1.5MW Solar Module
- Operations & Maintenance Building
- Substation
- Palo Verde Mesa 230kV Transmission Line
- Existing 161kV Line
- Roadway

N

0 2,000 4,000

Scale in Feet

1:12,000

SITE PLAN AND SOLAR MODULE

PALO VERDE MESA SOLAR SITE

POWER ENGINEERS RENEWABLE RESOURCES GROUP

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

AUG 23 2012

Jeffery Childers, Project Manager
California Desert District Office, BLM
22835 Calle San Juan De Los Lagos
Moreno Valley, California 92553

Subject: Draft Environmental Impact Statement for the Proposed McCoy Solar Energy Project and California Desert Conservation Area Plan Amendment, Riverside County, California (CEQ #20120164)

Dear Mr. Childers:

The U.S. Environmental Protection Agency has reviewed the Draft Environmental Impact Statement for the proposed McCoy Solar Energy Project (MSEP) and California Desert Conservation Area Plan Amendment. Our review and comments are provided pursuant to the National Environmental Policy Act, the Council on Environmental Quality Regulations (40 CFR Parts 1500-1508), and our NEPA review authority under Section 309 of the Clean Air Act.

EPA continues to support increasing the development of renewable energy resources in an expeditious and well planned manner. Using renewable energy resources such as solar power can help the nation meet its energy requirements while reducing greenhouse gas emissions. We encourage BLM to apply its land management and regulatory authorities in a manner that will promote a long-term sustainable balance between available energy supplies, energy demand, and protection of ecosystems and human health.

On September 27, 2011, EPA provided extensive formal scoping comments for the project, including detailed recommendations regarding purpose and need, range of alternatives, cumulative impacts, biological and water resources, and other resource areas of concern. We are pleased that the DEIS indicates that there will be limited grading of the project site and the layout of the solar field will allow existing drainage patterns to be maintained where possible. We commend the inclusion of a comprehensive hydrological section and a detailed discussion of the groundwater and surface water modeling analyses. EPA also commends the early analyses of key resource areas, such as jurisdictional waters of the United States, impacts to threatened and endangered species, and cultural resources. This information is important to determine a project's viability and avoid potential project delays. 17-1 17-2

Notwithstanding the positive aspects of the proposed project, the DEIS identifies potential impacts to aquatic resources, air quality, desert pavement, biological resources, and tribal resources, as well as the cumulative impacts associated with other large-scale solar energy projects proposed in the area. Based on our review of the DEIS, we have rated the project and document as *Environmental Concerns – Insufficient Information* (EC-2) (see the enclosed "Summary of EPA Rating Definitions").

We recommend that the FEIS clearly explain the rationale for identifying Alternative 1 as BLM's preferred alternative. In addition, we recommend that the Final EIS include additional discussion of impacts to aquatic resources from of disc-and-roll grading and the use of engineered channels, and the effectiveness of the proposed mitigation measures to account for stormwater drainage and impacts from flooding events. We also recommend clarification of the subsurface connection of the Palo Verde Mesa Groundwater Basin to the Colorado River. With respect to PM_{10} air quality impacts resulting from the 46-month construction period, we recommend requiring additional mitigation measures as proposed in the neighboring South Coast Air Quality Management District (SCAQMD) Rule 403, phased construction, 17-3 17-4 17-5 17-6

and early coordination among multiple renewable energy project construction schedules to minimize adverse air quality impacts in the region. 17-6 (cont.)

We recommend that the Final EIS provide the outcome of government-to-government consultation between the BLM and the tribal governments and update discussions of, and demonstrate consistency with, the Desert Renewable Energy Conservation Plan and the Solar Programmatic EIS. The latter discussion should be supported by up-to-date maps illustrating proposed Solar Energy Zone development boundaries. 17-7 17-8

We appreciate the opportunity to review this DEIS, and are available to discuss our comments. Please note that starting October 1, 2012, EPA Headquarters will not accept paper copies or CDs of EISs for official filing purposes. Submissions on or after October 1, 2012, must be made through the EPA's new electronic EIS submittal tool: *e-NEPA*. To begin using *e-NEPA*, you must first register with the EPA's electronic reporting site - https://cdx.epa.gov/epa_home.asp. Electronic submission does not change requirements for distribution of EISs for public review and comment, and lead agencies should still provide one hard copy of the Final EIS released for public circulation to the EPA Region 9 office in San Francisco (Mail Code: CED-2). If you have any questions, please contact me at (415) 972-3843 or contact Anne Ardillo, the lead reviewer for this Project. Anne can be reached at (415) 947-4257 or ardillo.anne@epa.gov.

Sincerely,

Enrique Manzanilla, Director
Communities and Ecosystems Division

Enclosures: Summary of EPA Rating Definitions
EPA's Detailed Comments

Cc: Bill Miller, U.S. Army Corps of Engineers
Joe Marhamati, Department of Energy
Tera Keeler Baird, US Fish and Wildlife
Magdalena Rodriguez, California Department of Fish and Game

Jeff Grubbe, Acting Chairman and Jeanne Jussila, ED, Agua Caliente Band of Cahuilla Indians
Maryann Green, Chairperson and Bill Anderson, ED, Augustine Band of Cahuilla Indians
David Roosevelt, Chairman and Darlene Coombes, ED, Cabazon Band of Mission Indians
Luther Salgado, Sr., Chairman and Brian Bahari, ED, Cahuilla Band of Indians
Charles Wood, Chairman and Tom Pradetto, Environmental Director (ED), Chemehuevi Indian Tribe
Sherry Cordova, Chairperson and Kevin Conrad, ED, Cocopah Indian Tribe
Eldred Enas, Chairman and Guthrie Dick, Acting ED, Colorado River Indian Tribes
Timothy Williams, Chairperson and Luke Johnson, ED, Fort Mojave Indian Tribe
Keeny Escalanti, President and Chase Choate, ED, Quechan Indian Tribe
Robert Martin, Chairperson and Liz Bogdanski, ED, Morongo Band of Cahuilla Mission Indians
Joseph Hamilton, Chairman and Reginald Agunwah, ED, Ramona Band of Cahuilla
James Ramos, Chairman and Clifford Batten, ED, San Manuel Band of Serrano Mission Indians

Scott Cozart, Chairman and Erica Helms-Schenk, ED, Soboba Band of Luiseno Indians
Maxine Resvaloso, Chairwoman and Gerardo Bojorquez, ED, Torres Martinez Desert Cahuilla Indians
Darrell Mike, Chairperson and Marshall Cheung, ED, Twenty-Nine Palms Band of Mission Indians

SUMMARY OF EPA RATING DEFINITIONS*

This rating system was developed as a means to summarize the U.S. Environmental Protection Agency's (EPA) level of concern with a proposed action. The ratings are a combination of alphabetical categories for evaluation of the environmental impacts of the proposal and numerical categories for evaluation of the adequacy of the Environmental Impact Statement (EIS).

ENVIRONMENTAL IMPACT OF THE ACTION

"LO" (Lack of Objections)

The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

"EC" (Environmental Concerns)

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

"EO" (Environmental Objections)

The EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

"EU" (Environmentally Unsatisfactory)

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potentially unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

ADEQUACY OF THE IMPACT STATEMENT

"Category 1" (Adequate)

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

"Category 2" (Insufficient Information)

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analysed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

"Category 3" (Inadequate)

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analysed in the draft EIS, which should be analysed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

*From EPA Manual 1640, Policy and Procedures for the Review of Federal Actions Impacting the Environment.

U.S. EPA DETAILED COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE PROPOSED MCCOY SOLAR ENERGY PROJECT, RIVERSIDE COUNTY, CALIFORNIA, AUGUST 23, 2012

Preferred Alternative

According to the DEIS, both Alternative 1and Alternative 2 would satisfy BLM's purpose and need; however, Alternative 2 would result in "less permanent disturbance, less time to construct, and less water" use. As noted in the DEIS, a NEPA Lead Agency may select a preferred alternative based on reasons other than environmental considerations; however, the DEIS does not explain BLM's reasons for selecting Alternative 1 as the Preferred Alternative.

The DEIS also evaluates three options for the gen-tie line that would support the project, and notes that any of those options could support the proposed site. It is our understanding that the applicant has recently acquired the neighboring Blythe Solar Power Project (BSPP). According to the DEIS, the Central Gen-Tie option would run through the center of that project. We encourage the BLM to consider this option. 17-9

Recommendations:
Provide an explanation of BLM's rationale for choosing Alternative 1 as the preferred alternative in the Final EIS.

Consider incorporating the Central Gen-Tie option into the Alternative that is selected.

Aquatic Resources

Drainages and Ephemeral Washes

According to the DEIS, field observations on site indicate that numerous moderately defined washes traverse the site. The conveyance capacity of the washes is limited, and runoff during moderate to large events would break out of these features and be conveyed across the alluvial fan as shallow sheet flow (p. 3.20-15). As stated in the DEIS, the ephemeral washes within the study area provide significant hydrologic, biogeochemical, plant, and wildlife functions (p. 3.3-6). The potential damage that could result from disturbance of flat-bottomed washes includes alterations to the hydrological functions that natural channels provide in arid ecosystems, such as adequate capacity for flood control, energy dissipation, and sediment movement; as well as impacts to valuable habitat for desert species. 17-10

EPA commends the proposed design and layout of the solar arrays which would minimize the placement of the arrays in large, established channels (to the extent practical) and utilize equipment and protective measures that would allow existing drainage patterns to be maintained where possible. The proposed solar field would follow natural grade to the southeast, and minimal grading is proposed to maintain anticipated on-site runoff and infiltration close to the existing conditions (p. 2-17).

It appears there are instances where the grading and an engineered channel would be used. The DEIS states that, although not anticipated, if larger areas require grading, a disc-and roll-technique would be used (p. 2-17). In addition, Advanced Protection Measure (APM) VEG-10 Site Design Modifications proposes to design the engineered channel discharge points to maintain the natural surface drainage patterns between the engineered channel and the outlet of the natural washes that flow toward the south and east, downstream of the Project (p. 4.3-28). 17-11

Recommendations:
In addition to the proposed mitigation measures that would avoid and minimize direct and indirect impacts to desert washes, EPA recommends that the FEIS evaluate, and include commitments to, the following:

- implementing all practicable opportunities to further reduce the footprint of project elements (parking, buildings, roads, etc.);
- distributing PV panel support structures to avoid desert dry wash woodlands and minimizing placement in washes;
- configuring the project layout, roads, drainage channels and ancillary facilities, to avoid, to the extent practicable, ephemeral washes, including desert dry wash woodlands within the project footprint; and,
- minimizing the number of road crossings over washes and designing necessary crossings to provide adequate flow-through during storm events.

Quantify the disc-and-roll acreage. Demonstrate that downstream flows would not be adversely impacted as a result of disc-and-roll grading.

Discuss in further detail where the engineered channel would be used and how it would affect upstream and downstream hydrological conditions. EPA encourages utilizing existing natural drainage channels on site and more natural features, such as earthen berms or channels for site drainage, rather than engineered and armored channels.

Based on the above, clarify in the FEIS the flow path of exterior storm water flow, and summarize modeled impacts (hydraulics of flow, velocity, sediment transport, sediment delivery and potential stream channel changes) of diverting drainages and floodplains.

17-11 (cont.)

Flooding

The DEIS discloses that the area is subject to flooding, and that the distribution of artifacts across the Project site, found during cultural resource surveys, shows that few cultural resources were identified in the southwestern and eastern portions of the Project site, which may be a result of flooding events that have taken place over time. The area in question has deep washes, suggesting that a high volume of water has the potential to move through the area. There is also evidence of flooding from the McCoy Wash near the eastern edge of the Project site and beyond the surveyed area (p. 3.5-29).

Surface flow modeling referenced in the DEIS suggests that there would be up to a 24% increase in flow from the project, primarily from fencing and impervious road surfaces (p. 4.20-6-7). As discussed in Section 4.20, Water Resources, the Project would manage stormwater drainage by allowing washes to inundate much of the proposed solar field and associated facilities. Mitigation measures WATER-2 through WATER-5 are proposed to account for stormwater drainage and flood flows. The DEIS acknowledges that these measures would not, however, account for the potential increases in stormwater and flood flows that could result from climate change; therefore, implementation of mitigation measure CLIMATE-1 would be required to ensure that the application of mitigation measures WATER-2 through WATER-4 account for potential increases in flows associated with the indirect effects of climate change (p. 4.8-9).

17-12

Recommendations:
Include the finalized drainage plan for the construction and operational phases of the project in the FEIS to facilitate assessment of impacts and effectiveness of mitigation measures.

Describe the specifics of a maintenance program necessary to prevent significant erosion and offsite damage and flooding, including the implementation mechanism, responsible parties, enforcement, and funding sources.

The FEIS should clarify discharge locations for any detention or sediment basins and describe the impacts of excess water provided to some drainages and reduced or no discharges to other drainages.

Consider, in the FEIS, the damage to the nearby Genesis Solar Energy project that resulted from the recent summer monsoon event on July 31, 2012. Describe the design features for McCoy Solar that will be employed, during construction and operation phases, to ensure that a similar event in the Palo Verde Mesa will not result in similar damage or alteration to the site hydrology.

17-12 (cont.)

Groundwater

The DEIS is internally inconsistent regarding subsurface groundwater connectivity between the Palo Verde Mesa Groundwater Basin (PVMGB), the Palo Verde Valley Groundwater Basin (PVVGB) directly to the east, and the Colorado River. According to the DEIS, one of the sources for natural groundwater recharge to the PVMGB occurs from the Colorado River which is located to the east of both basins (pg. 3.20-4). The DEIS also states that subsurface inflow into the PVMGB occurs from the Colorado River, via the PVVGB (pg. 3.20-7). The DEIS further notes that geochemical and water level data (supplied by AECOM in 2009) suggested that groundwater from the Colorado River could potentially flow through the PVVGB to the PVMGB. However, the DEIS then states that "available data do not substantiate or support this hypothesis, and groundwater connection between the Colorado River and the PVMGB is not anticipated" (p. 3.20-7 to 8). It is unclear what subsurface connectivity exists between the project site and the Colorado River.

The DEIS concluded that, with consideration of a cumulative scenario that included seven solar power projects in the vicinity of the MSEP, total water usage of the Project would be about 1.3 percent of total cumulative scenario water usage and would not result in a cone of depression. The groundwater model used indicated that the higher areas of drawdown would occur around other projects (p. 4.20-15).

The DEIS refers to figure 4.20-9, which shows the resulting cone of depression under the cumulative scenario; however, figure 4.20-9 is not included in the document.

Recommendations:
The FEIS should clarify the subsurface connection between the PVMGB and the Colorado River. It should also further describe the estimation of the impacts from withdrawing groundwater that is recharged by the Colorado River. Indicate in the FEIS whether or not an entitlement to water from the Colorado River aquifer would be needed. This information should be made available in the FEIS and the ROD.

17-13

Address, in the FEIS, what mitigation measures would be taken, and by whom, should groundwater resources in the basins become overextended to the point that curtailment is necessary due to, for example, additional growth, the influx of large-scale solar projects, drought, climate change, or the utilization of existing or pending water rights in the basin.

17-14

Include figure 4.20-9 in the FEIS. 17-15

Desert Pavement

The DEIS states that broad expanses of desert pavement exist on the proposed MSEP site. The document acknowledges that it is of the mature variety; therefore, it is not subject to a great deal of wind erosion, it provides value to wildlife habitat, and often plays an important role in cultural resources. (pgs. 3.3-5, 4.2-4). Throughout the DEIS, the Applicant has proposed to minimize the disruption of desert pavement to the extent feasible. APMs have been proposed which include constraining vehicles and equipment to the active construction areas and roads; and application of non-toxic soil stabilizer where desert pavement has been disturbed.

Recommendations: 17-16
In addition to the proposed protection and mitigation measures, we recommend that the FEIS include the following measures:

1. Avoid or minimize grading for new access roads or work areas in areas covered by desert pavement.

2. Consider protecting desert pavement surfaces from damage or disturbance from construction vehicles by use of temporary mats on the surface.

Air Quality

Mitigation

While we commend the inclusion of APMs AIR-1 and AIR-2, which would minimize impacts on air resources, we remain concerned about the direct, indirect and cumulative impacts of construction and fugitive dust emissions associated with the project, even after mitigation measures have been taken into account. The DEIS states that, currently, the ambient air quality within the Mojave Desert Air Basin is classified in the non-attainment category for state ozone and fugitive dust particulate matter (PM_{10}) criteria. Included in the DEIS are estimated emissions for criteria pollutants and description of the mitigation measures that would be implemented to reduce the adverse air impacts identified in the DEIS; however, even with implementation of these mitigation measures, maximum daily construction emissions are predicted to exceed Mojave Desert Air Basin Air Quality Management District's (MDAQMD) thresholds of significance for PM_{10} (p. 4.2-11).

Recommendations: 17-17
In light of the influx of projects in the area and cumulative impacts, we recommend incorporating additional mitigation measures as proposed by the neighboring South Coast Air Quality Management District (SCAQMD) Rule 403to further reduce fugitive dust and PM_{10} emissions.

Ensure that mitigation measures in the DEIS, and additional mitigation measures that go beyond those in the DEIS (see recommendations, below), are implemented on a schedule that will reduce construction emissions to the maximum extent feasible.

Include, in the FEIS and ROD, all mitigation measures proposed in the DEIS and any additional measures adopted. Describe, in the FEIS, how these mitigation measures will be made an enforceable part of the project's implementation schedule. We recommend implementation of

applicable mitigation measures prior to or, at a minimum, concurrent with the commencement of construction of the project. 17-17 (cont.)

Additional mitigation for non-road and on-road engines

We commend the use of two 35-horsepower diesel-powered emergency (standby) generators that would comply with the interim Tier 4 off-road compression ignition engines exhaust emissions standards (p. 4.2-5) and mitigation measure MM AQ-1 to demonstrate that off-road equipment more than 50 horsepower would achieve a 45 percent PM_{10} reduction and 20 percent NOx reduction (p. 4.2-20).

Recommendations:
All applicable state and local requirements, and the additional and/or revised measures listed below, should be included in the FEIS, and the FEIS and ROD should include a condition that the applicant incorporate the following measures into construction contracts:

Mobile Source Controls:
- Employ periodic, unscheduled inspections to limit unnecessary idling and to ensure that construction equipment is properly maintained, tuned, and modified consistent with established specifications.
- Prohibit any tampering with engines and require continuing adherence to manufacturer's recommendations.

17-18

Administrative controls:
- Identify where implementation of mitigation measures is rejected based on economic infeasibility.
- Prepare an inventory of all equipment prior to construction, and identify the suitability of add-on emission controls for each piece of equipment before groundbreaking.[1] Where appropriate, use alternative fuels.
- Develop a construction traffic and parking management plan that minimizes traffic interference and maintains traffic flow in coordination with other projects in the area.

Speed Limits

APM AIR-1states that no vehicle shall exceed 10 miles per hour on unpaved areas within the site, with the exception that vehicles may travel up to 25 miles per hour on stabilized unpaved roads as long as such speeds do not create visible dust emissions (p. 2-31). However, APM BIO-2- and MM VEG-8 indicate that the speed limit when traveling on dirt access routes within desert tortoise habitat shall not exceed 25mph (pgs. 4.3-22 & 24, 4.4-5).

Recommendation:
The FEIS should reflect a consistent policy throughout the document for speed limits on dirt roads. To minimize dust emissions, EPA encourages BLM to adopt the 10 mph limit for all dirt roads.

17-19

[1] Suitability of control devices is based on: whether there is reduced normal availability of the construction equipment due to increased downtime and/or power output, whether there may be significant damage caused to the construction equipment engine, or whether there may be a significant risk to nearby workers or the public.

Cumulative Air Quality Analysis

The Cumulative Air Quality analysis assumes that past, present and foreseeable projects highlighted in Table 4.1-1 would be constructed concurrently with the Project. It concludes that the impacts would occur from short-term construction-related PM_{10} emissions and associated cumulative impacts when combined with the emissions-related impacts of the cumulative projects; however, it does not provide data or analyze the other combined emissions that would result.

Recommendations:
Estimate, in the FEIS, the cumulative emissions from the proposed project combined with the present and reasonably foreseeable projects highlighted in Table 4.1-1. We recommend that these cumulative emissions data be used to evaluate, in consultation with the MDAQMD, a phased construction schedule in the FEIS, for projects that would undergo construction concurrently, that would not result in any violations of local, state or federal air quality regulations. EPA recommends incremental construction on-site to ensure air quality standards are not exceeded. 17-20

If additional mitigation measures would be needed, based on the evaluation of cumulative emissions, or if the project would affect the ability of other foreseeable projects to be permitted, the FEIS should discuss this.

Biological Resources

Endangered Species and Other Species of Concern

The site supports a diversity of mammals, birds, and reptiles, including special status wildlife species. In addition to desert tortoise, the project site provides suitable habitat for Mojave fringed-toed lizards, Couch's Spadefoot toads, desert kit fox, western burrowing owls and Nelson's bighorn sheep, as well as foraging habitat for the golden eagle and various species of bats (pgs. 3.4 4-20). The project site is also located within 10 miles of known golden eagle nesting territories. Project construction would result in direct impacts to special status animal species through the removal of native vegetation that provides cover, foraging, and breeding habitat for wildlife. Long-term impacts may occur as a result of increased predation and habitat fragmentation. EPA understands that an ESA Section 7 formal consultation with the USFWS has been initiated and the Biological Opinion will be finalized in October 2012. The Biological Opinion will play an important role in informing the decision on which alternative to approve and what commitments, terms, and conditions must accompany that approval. 17-21

Recommendations:
The FEIS should provide an update on the consultation process and include the Biological Opinion as an appendix. If this is not possible, the FEIS should provide an update on the consultation process and explain how the BO will be factored into BLM's decision making.

Mitigation and monitoring measures that result from consultation with USFWS to protect sensitive biological resources should be included in the FEIS and, ultimately, the ROD.

Identify specific measures to reduce impacts to eagles. Specify in the FEIS how approval of the proposed project would comply with the Migratory Bird Treaty Act, and the Bald and Golden Eagle Protection Act. 17-22

Discuss the applicability of the recent Eagle Conservation Plan Guidelines[2] to the proposed project and, as necessary, describe compensatory mitigation to reduce the effect of permitted mortality to a no-net-loss standard. 17-22 (cont.)

Habitat Connectivity

The DEIS states that the effects of proposed and future actions on habitat connectivity and wildlife movement are likely to remain even after the application of mitigation measures. Permanent fencing that is proposed around the MSEP and BSPP projects would create a 5-mile-long wildlife movement barrier, which the DEIS concludes would alter, but not likely impede, the movement of large wildlife species. Desert tortoises would not be able to directly traverse the MSEP and BSPP sites; however, the DEIS indicates that the remaining 1-mile-wide movement corridor would be of sufficient size that remaining tortoise populations may be sustained and would not be isolated from the regional population. The reduced size of the movement corridor is described as presenting "an adverse, though not substantial, impact to the desert tortoise" (p. 4.4-26). EPA is aware that the adequacy of the movement corridor has been a subject of recent discussion with the U.S. Fish and Wildlife Service. 17-23

Recommendations:
As appropriate, update the description of the proposed project's impacts on the desert tortoise movement corridor per the outcome of discussions with USFWS.

Discuss, in the FEIS, potential impacts to wildlife movement in the area under future climate change scenarios.

Review University of California, Riverside's recently published article[3] on the sensitivity to climate change of the desert tortoise in the area of Joshua Tree National Park. Discuss the applicability of such research and modeling in the vicinity of the project, and how such issues will be addressed with this project.

Compensatory Mitigation

We note that mitigation measures provide extensive protocols to ensure adequate compensatory mitigation for impacts to desert tortoise, Mojave fringe-toed lizards, bighorn sheep, state jurisdictional waters and special status plants. In light of the numerous renewable energy projects in the Riverside East Solar Energy Study Zone area, the availability of land to adequately compensate for environmental impacts to resources such as state jurisdictional waters, desert dry wash woodlands, and desert tortoise, may serve as a limiting factor for development. 17-24

Recommendations:
Identify compensatory mitigation lands or quantify, in the FEIS, available lands for compensatory habitat mitigation for this project, as well as reasonably foreseeable projects in the Riverside East Solar Energy Study Zone. Demonstrate that sufficient lands are available to meet the compensation land selection criteria outlined throughout the DEIS.

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[2] See Draft Eagle Conservation Plan Guidelines, February 2011: See internet address: http://www.fws.gov/windenergy/eagle_guidance.html

[3] Barrows, C.W., 2011. Sensitivity to climate change for two reptiles at the Mojave-Sonoran Desert interface. Journal of Arid Environments 75, 629-635.

Specify provisions to be adopted in the ROD that set out a clear timetable for ensuring adequate compensatory mitigation has been identified, approved and purchased, as appropriate.

Table 2-7 APM HYDRO-1 contains impacts, proposed mitigation ratios and resulting mitigation acres to address impacts to state jurisdictional washes. Consider consolidating the other mitigation measure information in a table format, which may enable a clearer understanding of the total compensatory mitigation strategy. 17-24 (cont.)

Consistency with the California Desert Renewable Energy Conservation Plan and the Solar PEIS

The California DRECP, scheduled for completion in 2013, is intended to advance state and federal conservation goals in the desert regions while also facilitating the timely permitting of renewable energy projects in California. The DRECP will include a strategy that identifies and maps areas for renewable energy development and areas for long-term natural resource conservation. The Solar Programmatic EIS, scheduled for completion later this Fall, is being developed by the Department of Energy and the BLM and is intended to apply to all pending and future solar energy development right of way applications. The McCoy Solar project is located in the DRECP boundary area and in the Riverside East Solar Energy Zone identified in the PEIS. 17-25

Recommendation:
The FEIS should elaborate on the DRECP and Solar PEIS; include up-to-date maps illustrating the current boundaries and conceptual alternatives that are relevant to the proposed project; and acknowledge that additional requirements and/or conditions may apply upon approval of the DRECP and/or the Solar PEIS.

Cultural Resources and Consultation with Tribal Governments

According to the DEIS, the BLM invited 15 Indian tribes to consult on a government-to-government basis, and such consultation with interested Indian tribes is on-going. In addition, BLM has determined that seven archaeological sites identified in cultural resource inventories are eligible for the National Register of Historic Places (p. 3.5-28). The DEIS states that a Memorandum of Agreement is being developed for this Project for the purpose of resolving adverse effects to historic properties, and specific measures to resolve adverse effects will be developed in a Historic Properties Treatment Plan (HPTP) and included as an attachment to the MOA (p. 4.5-2). In addition, the DEIS indicates that the Applicant will be required to develop and implement a Long Term Management Plan for post-construction monitoring and condition assessment of sites in the Area of Potential Effects that could be subject to impacts from project operation and maintenance activities (p. 4.5-11). 17-26

Recommendations:
Describe, in the FEIS, the process and outcome of government-to-government consultation between the BLM and the tribal governments listed on page 5-4. Discuss issues that were raised, how those issues were addressed in relation to the proposed project, and how impacts to tribal or cultural resources will be avoided or mitigated consistent with Executive Order 13175, *Consultation and Coordination with Indian Tribal Governments,* Section 106 of the National Historic Preservation Act, and Executive Order 13007, *Indian Sacred Sites.*

Include, in the FEIS, the NRHP eligibility determinations and the results of the indirect effects studies.

Provide an update on the status of the MOA. Include the Historic Properties Treatment Plan and Long Term Management Plan and the results of the ongoing cultural resource surveys in the FEIS and ROD. 17-26 (cont.)

Hazardous Materials/Hazardous Waste and Decommissioning–CdTe containing Solar Modules

The DEIS states that the Applicant is considering use of PV panels that contain a thin semiconductor layer containing cadmium telluride (CdTe). While CdTe, itself, is a hazardous substance in an isolated form, the CdTe in the PV panels is bound and sealed within the glass sheets and a laminate material (Fthenakis, 2008). According to the DEIS, the CdTe within the PV modules is highly stable and, even if the modules were damaged, CdTe would not mobilize from the glass and into the environment under any plausible Project conditions (p. 4.9.6). The EPA agrees that there is little risk of CdTe emissions during normal use, if the modules are properly handled, a systematic method for detection and removal of damaged modules is employed, and the modules are properly recycled. One review of the available literature by the Fraunhofer Institute stated that the main concerns with CdTe technologies is addressing unexpected incidents, such as releases in the case of fire, uncontrolled disposal, and leaching to groundwater. This review suggested a need for further research related to releases due to fire, as well as for toxicity or eco-toxicity studies[4]. 17-27

Recommendations:
The FEIS should fully disclose the amount of CdTe and Cd that would be on site in the modules.

The FEIS should include a Broken PV Module Detection and Handling plan that will ensure broken modules are adequately detected and handled as California hazardous waste.

Studies and Plans

The DEIS indicates that there are numerous plans that will be developed and submitted to the appropriate agencies. 17-28

Recommendation:
The referenced plans should be completed and included in the FEIS and ROD.

[4] Fraunhofer Institute for Mechanics of Materials. Scientific Comment of Fraunhofer to Life Cycle Assessment of CdTe Photovoltaic's July 2010

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Palm Springs Fish and Wildlife Office
777 East Tahquitz Canyon Way, Suite 208
Palm Springs, California 92262

In Reply Refer To:
FWS-ERIV-10B0592-12TA0545

AUG 2 3 2012

Memorandum

To: District Manager, California Desert District, Bureau of Land Management
Moreno Valley, California
Attention: Jeffery Childers, Project Manager

From: for Assistant Field Supervisor, Palm Springs Fish and Wildlife Office
Palm Springs, California

Subject: Comments on the Draft Environmental Impact Statement/Draft California Desert Conservation Area Plan Amendment for the Proposed McCoy Solar Project (Application CACA-048728), Riverside County, California

This memorandum transmits the U.S. Fish and Wildlife Service's (Service) comments on the above-referenced draft Environmental Impact Statement/California Desert Conservation Area Plan Amendment (EIS/CDCA PA) for the proposed McCoy Solar Energy Project (MSEP or Project). The comments provided herein are based on the information provided in the draft EIS/CDCA PA; the Service's knowledge of sensitive and declining wildlife populations and vegetation communities; and our participation in regional renewable energy conservation planning efforts.

We offer the following comments on the draft EIS/CDCA PA as they relate to potential impacts on public trust resources. The primary concern and mandate of the Service is the protection of fish and wildlife resources and their habitats. The Service has legal responsibility for the welfare of migratory birds, anadromous fish, and threatened/endangered animals and plants occurring in the United States. We are also responsible for administering the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*). We recognize the need for development of renewable energy and the challenge of balancing solar energy development with conserving natural resources in the southwest. We are working with the agencies involved in this effort and offer our assistance to help achieve the various State and Federal renewable energy goals and policies guiding renewable energy programs. 18-1

NextEra Energy Resources, LLC (NextEra or applicant) has filed an application for a right-of-way (ROW) grant with the Bureau of Land Management (BLM) to construct, operate, maintain, and decommission an up-to-750 megawatt (MW) photovoltaic (PV) solar energy generating facility and related infrastructure in unincorporated Riverside County, California. The majority of the Project would be developed on public land administered by the BLM. Approximately

7,700 acres of the Project is proposed on BLM-administered land and 477 acres of privately owned land would be included in the proposed site boundary. Within the BLM-administered lands, construction and operation the preferred alternative would disturb approximately 4,900 acres. Remaining acreage that would not be disturbed would be excluded from the ROW. The BLM's stated purpose and need for the proposed Project is to construct, operate, maintain, and decommission a solar PV facility on public lands in compliance with the Federal Land Policy and Management Act of 1976 (43 USC §1701 *et seq.*), BLM ROW regulations and other applicable Federal laws. NextEra also has a loan guarantee application pending with the U.S. Department of Energy (DOE). If the DOE decides to enter into negotiation of a possible loan guarantee with the Applicant, the DOE would likely become a cooperating agency in developing the final Environmental Impact Statement (EIS).

Based on our review of the DEIS we are commenting to two categories of concern: (1) impacts to the federally threatened Mojave desert tortoise *(Gopherus agassizii)*, particularly on the western boundary of the project; and (2) potential project impacts on golden eagle (*Aquila chrysaetos*) and migratory birds, and the need for additional surveys to meet stated goals. 18-2

The draft EIS presents and evaluates six alternatives for the project, and we will be addressing the first three alternatives. Alternative 1, the proposed action and BLM-preferred alternative, would consist of Units 1 and 2 for a combined capacity of at least 500 MW and up to 750 MW. The proposed action gen-tie line would run on the eastern border of the project along the border of Blythe Solar Power Project (BSPP) and continue south to interconnect with the Colorado River Substation. Alternative 2, Reduced Acreage Alternative, would consist of only Unit 1, for a capacity of 250 MW. It would permanently disturb 1,693 acres of BLM-administered land and 477 acres of privately owned land under Riverside County jurisdiction. Alternative 3 includes two options for alternate gen-tie line routes a central or western route. The central route would be a total of 12.5 miles long, 5.5 miles of which would differ from the Proposed Action gen-tie line. It would be collocated with the approved gen-tie line for the adjacent BSPP. The western route would be 15.5 miles long, 8.5 miles of which would differ from the proposed action gen-tie line. It would be located farther west than either the proposed route or the central route, and would travel along the western side of the adjacent BSPP. 18-3

Desert Tortoise

Areas of higher concentration of active desert tortoise sign were strongly associated with the upper alluvial fans and incised drainages on the western portion within Unit 2 of the Project. Therefore, the Reduced Acreage Alternative (Alternative 2) is preferred by the Service because it minimizes potential impacts to desert tortoise by excluding higher quality habitat of Unit 2. 18-4

The Service is concerned about the design of the western boundary (Unit 2) in the agency preferred alternative. The western side of the project consists of deeply incised desert dry washes interspersed with desert pavement. As proposed, the western boundary would wrap fencing and maintenance roads tightly around desert pavement and then cross drainages, creating extreme inter-digitation that maximizes edge to area ratios of the project. 18-5

Although this design excludes some of the larger riparian drainages, the fingers of fencing that exclude larger incised washes extend relatively great distances into the western edge of the project. These development fingers create a potential entrapment hazard to wildlife. The extreme inter-digitation would unnecessarily create a wildlife management problem that threatens local wildlife populations with an unnecessarily high mortality and predation risk. Given the extreme/steep topography and unstable slopes, any fence design could not be relied upon to keep wildlife out of the development area, especially after heavy rainfall events. Various wildlife species could become disoriented both inside and outside the fence, and would suffer increased predation/mortality risk. Therefore, the Project design is neither reasonable nor prudent from a wildlife management perspective, and we recommend reconfiguration to develop a more compatible project in this wildland setting. 18-5 (cont.)

In an agency/applicant meeting on August 14, 2012, the Service discussed pursuing an alternative fence alignment for the preferred alternative that would reduce potential edge effects of the project by truncating the fingers of solar panels extending to the west into wildlands and higher quality desert tortoise habitat. 18-6 If the preferred alternative is selected, we recommend designing a two unit project with a combined capacity up to 500 MW, reducing the acreage on the western boundary, and using a central collocated gen-tie line with adjacent BSPP. The area between McCoy Mountains, the Project site, and along the BSPP site forms a continuous band of occupied habitat along the upper alluvial fans that links tortoise populations north and south. This area is modeled higher quality habitat according to the U.S. Geological Survey desert tortoise habitat model (Nussear et al. 2009) and desert tortoise protocol survey results validate higher densities in this area. The protection of habitat linkages for resident populations is necessary to maintain a viable population of the species in this area. Therefore, we recommend protecting the translocation areas, the upper bajadas (mapped as "dissected fans" in the BLM northern and eastern Colorado Desert Coordinated Management Plan landforms map) and prohibiting additional renewable energy development of within the unused portion of the 7,700 acres ROW from all future development. 18-7

Golden Eagle

To fully analyze the potential risks to golden eagles, the draft EIS should present up-to-date biological information about eagles that breed, feed, shelter, and/or migrate in the vicinity that will potentially be affected by the proposed activity. However, surveys conducted to date consisted of primarily nesting season helicopter work and spring/summer avian point count plots that do not adequately address year-round eagle presence within or adjacent to the project footprint. We recommended that surveys follow the Service's Interim Golden Eagle Inventory and Monitoring Protocols (Pagel et al. 2010), but the dates of the aerial surveys were generally outside of what the Service recommends as time periods suitable for initial reconnaissance and surveys of Mojave/Sonoran Desert habitat per the nesting chronologies of birds in that area. 18-8 The document does not adequately evaluate potential threats to golden eagle via direct or indirect loss of foraging habitat or increased disturbance at or near known territories. 18-9 At this time, the Service has not adopted specific guidance for the potential loss of golden eagle foraging habitat near an

active nest. The conclusions drawn about the direct and indirect impacts of foraging habitat are based on incidental observations of prey during other focal species surveys and limited eagle survey data. 18-9 (cont.)

Cumulative analyses should use the appropriate geographic and temporal boundaries and we do not consider a 10-mile radius of the project footprint to be appropriate scale. This is an adequate scale to inventory golden eagles that occur near a project but it is not suitable to determine cumulative impacts. We recommend evaluating cumulative impacts at the local area population level, which is based on dispersal distances from a nest or 140 miles (Pagel et al. 2010). 18-10

In summary, we understand that the BSPP and McCoy projects are separate with different permitting processes and schedules. However, since both projects share the same ownership and boundary, the public has a unique opportunity for increased flexibility to work with the applicant to minimize adverse impacts. Therefore, if the preferred alternative is selected, we request the applicant and BLM to cooperatively work with the Service, California Department of Fish and Game, and interested public in a minor reconfiguration of the western end of the McCoy project to reduce edge effects to wildlife. With over 11,700 acres of approved/proposed development between these two projects, or even the 4,900 acres for the MSEP alone, this reconfiguration represents only minor change in acreage. Eliminating the western-most fingers of development would eliminate approximately 600 acres of MSEP, which represent 12 percent of the overall project footprint, and 5 percent of the two projects combined. Therefore, we consider a project modification of this scale to be both technically and economically feasible and more conveniently accommodated because power purchase agreement has not been approved for Unit 2 of the Project. 18-11

We look forward to working with BLM to refine the design of the western end of the MSEP so that the public, State, and Federal interests do not overlook an important opportunity to plan a project consistent with fundamental reserve design planning principles. If you have any questions regarding these comments, please contact Tera Baird of this office at 760-322-2070, extension 205.

cc:
Magdlena Rodriguez, CDFG, Ontario, California

Literature Cited:

Nussear, K.E., Esque, T.C., Inman, R.D., Gass, Leila, Thomas, K.A., Wallace, C.S.A., Blainey, J.B., Miller, D.M., and Webb, R.H. 2009. Modeling habitat of the desert tortoise (*Gopherus agassizii*) in the Mojave and parts of the Sonoran Deserts of California, Nevada, Utah, and Arizona: U.S. Geological Survey Open-File Report 2009-1102.

Pagel, J.E., D.M. Whittington, and G.T. Allen. 2010. Interim golden eagle inventory and monitoring protocols; and other recommendations. Division of Migratory Bird Management, U.S. Fish and Wildlife Service.

STATE OF CALIFORNIA - THE NATURAL RESOURCES AGENCY EDMUND G. BROWN JR., Governor

COLORADO RIVER BOARD OF CALIFORNIA
770 FAIRMONT AVENUE, SUITE 100
GLENDALE, CA 91203-1068
(818) 500-1625
(818) 543-4685 FAX

Comment Letter 19

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AUG 27 2012
ADMINISTRATION
RIVERSIDE COUNTY
PLANNING DEPARTMENT

August 23, 2012

State Clearinghouse
1400 Tenth Street
P.O. Box 3044
Sacramento, CA 95812-3044

Regarding SCH# 2012 054 002: Notice of Completion & Environmental Document Transmittal Form for the Draft Plan Amendment and Environmental Impact Statement for the McCoy Solar Energy Project (May 2012, Bureau of Land Management) in Riverside County, California; and SCH# 2011 101 007: Riverside County Planning Department Conditional Use Permit No. 3671/Public Use Permit No. 911/McCoy Solar Energy Project

To Whom It May Concern:

The Colorado River Board of California (Board) has received and reviewed a copy of Notice of Completion & Environmental Document Transmittal Form for the Draft Plan Amendment and Environmental Impact Statement (EIS) (May 2012, Bureau of Land Management) for the McCoy Solar Energy Project (MSEP) in Riverside County, California.

The Board's earlier comments on the Notice of Preparation of a draft Environmental Impact Report for the MSEP regarding potential Colorado River water use due to the groundwater pumping at this project site have not been addressed in this Draft EIS. The earlier comments contained in the October 28, 2011 comment letter were addressed to Mr. Scott Morgan, Director of the State Clearinghouse and may be found on Page B-200 of the Draft EIS. A copy of the Board's earlier comment letter is attached here for reference. As neither the Executive Summary nor Chapter 1 through 4 of the Draft EIS address the Board's previous comments on the potential for groundwater pumped for the MSEP to be replaced by Colorado River water, as the static water elevation in MSEP wells could be at an elevation near to, equal to, or below the Colorado River "Accounting Surface" elevation once the MSEP wells begin pumping water, these comments should be addressed in the Final EIS. 19-1

In this Draft EIS, the estimated groundwater extraction from the Palo Verde Mesa Groundwater Basin (PVMGB) is stated to be about 2,100 acre-feet, including a total of 750 acre-feet during the 46-month construction period and a total of 1,350 acre-feet during the operational 30-year period. Based on information contained in the U.S. Geological Survey Scientific Investigation Report 2008-5113, groundwater at the location of the proposed MSEP wells at a static water elevation near to, equal to, or below the "Accounting Surface", if pumped, is presumed to be replaced by water from the Colorado River. Any amount of groundwater withdrawn from the wells that will be replaced by Colorado River water, in total or in part, is considered a consumptive use of Colorado River water. 19-2

According to the Consolidated Decree of the U.S. Supreme Court in the case of *Arizona v. California, et al.* entered March 27, 2006, (547 U.S. 150, 2006), the consumptive use of water means 19-3

"diversion from the stream less such return flow thereto as is available for consumptive use in the United States or in satisfaction of the Mexican treaty obligation" and consumptive use "includes all consumptive uses of water of the mainstream, including water drawn from the mainstream by underground pumping". Additionally, pursuant to the 1928 Boulder Canyon Project Act (BCPA) and the Consolidated Decree, no water shall be delivered from storage or used by any water user without a valid contract between the Secretary of the Interior and the water user for such use, i.e., through a BCPA Section 5 contract.

Prior to the issuance of the Decree in *Arizona v. California, et al.,* BCPA Section 5 contracts had been entered into between users of Colorado River mainstream water in California and the Secretary of the Interior for the use of water in amounts that exceed California's apportionment under a normal condition as set forth in the Consolidated Decree. Thus, no additional Colorado River water is available for use by any new water users near the Colorado River under shortage, normal, or Intentionally Created Surplus conditions, except through an agreement with an existing BCPA Section 5 contract holder, through an exchange of non-Colorado River water in order to off-set any potential use of Colorado River water. 19-3 (cont.)

As a result of discussions associated with the use of water by other solar energy projects, including the Blythe Solar Power Project, Palen Solar Power Project, Desert Harvest Solar Project, and the Genesis Solar Energy Project, the Board has consistently suggested that a mechanism exists for obtaining a legally authorized and reliable water supply for these proposed projects should they be determined to be using groundwater which would be replaced by Colorado River water. Currently, that option involves obtaining water through an existing BCPA Section 5 contract holder, i.e. The Metropolitan Water District of Southern California. Although other options may be available, it is the Board's current assessment that these other options may not be implementable in a timely manner and/or address the requirement that Colorado River water consumptively used can only be satisfied via a valid BCPA Section 5 contractual entitlement. 19-4

If you have any questions or require further information, please feel free to contact me, or Dr. Jay Chen of my staff, at (818) 500-1625.

Sincerely,

Christopher S. Harris
Acting Executive Director

Attachments

cc: Mr. Terrance J. Fulp, Ph.D., Acting Regional Director, Lower Colorado Regional Office, U.S. Bureau of Reclamation
Mr. Steven C. Hvinden, Director, Boulder Canyon Operations Office, U.S. Bureau of Reclamation
Mr. John Kalish, Field Office Manager, Palm Springs-South Coast Field Office, BLM
Mr. Jeffrey Childers, Project Manager, California Desert District Office, BLM
Ms. Eileen Allen, Manager, California Energy Commission
Mr. Jay Olivas, Project Planner, Riverside County Planning Department
Mr. William J. Hasencamp, Manager of Colorado River Resources, The Metropolitan Water District of Southern California

Comment Letter 19

2012054002

NOTICE OF COMPLETION & ENVIRONMENTAL TRANSMITTAL FORM

SCH#: _____

Project Title: McCoy Solar Energy Project
Lead Agency: Bureau of Land Management, Desert District Office — Contact Person: Jeffery Childers
Mailing Address: 22835 Calle San Juan de Los Lagos — Phone: (951) 697-5308
City: Moreno Valley — Zip: 92553-9046 — County: Riverside

Project Location
County: Riverside — City/Community: East Riverside County, northwest of Blythe
Cross Streets: North of Interstate-10, south of McCoy Wash, east of McCoy Mountains — Zip Code: 92225
Assessor's Parcel No(s): (Attached) — Section: 36 — Twp: 5 South — Range: 21 — Base: San Bernardino
Latitude/Longitude: 33° 41' 44.96" North/ -114° 44' 23.47" West — Total Acres: 8,170
Within 2 miles: State Hwy# 95 — Waterways: Colorado River
Airports: Blythe — Railways: Union Pacific — Schools: Palo Verde Valley

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Document Type:
CEQA: ☐ NOP ☐ Draft EIR ☐ Early Cons ☐ Supplemental EIR ☐ Neg Dec ☐ Subsequent EIR ☐ Mit Neg Dec ☐ Other
NEPA: ☐ NOI ☐ EA ☒ Draft EIS ☐ FONSI
Other: ☐ Joint Document ☐ Final Document ☒ Other Plan Amendment

Local Action Type:
☐ General Plan Update ☐ General Plan Amendment ☐ General Plan Element ☐ Community Plan
☐ Specific Plan ☐ Master Plan ☐ Planned Unit Development ☐ Site Plan
☐ Rezone ☐ Prezone ☒ Use Permit ☐ Land Division (Subdivision, etc.)
☐ Annexation ☐ Redevelopment ☐ Coastal Permit ☐ Other

Development Type:
☐ Recreational: ☐ Water Facilities: Type MGD
☒ Other: Commercial Solar

Project Issues That May Have A Significant or Potentially Significant Impact
☒ Aesthetic/Visual ☐ Agricultural Land ☒ Air Quality ☒ Archaeology/Historical ☒ Biological Resources ☐ Coastal Zone ☒ Drainage/Absorption ☒ Economic/Jobs ☒ Fiscal
☒ Flood Plain/Flooding ☒ Forest Land/Fire Hazard ☒ Geologic/Seismic ☐ Minerals ☒ Noise ☐ Population/Housing Balance ☐ Public Services/Facilities ☐ Recreation/Parks
☐ Schools/Universities ☐ Septic Systems ☐ Sewer Capacity ☒ Soil Erosion/Compaction/Grading ☐ Solid Waste ☒ Toxic/Hazardous ☒ Traffic/Circulation ☒ Vegetation
☒ Water Quality ☒ Water Supply/Groundwater ☐ Wetland/Riparian ☐ Growth Inducing ☐ Land Use ☒ Cumulative Effects ☐ Other:

Present Land Use/Zoning/General Plan Designation: vacant/W-2-10 and N-A/ Open Space-Rural

Project Description *(use separate sheet if necessary)*:

McCoy Solar LLC, a subsidiary of NextEra Energy Resources LLC (Applicant), proposes to construct, operate, maintain, and decommission an up-to-750 megawatt (MW) photovoltaic (PV) solar energy generating facility and related infrastructure in unincorporated Riverside County, California, to be known as the McCoy Solar Energy Project (MSEP or Project). The majority of the MSEP would be developed on public land administered by the Bureau of Land Management (BLM). Approximately 477 acres of privately owned land would be included in the proposed solar plant site boundary. The Project would generate and deliver solar-generated power to the California electrical grid through an interconnection at the Colorado River Substation (CRS) owned by Southern California Edison (SCE).

State Clearinghouse Contact: (916) 445-0613

State Review Began: 5 24 2012

SCH COMPLIANCE* 8 23 2012

*Per Lead Agency

Ref. # 2011101007 & 2012011019

Please note State Clearinghouse Number (SCH#) on all Comments

SCH#: 2012054002

Please forward late comments directly to the Lead Agency

AQMD/APCD 33

(Resources: 5 26)

Project Sent to the following State Agencies

X Resources
Boating & Waterways
Coastal Comm
X Colorado Rvr Bd
Conservation
X Fish & Game # 6
Delta Protection Comm
Cal Fire
X Historic Preservation
X Parks & Rec
Central Valley Flood Prot.
Bay Cons & Dev Comm.
DWR
Cal EMA
Resources, Recycling and Recovery

Bus Transp Hous
Aeronautics
X CHP
X Caltrans # 8
Trans Planning
Housing & Com Dev
Food & Agriculture
Public Health

State/Consumer Svcs
General Services

Cal EPA
X ARB: Airport/Energy Projects
ARB: Transportation Projects
ARB: Major Industrial Projects
SWRCB: Div. Financial Assist.
SWRCB: Wtr Quality
SWRCB: Wtr Rights
X Reg. WQCB # 7
X Toxic Sub Ctrl-CTC

Yth/Adlt Corrections
Corrections

Independent Comm
X Energy Commission
X NAHC
X Public Utilities Comm
X State Lands Comm
Tahoe Reg Plan Agency
Conservancy

Other

Comments attached?

STATE OF CALIFORNIA - THE NATURAL RESOURCES AGENCY
COLORADO RIVER BOARD OF CALIFORNIA
770 FAIRMONT AVENUE, SUITE 100
GLENDALE, CA 91203-1068
(818) 500-1625
(818) 543-4685 FAX

Comment Letter 19

October 28, 2011

Mr. Scott Morgan
Director
State Clearinghouse
1400 Tenth Street
P.O. Box 3044
Sacramento, CA 95812-3044

Regarding SCH# 2011-101-007: Notice of Preparation of a Draft Environmental Impact Report for Conditional Use Permit No. 3671 and Public Use Permit No. 911 for McCoy Solar Energy Project, City of Blythe, County of Riverside, California

Dear Mr. Morgan:

The Colorado River Board of California (CRB) has received and reviewed a copy of the Notice of Preparation of a Draft Environmental Impact Report for Conditional Use Permit No. 3671 and Public Use Permit No. 911 for McCoy Solar Energy Project (MSEP), City of Blythe, County of Riverside, California.

Table 2-3 of the Notice of Preparation of a Draft Environmental Impact Report (DEIR) indicates that the estimated overall water usage for the construction-related activities for the MSEP could be 650 to 750 acre-feet. In addition, potable water would be supplied for construction workers on-site with an estimated consumptive use of approximately one acre-foot per year. As for the operations, the proposed water use for module cleaning and dust control would be 30 acre-feet per year for the project. This water supply for the MSEP project will be pumped from three on-site groundwater wells. Groundwater in the area is contained within the Palo Verde Mesa Groundwater Basin.

According to the Consolidated Decree of the Supreme Court of the United States in the case of *Arizona v. California, et al.* entered March 27, 2006, (547 U.S. 150, 2006), the consumptive use of water means "diversion from the stream less such return flow thereto as is available for consumptive use in the United States or in satisfaction of the Mexican treaty obligation" and consumptive use "includes all consumptive uses of water of the mainstream, including water drawn from the mainstream by underground pumping." Also, pursuant to the 1928 Boulder Canyon Project Act (BCPA) and the Consolidated Decree, no water shall be delivered from storage or used by any water user without a valid contract between the Secretary of the Interior and the water user for such use, i.e., through a BCPA Section 5 contract.

Within California, BCPA Section 5 contracts have previously been entered into between users of Colorado River mainstream water and the Secretary of the Interior for water from the Colorado River that exceeds California's basic entitlement to use Colorado River water as set forth in the Consolidated Decree. Thus, no additional Colorado River water is available for use by new project

proponents along the Colorado River, except through the contract of an existing BCPA Section 5 contract holder, either by direct service or through an exchange of non-Colorado River water for Colorado River water.

The lands proposed for the MSEP overlie the "Accounting Surface" area designated by U.S. Geological Survey Scientific Investigations Report 2008-5113. The Accounting Surface is defined to represent the elevation and slope of the static water table in the river aquifer outside the flood plain and the reservoirs of the Colorado River that would exist if the water in the river aquifer were derived only from the river. The Accounting Surface extends outward from the edges of the flood plain or a reservoir to the subsurface boundary of the river aquifer. This report indicates that the aquifer underlying the lands is considered to be hydraulically connected to the Colorado River and groundwater withdrawn from wells located on the lands would be replaced by Colorado River water, in part or in total. Generally speaking, wells that have a static water-level elevation near, equal to or below the Accounting Surface are presumed to yield water that will be replaced by water from the Colorado River. Wells that have a static water-level elevation above the Accounting Surface are presumed to yield water that will be replaced by water from precipitation and inflow from tributary valleys. This means that if it is determined that these wells are, in fact, pumping water that will be replaced by water from the Colorado River, a BCPA Section 5 contract with the Secretary of the Interior would be required before such a diversion and use is deemed to be a legally authorized use of this water supply.

The MSEP is located adjacent to the Blythe Solar Power Project. The CRB has identified a preferred option for obtaining a legally authorized and reliable water supply for these projects. Currently, that option involves obtaining water through an existing BCPA Section 5 contract holder, The Metropolitan Water District of Southern California. Although other options may be available, it is the Board's assessment that they could not be implemented in a timely manner and address the requirement that water consumptively used from the Colorado River must be through a BCPA Section 5 contractual entitlement.

If you have any questions or require further information, please feel free to contact me, or Dr. Jay Chen of my staff, at (818) 500-1625.

Sincerely,

Christopher S. Harris
Acting Executive Director

cc: Ms. Lorri Gray-Lee, Regional Director, U.S. Bureau of Reclamation
Ms. Holly Roberts, Associate Field Manager, Palm Springs-South Coast Field Office, BLM
Mr. Jay Olivas, Project Planner, Riverside County Planning Department
Mr. William J. Hasencamp, The Metropolitan Water District of Southern California

Comment Letter 19

NOP Distribution List

County: Riverside

SCH# 2011101007

Resources Agency

- [x] Resources Agency
  Nadell Gayou
- [ ] Dept. of Boating & Waterways
  Mike Solelo
- [ ] California Coastal Commission
  Elizabeth A. Fuchs
- [ ] Colorado River Board
  ~~Gerald R. Zimmerman~~
  Christopher S. Harris
- [ ] Dept. of Conservation
  Jonathan Marlis
- [ ] California Energy Commission
  Eric Knight
- [ ] Cal Fire
  Allen Robertson
- [ ] Central Valley Flood Protection Board
  James Herota
- [x] Office of Historic Preservation
  Ron Parsons
- [x] Dept of Parks & Recreation
  Environmental Stewardship Section
- [ ] California Department of Resources, Recycling & Recovery
  Sue O'Leary
- [ ] S.F. Bay Conservation & Dev't. Comm.
  Steve McAdam
- [x] Dept. of Water Resources
  Resources Agency
  Nadell Gayou
- [ ] _____
  Conservancy

Fish and Game

- [ ] Depart. of Fish & Game
  Scott Flint
  Environmental Services Division
- [ ] Fish & Game Region 1
  Donald Koch
- [ ] Fish & Game Region 1E
  Laurie Harnsberger
- [ ] Fish & Game Region 2
  Jeff Drongesen
- [ ] Fish & Game Region 3
  Charles Armor
- [ ] Fish & Game Region 4
  Julie Vance
- [ ] Fish & Game Region 5
  Leslie Newton-Reed
  Habitat Conservation Program
- [x] Fish & Game Region 6
  Gabrina Gatchel
  Habitat Conservation Program
- [ ] Fish & Game Region 6 I/M
  Brad Henderson
  Inyo/Mono, Habitat Conservation Program
- [ ] Dept. of Fish & Game M
  George Isaac
  Marine Region

Other Departments

- [ ] Food & Agriculture
  Steve Shaffer
  Dept. of Food and Agriculture
- [ ] Depart. of General Services
  Public School Construction
- [ ] Dept. of General Services
  Anna Garbeff
  Environmental Services Section
- [ ] Dept. of Public Health
  Bridgette Binning
  Dept. of Health/Drinking Water

Independent Commissions,Boards

- [ ] Delta Protection Commission
  Linda Flack
- [ ] Cal EMA (Emergency Management Agency)
  Dennis Castrillo
- [ ] Governor's Office of Planning & Research
  State Clearinghouse
- [x] Native American Heritage Comm.
  Debbie Treadway
- [ ] Public Utilities Commission
  Leo Wong
- [ ] Santa Monica Bay Restoration
  Guangyu Wang
- [ ] State Lands Commission
  Cy R. Oggins
- [ ] Tahoe Regional Planning Agency (TRPA)
  Cherry Jacques

Business, Trans & Housing

- [ ] Caltrans - Division of Aeronautics
  Philip Crimmins
- [ ] Caltrans - Planning
  Terri Pencovic
- [x] California Highway Patrol
  Bob Nannini
  Office of Special Projects
- [ ] Housing & Community Development
  CEQA Coordinator
  Housing Policy Division

Dept. of Transportation

- [ ] Caltrans, District 1
  Rex Jackman
- [ ] Caltrans, District 2
  Marcelino Gonzalez
- [ ] Caltrans, District 3
  Bruce de Terra
- [ ] Caltrans, District 4
  Lisa Carboni
- [ ] Caltrans, District 5
  David Murray
- [ ] Caltrans, District 6
  Michael Navarro
- [ ] Caltrans, District 7
  Elmer Alvarez
- [x] Caltrans, District 8
  Dan Kopulsky
- [ ] Caltrans, District 9
  Gayle Rosander
- [ ] Caltrans, District 10
  Tom Dumas
- [ ] Caltrans, District 11
  Jacob Armstrong
- [ ] Caltrans, District 12
  Marlon Regisford

Cal EPA

Air Resources Board

- [ ] Airport Projects
  Jim Lerner
  - [ ] Transportation Projects
    Douglas Ito
  - [ ] Industrial Projects
    Mike Tollstrup
- [ ] State Water Resources Control Board
  Regional Programs Unit
  Division of Financial Assistance
- [ ] State Water Resources Control Board
  Student Intern, 401 Water Quality Certification Unit
  Division of Water Quality
- [ ] State Water Resouces Control Board
  Phil Crader
  Division of Water Rights
- [x] Dept. of Toxic Substances Control
  CEQA Tracking Center
- [ ] Department of Pesticide Regulation
  CEQA Coordinator

Regional Water Quality Control Board (RWQCB)

- [ ] RWQCB 1
  Cathleen Hudson
  North Coast Region (1)
- [ ] RWQCB 2
  Environmental Document Coordinator
  San Francisco Bay Region (2)
- [ ] RWQCB 3
  Central Coast Region (3)
- [ ] RWQCB 4
  Teresa Rodgers
  Los Angeles Region (4)
- [ ] RWQCB 5S
  Central Valley Region (5)
  - [ ] RWQCB 5F
    Central Valley Region (5)
    Fresno Branch Office
  - [ ] RWQCB 5R
    Central Valley Region (5)
    Redding Branch Office
- [ ] RWQCB 6
  Lahontan Region (6)
  - [ ] RWQCB 6V
    Lahontan Region (6)
    Victorville Branch Office
- [x] RWQCB 7
  Colorado River Basin Region (7)
- [ ] RWQCB 8
  Santa Ana Region (8)
- [ ] RWQCB 9
  San Diego Region (9)

- [ ] Other _____

Last Updated 8/23/11

Comment Letter 20

United States Department of the Interior

BUREAU OF RECLAMATION
Lower Colorado Regional Office
P.O. Box 61470
Boulder City, NV 89006-1470

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MEMORANDUM

To: California Desert District Manager, California Desert District Office, Bureau of Land Management, 22835 Calle San Juan de Los Lagos, Moreno Valley, CA 92553
Attn: Mr. Jeffery Childers

From: Steven C. Hvinden Steven C. Hvinden
Chief, Boulder Canyon Operations Office

Subject: Bureau of Reclamation Comments on Bureau of Land Management (BLM) Draft Environmental Impact Statement (EIS) for the Proposed McCoy Solar Energy Project and Possible Land Use Plan Amendment, Riverside County (Project)

Reclamation has reviewed the draft EIS for the Project and submits the following comments. We understand from the draft EIS that water for construction and operation and maintenance of the Project would be from on-site wells.

The Secretary of the Interior, acting through Reclamation, manages the mainstream waters of the lower Colorado River pursuant to Federal law. For reference, see the Boulder Canyon Project Act, 45 Stat. 1057 (1928) (BCPA) and the United States Supreme Court Decree in *Arizona* v. *California* entered March 9, 1964 (376 U.S. 340) as consolidated March 27, 2006 (547 U.S. 150 (2006)) (Consolidated Decree). In Article I (C) of the Consolidated Decree, the Supreme Court recognizes that consumptive use of mainstream water of the lower Colorado River may occur through underground pumping:

> "(C) Consumptive use from the mainstream within a State shall include all consumptive uses of water of the mainstream, *including water drawn from the mainstream by underground pumping,* and including, but not limited to, consumptive uses made by persons, by agencies of that State, and by the United States for the benefit of Indian reservations and other federal establishments with the State;" [emphasis added]

20-1

The United States Geological Survey (Survey) has conducted studies and developed a method to identify wells that, when pumped, result in water being drawn from the mainstream of the lower Colorado River. This methodology (referred to as the "accounting surface methodology") is described in the Survey's Water-Resources Investigations Reports (WRIR) No. 94-4005- and No. 00-4085, published in 1994 and 2000, respectively. WRIR No. 94-4005 can be downloaded at http://pubs.er.usgs.gov/usgspubs/wri/wri94405. WRIR No. 00-4085 can be downloaded at http://az.water.usgs.gov/pubs/WRIR00-4085intro.html.

The Survey updated these reports in 2009 through publication of Scientific Investigations Report No. 2008-5113 (this report, including maps of the accounting surface, can be downloaded at http://www.usbr.gov/lc/region/programs/unlawfuluse.html). Since July of 1994, the accounting surface methodology is the primary tool Reclamation utilizes to determine if the use of a well does, or does not, result in a consumptive use of mainstream water from the lower Colorado River water. 20-1 (cont.)

If the new wells for the Project will draw water from the mainstream of the lower Colorado River, an entitlement to the use of Colorado River water is required by Section 5 of the BCPA and by the Consolidated Decree. An entitlement is an authorization for an individual or entity to put Colorado River water to a beneficial use pursuant to: (1) a right decreed by the United States Supreme Court; (2) a contract with the United States under Section 5 of the BCPA; or (3) a reservation of water by the Secretary. 20-2

If an entitlement is required, it must be satisfied from Colorado River water apportioned for use within the State of California by the Secretary in accordance with the terms of the Consolidated Decree. The Colorado River water to be used for a proposed solar project may be under an existing entitlement made available for this purpose by an existing entitlement holder either directly or through exchange.

We recommend that the final EIS contain an analysis of the potential for the proposed wells to draw water from the mainstream of the lower Colorado River. The BLM's April, 2012 *Desert Harvest Solar Project Draft EIS and Draft California Desert Conservation Area Plan Amendment* contains an analysis titled "Colorado River Accounting Surface" in the Water Resources section that may provide a template for this analysis. 20-3

For additional information on Reclamation Colorado River water accounting requirements, accounting surface information, and water contracting please contact me at 702-293-8414.

La Cuna de Aztlan Sacred Sites Protection Circle

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September 13, 2012

Jeffery Childers
California Desert District BLM
22835 Calle San Juan de Los Lagos
Moreno Valley, CA 92553

Comments by Alfredo Acosta Figueroa on the BLM Public meeting for the McCoy Solar Energy Project Draft Environment Impact Statement, of Thursday June 28, 2012 at the City of Blythe Multi-Purpose Room located at 235 N. Broadway

My name is Alfredo Acosta Figueroa and I am a native of the Colorado River, born and raised in Blythe, California. I am also Elder/Historian and Chemehuevi Tribal Monitor as well as Coordinator/Founder of La Cuna de Aztlan Sacred Sites Protection Circle and I am hereby submitting these public comments of our opposition to the McCoy Solar Power Project. 21-1

These comments are a follow-up to the BLM public meeting for the McCoy Solar Energy Project DEIS. La Cuna de Aztlan Sacred Sites Protection Circle members Phil Smith and I gave public testimony concerning the McCoy Solar Project but to our knowledge, no one was recording our comments. For this reason, we are submitting this letter. 21-2

La Cuna de Aztlan Sacred Sites Protection Circle

Our group La Cuna de Aztlan Sacred Sites Protection Circle is a Native American organization comprised of mostly Native America individuals dedicated to physically protecting sacred sites. The mission of the Protection Circle is to protect and preserve sacred indigenous sites that are located along the Colorado River.

On February 15, 2008, La Cuna de Aztlan Sacred Sites Protection Circle signed a Memorandum of Understanding (MOU) together with the Southern Low Desert Resources Conservation & Development Council with the Bureau of Land Management.

The MOU specifies the formation of partnership of cultural resources and protection of the world famous Blythe Giant Intaglios, as well as over 300 geoglyph (intaglios), thousands of petroglyphs, hundreds of pictographs, surrounding mountain images and several hundred scared sites that are located along the Colorado River extending from Needles, California to Yuma, Arizona. 21-3

In December 2009, I was designated by the Director of the Chemehuevi Tribe's Cultural Center to serve as one of the Tribal Sacred Sites Monitors to represent the tribe and educate the general public on the importance of the protection of sacred sites and artifacts.

History of Aztlan in the Lower Colorado River Valleys

For the past 58 years we have been studying Aztlan, *"The Aztec Place of Origin"* here in the Palo Verde/Parker Valleys. After examining geographical and linguistic evidence, our research concludes that *The Island of Aztlán* was located within the Colorado River Indian Tribes Reservation at the base of the Moon Mountains.

In the Parker Valley, there is a dried river channel adjacent to the Moon Mountains where the Aztec built dikes that separated the water from the river that flowed nearby. The water was channeled into a lake called *"Mexico,"* around an island were they settled and built Aztlán.

Aztlán means, *"Place of the Herons,"* due to the abundance of herons in the Palo Verde/Parker Valleys. It also means *"Land of Whiteness,"* because of the large white limestone deposits that are seen on the slopes of the surrounding mountains. The name of the Aztec Nation is also derived from Aztlan, this is why we know that the *"Aztecs"* came from the Colorado River. In addition, Aztlán means, *"Land of the Rising Sun,"* because the sun rises during the equinoxes in between two peaks that outline a letter "U" in the Moon Mountains (Are seen from the Blythe Giant Intaglios in the west). This "U" represents the vulva of the women's womb and it is being impregnated by the rising sun. 21-4

The island was located in what today is called the Moon Mountain Ranch located at the base of the Mountain range of the same name. The geoglyphs, pictographs. petroglyphs, intaglios, mountain images, rivers and swamps of the Lower Colorado River Basin Valleys bear witness to the indigenous nation creation story and their subsequent migrations. These artifacts, along with Mohave and Chemehuevi oral traditions, Nahuatl language, and codex as well as the names of mountain ranges and sites are essential in understanding the history of Aztlán. All this information and more is found in our book *"Ancient Footprints of the Colorado River," (2002).*

For thousands of years, the Chemehuevi people have traditionally occupied, traveled, traded, and utilized resources within a broad geographical area located primarily with the desert lands of modern-day Southern Nevada, California and Arizona. The traditions of visiting the sacred sites and engaging in ceremonies on the land express the history and tradition of our people. 21-4 cont.

Unfortunately, there are cultural and sacred sites that have been ignored by the Bureau of Land Management during the drafting of the environment-review documents for the McCoy Solar Power Project. As a large-scale solar commercial facility, the Project directly and indirectly threatens to destroy the sacred sites and traditions of our Native people. 21-5

Not only are the cultural sites directly impacted, but it is important to note that part of the significance of these sites is how they connect and relate to one another. These sites, both on and off the project sites, together tell the Creation Story of the Uto-Aztecan and Hokan Linguistic families.

Most of the Native American languages have been lost in large part due to attempts by the federal government to stop people from speaking the language and practicing their cultural and traditions. So much has been lost that the survival of our culture now depends on what remains on the ancestral ground, where the projects are proposed to be built. Cultural sites allow for the revival of language through stories and songs explaining the sacred images, land, and practices of traditional ceremonies including spiritual runs, the singing of Salt Songs and so on. 21-6

The location of artifacts in their environment serves as the strongest links to our past. Therefore, harm to the encompassing surrounding areas is tantamount to direct harm to the artifacts and sacred images because they are irreparable. The construction of Solar Projects will destroy hundreds of culturally significant sites, artifacts, and remains of the Chemehuevi and other Native American Tribes—none of which can be repaired, replaced, or re-created. 21-7

The Sacred Mule Mountains

In 1975, the Riverside County Tribes and our group organized opposition against the proposed Sun Desert Nuclear Power Plant projected to be built at the base of the Sacred Mule Mountains called *"Calli."* Calli means *"Earth/House"* and its glyph is on the Aztec Sun Stone Calendar with the 20-day glyphs.

The origin of word *"California"* derives from *"Calli-Fornax"* meaning *"The Hot House."* In the Aztec cosmic tradition when the body of a person dies they first go to *"Calli."* There at Calli, *"The Great Spirit Cicimitl,"* takes the spirit to one of the four final resting places all based on how the person died and how they lived during their life. 21-8

In the beginning of the19th century, the Mule Mountains were referred to as the *"Upside –down Mountains"* and as the "*Molcajete Mountain,"* because of their 3-peaks. In Nahuatl *"Molcajete"* represents *"Mortar Stone."*

Ron Van Fleet, a Mohave Elder descendent of the last Traditional Mohave Chief Peter Lambert, explains that *"Mastumho,"* with his magic wand, stirred the content of a three-legged pot, or *"molcajete."* He threw the contents up behind him, thus creating the Milky Way, the entire universe, water and air. When he was finished, he placed the empty pot upside down on earth, with the three legs up, which created the three peaks of *"Hamock Avi,"* the Mule Mountains (15-miles southwest of Blythe, California). The Mohave oral creation story Hamock-Avi is similar to the Aztec creation story. 21-8 cont.

The Mule Mountains also represent the *"Giant Calafia,"* (The Giant Amazon Women Warrior) which image is seen east from Palo Verde Valley. Also, the name Calafia represents the center of government of Mexicali, Baja California, Mexico. *"Mexicalli"* is also derived from *"Calli"* meaning *"The House of the Mexica."*

On September 9, 2012 The Desert Sun Newspaper included an article by reporter K. Kaufmann which revealed that within the proposed Rio Mesa Project Site the remains of many mammoth ivory fossils and teeth of non-extinct prehistoric horses to hundreds of desert tortoise fossils including rare eggshell fragments carbon-dated at up to 13,700 years old were found within the area. This information alludes to our Indigenous Creation Story and the sacredness of the Mule Mountains. 21-9

The McCoy Solar Project

The McCoy Solar Project is an extension to the north of the Blythe Solar project and part of the overall expansion of NextEra Inc. Natural Gas Power Plant. In 2000, they displace over 500 citrus workers by destroying over 1500 acres of citrus trees to obtain the Colorado River water rights. 21-10

During April-May 2011, the *"Sun Geoglyph"* which is part of the *"Kokopilli/Cicimitl"* group was partly destroyed and completely destroyed was the 5-feet wide by 50-feet long "*True North Geoglyph"* (Also within the group are over 10 large images on the small mesa). The Quechan North/South trail and other East/West trails were also destroyed when the company leveled a 150-foot wide by 5-miles long transmission line roadway. 21-11

On June 17, 2011, the Blythe Solar Company, CEO made complete fools of Secretary of Interior Ken Salazar, Governor of California Jerry Brown, Assemblyman Manuel Perez and the rest of the VIP's that were bused in from Palm Springs, California to participate in what was supposed 21-12

to be the official ground breaking event at the project site. However, the site had already been bulldozed a month prior to the ground breaking ceremony. During this event, no local citizens or Natives were invited to participate. 21-12 cont.

The McCoy Solar Project is proposed to be built in the sacred McCoy Valley and the McCoy Wash runs through it. The McCoy valley is formed by the McCoy Mountains on the west and northwest; the Little Maria and the Big Maria Mountains form the northeast part of the valley, and if seen northwest from Blythe, CA the McCoy Valley is clearly outlined. 21-13

At the extreme northwest of the McCoy Valley is the majestic Granite Peak that resembles a pyramid, and among the native oral cosmic tradition it forms the letter "X." The top triangle of the "X"represents the cosmos and the bottom triangle represents earth. Thus the phase *"Where the Sky meets Earth."* The "X" also depicts the image of an hourglass and is seen on the petroglyphs throughout the southwest and Mexico. In the Aztec Codex Granite Peak it is called *"Tamoanchan," "Ta=Tata/Grandfather", "Moan=Meets," Chan/Chanti=House/Earth,"* all together this means *"Where grandfather meets his House."* 21-14

The McCoy project will destroy the giant geoglyphs of El Tosco (100-feet long by 30-feet wide) and the other large geoglyphs, trails, stone monuments and mazes. El Tosco represents the descending of the Great Spirit to earth from Tamoanchan and the geoglyph is directly aligned with Granite Peak. 21-15

The McCoy Mountains in the Uto-Aztecan language are called *"Nonoalcatepetl"* meaning *"Where she is stretched out in her house in the Mountain Ridge."* This image portrays a sleeping woman with her head towards the north and face looking up and she is called *"Quetzalpetlatl,"* and is the duality of *"Quetzalcoatl."* This image is seen west of the McCoy project site on top of the McCoy Mountain ridge. Directly west of the Sleeping Woman is the McCoy Well that has over 1,000 petroglyphs. It is one of the most condensed areas of petroglyphs in the Colorado River Desert.

In the Big Maria Mountain there is a large white limestone Thunderbird Eagle image. The eagles' wings are over one half mile wide and are facing south towards west Blythe where the old Chemehuevi neighborhood of *"La Liebre"* (Jackrabbit) is located. According to our Chemehuevi elders, in the Uto-Aztecan language this neighborhood was called *"Acacitli"* which means *"Jackrabbit in the Swamp/Tullies,"* and it used to be an island before it was destroyed by thousands of Colorado River floods and modern day agriculture fields. The Thunderbird Eagle is called *"Cuautlehuanitl,"* meaning *"Ascending Eagle."* It is the image of the origin of the Mexican Flag and is where the Bird Songs originated. The Bird Songs are famous chants that reveal the migrations to and from the Colorado River and are depicted in the Siguenza Codex. 21-16

The Thunderbird Eagle image is directly six-miles west of the Blythe Giant Intaglios next to Marie Peak and there is a mountain pass and a series of trails that pass west through the base of the eagle from the Blythe Giant Intaglios. This is where most of the main trails lead from and go west and pass through the proposed McCoy Solar Project site. Also, this is one of the main areas where Native American traditionalists continue to perform their ceremonial rituals. And in between the base of the Thunderbird Eagle and the small black peak that is directly in front, is where a cradle shape small valley is formed. This valley represents *"La Cuna"* in Spanish meaning *"Cradle"* thus, the name of our organization La Cuna Aztlan Sacred Sites Protection Circle. 21-16 cont.

The McCoy Solar Power Project will destroy thousands of acres of pristine desert environment and will exterminate thousands of scared turtles, horny toad, as well as other animals that live within the area. The turtle and the horny toad are one of the most venerated sacred animals among all the Indigenous nations, especially along the Colorado River. The turtle is the *"Nahualli"* (animal representation) of Mother Earth and its image is seen in the center of the Aztec Sun Stone Calendar. The Horny Toad is the *"Nahualli"* of the *"Great Spirit Cicimitl,* and it is represented by the Arica Mountains that are located 30-miles north of the project site. 21-17

Setback of Solar Power Projects in the Desert

In 2009, the 862 billion dollar economic stimulus fast-track package that was signed and promoted by President Barack Obama was a complete failure as we have seen with the 528 million loan package that was given to Solyndra, Inc., a now-bankrupt solar panel manufacturer company from Fremont, California. The Solyndra Inc. has declined to testify before the congressional hearings that are investigating the 585 million government loan, thus making a complete mockery of these solar projects.

The southern California blackout of September 10, 2011 proves that the government should build these solar power projects in urban areas. This is where the majority of the energy is needed because of the risk of another blackout. As we now experienced, one man's mistake paralyze 6 million people's lives and as we know the long distance transmission lines can easily be sabotaged. According to The Press Enterprise article of September 11, 2011, *"the nation's transmission lines remain all too vulnerable to cascading failure."* 21-18

Summary of Conclusions by the California Energy Commission & Laws/Resolutions of Indigenous Rights

The California Energy Commission: Resource Docket #09-AFC-8, recorded on June 22, 2010, the summary of conclusions testimony of Elizabeth A. Bagwell, Ph.D., and Beverly E. Bastian, reveals the following: 21-19

"Staff finds that the GSEP construction impact, when combined with impact from past, present, and reasonably foreseeable projects, contribute in a small but significant way to the cumulatively considerable adverse impacts for cultural resources at both the local I-10 Corridor and regional levels. This analysis estimates that more than 800 sites within the I-10 Corridor, and 17,000 sites within the Southern California Desert Region, will potentially be destroyed. Mitigation can reduce the impact of this destruction, but not to a less-than-significant level."

21-19 cont.

For this reason, we are opposing the construction of solar panel projects because of their gross violation to the following Indigenous, State, Federal and United Nation laws that support our demands and why these projects should not be constructed within sacred areas:

- **Inter-Tribal Council of Arizona: Resolution 0212, opposing the Department of Interior Fast-Track Polices of Renewable Energy Projects on Ancestral Homelands, June 29, 2012**
- **National Congress of American Indians: Resolution #LNK-12-036, opposing the Department of Interior Fast-Track Polices of Renewable Energy Projects on Ancestral Homelands, June 17, 2012.**
- **Colorado River Indian Tribes Resolution and Letter to President Barack Obama: opposing the construction of Solar Power Projects within 50-miles from the CRIT Reservation boundary of February 27, 2012.**
- **United Nations Declaration on the Right of Indigenous People Resolution of 2007: was adapted by the General Assembly during the 107th plenary meeting and was signed by President Barack Obama on December 15, 2010.**
- **Native American Sacred Places, March 6, 2003(S.B. 18)**
- **Native American Sacred Lands Act, June 11, 2003 (H.R. 2419)**
- **The Sacred Land Protection Act, July 18, 2002 (H.R. 5155)**
- **The Native American Sacred Sites Protection Act, February 22, 2002 (S.B. 1828)**
- **Accommodations of Sacred Sites and Federal Land, Signed by President Bill Clinton on May 24, 1996 (Executive Order 13007)**

21-20

- **Native American Graves Protection & Repatriation Act of 1990**
- **Archeological Resources Protection Act of 1979**
- **American Indian Religious Freedom Act, August 11, 1978**
- **The Civil Right Act of 1968**
- **Antiquities Act of 1906**

21-20 cont.

We however, do not oppose to solar panels, we feel that they should be placed in areas that have already been disturbed as well as placing them on roof-tops and in urban areas where energy is mostly needed (warehouses, supermarkets, apartment complexes, abandoned air bases, and along the current electrical transmissions lines). In a recent study, it shows that the solar panels in the above mentioned areas are meeting the requirement by the state to create renewable energy. 21-21

Please feel free to contact us regarding any questions or for an onsite tour of the mentioned sites.

Enclosed are aerial photographs of The Sun Complex Geoglyph and the True North Geoglyph which were destroyed by the 150-foot grid roadway of the Blythe Solar Project as well as pictures of Granite Peak & El Tosco Geoglyph, Quetzalpetlatl. 21-22

Sincerely,

Alfredo Acosta Figueroa

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Kokopilli Geoglyph Before 2010 True North Geoglyph

Cicimitl Group Sun Geoglyph

After April 2011

150ft wide x 5-miles long road Destroyed Sun Geoglyph

These are aerial photographs of the geoglyph images of Kokopilli (Kokopelli) and Cicimitl which shows the destruction of the Sun Complex & True North Geoglyphs.

Quetzalpetlatl's mountain image in the center of the McCoy Mountains

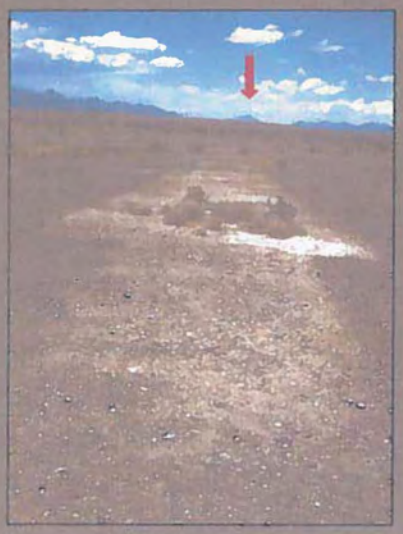
In this picture you can see Quetzalpetlatl laying north to south in what is called Nonoalcatepetl on the east side of the McCoy Mountain where she is doing penance..."After Quetzalcoatl gets drunk he orders his attendents to bring his elder sister Quetzalpetlatl to share in his revel and she goes and joins him."
(Anales de Cuauhtitlan)

Quetzalpetlatl's mountain image as seen further south

"She came to were Quetzalcoatl was and sat next to him and accepted 4 cups of pulque and finally her 5th, her libation. Both were throughly drunk and when dawn came and they awakened they were fully aware of what they had done during the night and were completed distraughted with grief." In this image the head of Quetzalcoatl (Mc Coy Peak) forms the feet of Quetzalpetlatl.
(Anales de Cuauhtitlan)

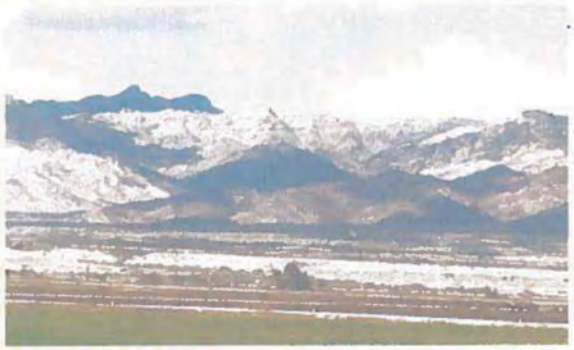
Granite Peak *"Tamoamchan" (Where the Cosmos & Earth meet)* located northwest from the McCoy Solar Project site

Photo of El Tosco Geoglyph (Descending from Granite Peak) & Aerial photo of El Tosco



THE CRADLE OF AZTLAN

BY: LA CUNA DE AZTLAN SACRED SITES PROTECTION CIRCLE



Defenders of Wildlife
Natural Resources Defense Council
Sierra Club
The Wilderness Society
Audubon California

August 23, 2012

Jeff Childers, Project Manager
California Desert District
Bureau of Land Management
22835 Calle San Juan De Los Lagos
Moreno Valley, CA 92553
(Via email: jchilders@blm.gov)

Re: Comments on Draft Plan Amendment (PA) to the California Desert Conservation Area Plan, 1980, as amended (CDCA Plan), and Draft Environmental Impact Statement (DEIS) for the McCoy Solar Energy Project (MSEP)

Dear Mr. Childers:

Thank you for the opportunity to provide comments on the Draft PA and DEIS for the proposed MSEP. These comments are submitted on behalf of Defenders of Wildlife ("Defenders"), the Natural Resources Defense Council ("NRDC"), the Sierra Club, The Wilderness Society (TWS) and Audubon California ("Audubon"), all non-profit public interest conservation organizations with offices in California as well as elsewhere in this country. These five organizations have been intensively involved in the permitting and decision-making processes for development of renewable energy on public lands particularly here in California over the past three years.

Defenders has more than 1 million members nationwide with more than 170,000 members and supporters in California. Defenders is dedicated to protecting all wild animals and plants in their natural communities. To this end, we employ science, public education and participation, media, legislative advocacy, litigation, and proactive on-the-ground solutions in order to impede the accelerating rate of extinction of species, associated loss of biological diversity, and habitat alteration and destruction.

NRDC has over 1.2 million members and online activists nationwide, more than 250,000 of whom live in California. NRDC uses law, science and the support of its members and activists to protect the planet's wildlife and wild places and to ensure a safe and healthy environment for all living things. NRDC has worked to protect wildlands and natural values on public lands and to promote pursuit of all cost effective energy efficiency measures and sustainable energy development for many years.

The Sierra Club is a national nonprofit organization of approximately 1.3 million members and supporters (approximately 250,000 of whom live in California) dedicated to exploring, enjoying, and protecting the wild places of the earth; to practicing and promoting the responsible use of the earth's ecosystems and resources; to educating and enlisting humanity to protect and restore the quality of the natural and human environment; and to using all lawful means to carry out these objectives. The Sierra Club's concerns encompass protecting our public lands, wildlife, air and water while at the same time rapidly increasing our use of renewable energy to reduce global warming.

The mission of The Wilderness Society is to protect wilderness and inspire Americans to care for our wild places. We have worked for more than 70 years to maintain the integrity of America's wilderness and public lands and ensure that land management practices are ecologically sustainable and based on sound science. With more than half a million members and supporters nation-wide, TWS represents a diverse range of citizens.

Audubon California is the state office of National Audubon Society with 150,000 members and supporters in California. Audubon's mission is to conserve and restore natural ecosystems, focusing on birds, other wildlife, and their habitats for the benefit of humanity and the earth's biological diversity. For more than a century, Audubon has built a legacy of conservation success by mobilizing the strength of its network of members, Chapters, Audubon Centers, state offices and dedicated professional staff to connect people with nature and the power to protect it.

As we transition toward a clean energy future, it is imperative for our future and the future of our wild places and wildlife that we strike a balance between addressing the near term impacts of large scale solar energy development with the long-term impacts of climate change on our biological diversity, fish and wildlife habitat and natural landscapes. To ensure that the proper balance is achieved, we need smart planning for renewable power that avoids and minimizes adverse impacts on wildlife and wild lands. These projects should be placed in the least harmful locations near existing transmission lines and on already disturbed lands.

We strongly support the emission reduction goals found in the Global Warming Solutions Act of 2006, AB 32, including the development of renewable energy in California. However, we urge that in seeking to meet our renewable energy portfolio standard in California, project proponents and land managers ensure that projects are designed from their inception in the most sustainable manner possible. This is essential to ensure that project approval moves forward expeditiously and in a manner that does not sacrifice our fragile desert landscape and wildlife in the rush to meet our renewable energy goals.

Summary of comments:

Our comments, detailed below, address recommendations for avoiding and minimizing impacts to natural communities, biological resources and lands with wilderness characteristics; expanding the

range of alternatives to include a combined federal-private land project involving the Reduced Acreage alternative plus the Palo Verde Mesa Solar Project ("PVMSP") private lands available for solar energy development; and analyzing opportunities for coordinated environmental review and development of both the McCoy and Blythe solar projects that would provide for a reasonable level of solar energy development while protecting federal lands with significant natural resources and values.

Brief description of the proposed project:

The DEIS analyzes the proposed MSEP, a 750 MW solar electricity generation facility utilizing PV technology located approximately 13 miles northwest of Blythe, CA. It includes arrays of PV panels, access roads, a 16-mile long generation tie-line, communication lines and switch-yard adjacent to the Colorado River Substation. The proposed project would be located on 7,700 acres of public land, and 470 acres of private land under the land use authority of Riverside County.

The facilities to be located on private land would include some of the solar panel arrays, inverters, and portions of the access road, generation tie-line, electric power distribution line, and a telecommunications line. The proposed 16-mile generation-tie line (gen-tie), with a right-of-way width of 100 feet, will require about 200 acres of public and private lands. The proposed 20-acre switch yard will be located adjacent to and connect into Southern California Edison's Colorado River Substation located southwest of Blythe and south of Interstate 10.

Our specific comments are as follows:

1. Introduction. Our organizations recognize the need to develop our nation's renewable energy resources and to do so rapidly in order to respond effectively to the challenge of climate change. Unique natural resources here in California are already being affected by climate change, including, for example, American pikas in the Sierra Nevada and Joshua trees in the Mojave Desert. We also recognize that renewable energy development can help create jobs in communities which have been impacted by the current economic situation. For these and other related reasons, our organizations are working with regulators and project proponents to move properly sited renewable energy projects forward. That said, renewable energy development is not appropriate everywhere on the public lands and must be balanced against the equally urgent need to protect unique and sensitive resources of the CDCA. California is fortunate in having ample renewable resources, and especially solar energy, in many areas of the State, which provide opportunities for development of renewable energy generation and transmission in an environmentally and economically sound manner. 22-1

We strongly support renewable energy production and utilization, but we do not consider the construction of large-scale projects, and especially the very large solar energy projects proposed on relatively undisturbed public lands in the CDCA, to be the only way, or even the best way, to achieve our renewable energy goals. We strongly advocate that, ideally, such large scale solar projects

should be located on degraded or disturbed land such as abandoned agricultural fields, industrial sites, and near existing infrastructure rather than on public lands containing intact natural biological communities, particularly those that include threatened, endangered or other at-risk species. 22-1 cont.

As we and our colleagues at other organizations have repeatedly stated, the best way to develop the renewable resources of the CDCA is through comprehensive, pro-active planning involving federal, state and local governments to identify the most appropriate areas for such development -- *i.e.*, development zones -- and to guide development to those zones. *See, e.g.,* letter dated June 29, 2009 to Interior Secretary Salazar and California's Governor Schwarzenegger and signed by eleven organizations, including our own, attached to this letter. 22-2

Although the proposed MSEP is located within the Proposed Riverside East Solar Energy Zone (SEZ), a large majority of the project is located on undisturbed and sensitive public lands containing Microphyll woodland, comprised of small-leaved trees including Blue palo verde (*Cercidium floridum*), Ironwood (*Olneya tesota*), and Smoke tree (*Psorothamnus spinosus*) that are confined to washes and small drainages where soil moisture is relatively high. In comments submitted by our organizations on the Solar PEIS, we recommended that the BLM exclude these woodlands from solar energy development. 22-3 Another significant feature within the MSEP is the Dissected Fans landform, identified and mapped by BLM in the Northern and Eastern Colorado Desert Coordinated Management Plan (NECO Plan). This landform is comprised of alluvial fans that are dissected by numerous drainages or washes that have formed incised channels in response to precipitation runoff. 22-4 This landform has special significance with regard to Desert tortoise conservation in the region, which is addressed in greater detail in this letter. Furthermore, portions of the proposed MSEP are on public lands having wilderness characteristics, which are also addressed in greater detail. 22-5 Of note, there is significant overlap between these important resources and the proposed MSEP.

Our comments on the proposed project are intended to offer ways in which the project can be made more environmentally sensitive, and we hope that the project proponent as well as the BLM will give them serious consideration.

2. <u>Cooperating agencies</u>. The DEIS is intended to satisfy the requirements of the California Environmental Quality Act (CEQA) as well as those of NEPA, but it does not appear local jurisdictions are jointly participating in the environmental analysis at this time. The DEIS indicates that in March 2012, the County of Riverside returned the application for use of 470 acres of private lands as part of the proposed MSEP, and that BLM anticipates that application will be re-filed at a later date. Thus, the NEPA and CEQA processes will not occur simultaneously, which BLM describes as a "bifurcated." 22-6

Comment: The proposed MSEP appears dependent on both public and private lands. <u>Please indicate how the CEQA and NEPA analyses and the associated mitigation requirements would be</u>

coordinated. We would like to know if any special requirements stemming from CEQA, other than fully mitigating impacts to state listed species and state jurisdictional resources (e.g., ephemeral streams) will be applied to the entire project or simply limited to those occurring on private lands. 22-6 cont.

3. Sensitive and Significant Lands and Resources

Lands with Wilderness Characteristics. In April 2011, the wilderness characteristics inventory of WIU #325 was updated and was used to determine whether public lands within the proposed Riverside East Solar Energy Zone (SEZ) have wilderness characteristics. The area in the vicinity of the proposed MSEP, identified as the East McCoy sub-unit (#325-1) is approximately 30,200 acres in size, of which about 27,640 acres are on public lands. This inventory sub-unit is generally bounded on the south by I-10, on the west by the foot of the McCoy Mountains, on the north by St. John's Mine Road/Arlington Mine Road, on the east by Gas Line Road to I-10.

In October 2011, based on this inventory, 11,925 acres of WIU #325-1 on the eastern side of the SEZ (in the area of McCoy Wash) was found to have wilderness characteristics. These lands include 1,256 acres of Unit 2 of the proposed MSEP.

22-7

Comment: The proposed McCoy solar project would impact 1,256 acres of BLM-identified "Lands with Wilderness Characteristics," or LWC. These LWC were identified by the BLM during the solar programmatic EIS (SPEIS) planning process, per BLM's authority to do so under section 201 of FLPMA. See Supplemental PEIS at pp. C-58 – C-60. Under section 201 of FLPMA, the BLM has the authority to identify LWC, and an obligation to consider impacts to these lands in planning documents such as the PEIS. See BLM Manual 6310, BLM Manual 6320.

The LWC identified in the SPEIS are adjacent to the Palen-McCoy wilderness. This wilderness area is important for Nelson's bighorn sheep and Golden eagles. The lands encompassed by the LWC also contain Microphyll woodland, a special habitat important to a variety of species including Kit fox, migrating songbirds, Desert mule deer and Desert tortoises.

Our organizations are deeply concerned about the precedent of agency-identified LWC being included in ROW applications and impacted by utility-scale solar energy development. BLM should remove these lands from the ROW application area. If that is not possible, then BLM should identify these lands as a permanent exclusion area within the ROW application area.

We do not believe that the loss of rare LWC can be appropriately mitigated on site given the nature of the proposed MSEP in altering the landscape. However, if construction is approved on LWC, we then recommend the BLM require specific measures that, while they will not mitigate for the loss of LWC on the site, will at least help to offset irreversible impacts to agency-identified LWC and help to compensate for the loss of these important lands. 22-8

In order of preference, we request that the BLM:

1. Avoid impacts by removing LWC lands from consideration for the MSEP.

2. Offset or compensate for LWC lands impacts through the purchase of a comparable amount of land within designated wilderness (i.e., inholdings) in proximity to the project or within designated wilderness areas within the Eastern Riverside County Region.

3. Funding of wilderness restoration (e.g., road closures, etc.) in designated wilderness adjacent to the Riverside East SEZ or within the Eastern Riverside County region.

22-8 cont.

Plant Communities. The western half of project area contains most, if not all, of the Microphyll woodland (Dry Desert Wash Woodlands) and Creosote bush-Big galleta communities, both considered sensitive by the California Department of Fish and Game because of their importance in sustaining the diversity and movement of biological resources in the region. Both these communities are associated with drainages, which naturally meander over alluvial fans over long periods of time through fluvial processes.

22-9

Comment: Microphyll woodland and Creosote bush-Big galleta communities, rather than simply the individual drainages supporting these plant assemblages, should be accounted for in assessing impacts of the project and in developing impact avoidance, minimization and compensatory mitigation. Wildlife inhabiting the area, including the Desert tortoise, move from drainage to drainage across the overall community that includes the desert pavement areas. Impact avoidance of these communities should be a priority. Furthermore, animal species richness in the Microphyll woodland community is much higher than in other community types in the desert, and is slow to recover from disturbance. (*see* NECO Plan, page 3-29). The general area northwest of Blythe, CA that includes the McCoy Wash drainage system has been identified by BLM as high in animal species richness, and this same area supports a large expanse of Microphyll woodland (see NECO Plan, Map H-3). The proposed MSEP appears to overlap with this area and should be addressed in the FEIS and excluded from development.

22-10

Dissected Fans. Dissected Fans is a landform described and mapped by BLM in the NECO planning area (see NECO Plan, Map 3-4). Dissected Fans in the NECO planning are important in sustaining and conserving Desert tortoises, as they are not only occupied by this species, but provide regional habitat linkages enabling gene flow among designated conservation areas and critical habitat, units which is critical to recovery of the species. In various biological opinions for solar projects in this region, the U.S. Fish and Wildlife Service has included the following conservation recommendation, thus strengthening the importance of preventing further loss of Dissected Fans habitat:

22-11

> "We recommend that the BLM amend the CDCA Plan to prohibit additional renewable energy development (i.e., utility-scale solar and wind energy facilities) within the upper bajadas (mapped as "dissected fans" on the Landforms Map 3-4 in

BLM 2002) adjacent to the mountains of northeastern Riverside County. This recommendation is intended to protect the higher quality desert tortoise habitats in the recovery unit."[1] 22-11 cont.

Desert tortoise. The MSEP is located within the Colorado Desert Recovery Unit for the Desert tortoise.[2] The eastern boundary of the preferred alternative footprint overlaps with habitat for desert tortoise that has been modeled as having a habitat suitability index of up to 0.7, according to the widely referenced USGS Desert tortoise habitat suitability model[3].

Comment: While the rest of the project area was modeled as having a habitat suitability index of 0.6 and under, it is important to recognize that Desert tortoise habitat is characterized differently in the Sonoran/Colorado desert than in the Mojave Desert. In the Sonoran desert, drainages that support vegetation provide important cover, food and other resources that are critical to Desert tortoise survival. The vegetated washes that meander through the desert pavement and alluvium on the MSEP site are important habitat for the local Desert tortoise population in this region, especially because the surrounding desert pavement does not provide the same cover and resources. 22-12

Comment: While the density of Desert tortoise in the project area is relatively low, it is important to note that the individuals that persist on the periphery of the Desert tortoise range have a specific set of adaptations that allow them to survive in less ideal environments. In the face of environmental fluctuations, including but not limited to climate change, flood events, extreme temperatures, etc, individuals on the edge of the Desert tortoise range can play a significant geographic and genetic role in the population as a whole. In a study of 245 imperiled species worldwide, Channell and Lomolino (2000)[4] found that 68% of surveyed species retained a greater than expected portion of their distribution in habitat peripheral to the historical range; thus, areas supporting peripheral populations can function as refugia against environmental catastrophes. The population of Desert tortoise on the edge of the Mojave sub-species' range in the vicinity of the McCoy project may prove to be just as important to the long-term survival of the species as larger core populations. 22-13

Comment: For the reasons given above and the confirmation from the DEIS that "nearly all [tortoise] use [is] concentrated in the western portion of the site" (DEIS p. 3.4-8), we consider the western half of the MSEP site to be inappropriate for solar energy development, and these lands should be excluded from not only this project but from future development that would result in a loss of habitat. 22-14

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[1] Fish and Wildlife Service. 2010. Section 7 Biological Opinion on the Blythe Solar Power Project, California. Carlsbad Fish and Wildlife Office, Carlsbad, CA. 43 pp.

[2] Fish and Wildlife Service. 2011. Revised Recovery Plan for the Mojave Population of the Desert Tortoise. Sacramento, CA.

[3] Nussear, K.E., Esque, T.C., Inman, R.D., Gass, Leila, Thomas, K.A., Wallace, C.S.A., Blainey, J.B., Miller, D.M., and Webb, R.H., 2009, Modeling habitat of the desert tortoise (Gopherus agassizii) in the Mojave and parts of the Sonoran Deserts of California, Nevada, Utah, and Arizona: U.S. Geological Survey Open-File Report 2009-1102, 18 p.

[4] Channell, R. and M.V. Lomolino. 2000. Dynamic biogeography and conservation of endangered species. Nature 403:84-86.

4. Alternatives. NEPA requires that BLM consider a range of alternatives, which is "the heart of the environmental impact statement." 40 C.F.R. § 1502.14. NEPA requires BLM to "rigorously explore and objectively evaluate" a range of alternatives to proposed federal actions. See id. §§ 1502.14(a) and 1508.25(c). "An agency must look at every reasonable alternative, with the range dictated by the nature and scope of the proposed action."[5]An agency violates NEPA by failing to "rigorously explore and objectively evaluate all reasonable alternatives" to the proposed action.[6] This evaluation extends to considering more environmentally protective alternatives and mitigation measures.[7] NEPA requires that an actual "range" of alternatives is considered, so that they will "preclude agencies from defining the objectives of their actions in terms so unreasonably narrow that they can be accomplished by only one alternative (i.e. the applicant's proposed project)."[8] This requirement prevents the EIS from becoming "a foreordained formality."[9]

22-15

Comment: As we indicated in our scoping comments on the proposed MSEP, NEPA's implementing regulations explain that agencies should consider connected, cumulative, and similar actions in the same environmental impact statement. "Connected actions" must "be considered together in a single EIS."[7] Likewise, cumulative actions "which when viewed with other proposed actions have cumulatively significant impacts should be discussed in the same impact statement." 40 C.F.R. § 1508.25(a)(2). Similar, reasonably foreseeable actions also should be considered together in the same environmental review document when the actions "have similarities that provide a basis for evaluating their environmental consequences together, such as common timing or geography," and the "best way to assess adequately [their] combined impacts or reasonable alternatives" is to consider them together. 40 C.F.R. § 1508.25(a)(3). Thus, we believe it is imperative that BLM consider the effects of both the MSEP and the Blythe connected actions in a single NEPA analysis, including a range of alternatives that applies to the entire development area in a consistent and coordinated manner.

Comment: We believe that the Reduced Acreage Alternative (Alternative 2) should be given further consideration for the reasons articulated below:

22-16

- The Reduced Acreage Alternative would protect public lands and sensitive resources occurring in the proposed Unit 2 of the project. Under this alternative, 2,700 acres located on the western half of the application area would not be approved for development. This area contains a large majority of the sensitive resources described previously – Lands with

[5] Northwest Envtl. Defense Center v. Bonneville Power Admin., 117 F.3d 1520, 1538 (9th Cir. 1997).
[6] City of Tenakee Springs v. Clough, 915 F.2d 1308, 1310 (9th Cir. 1990) (quoting 40 C.F.R. § 1502.14).
[7] *See, e.g.,* Kootenai Tribe of Idaho v. Veneman, 313 F.3d 1094,1122-1123 (9th Cir. 2002) (and cases cited therein).
[8] Colorado Environmental Coalition v. Dombeck, 185 F.3d 1162, 1174 (10th Cir. 1999), citing Simmons v. United States Army Corps of Engineers, 120 F.3d 664, 669 (7th Cir. 1997).
[9] City of New York v. Department of Transp., 715 F.2d 732, 743 (2nd Cir. 1983). *See also*, Davis v. Mineta, 302 F.3d 1104 (10th Cir. 2002).

Wilderness Characteristics, Desert tortoise, Microphyll woodland and vegetated drainages, Creosote bush-Big galleta swales, and dissected fans. Specifically, the Reduced Acreage Alternative would allow the BLM to avoid relocation of any tortoises and concentration of tortoises in the proposed relocation area. 22-16 cont.

- The Reduced Acreage Alternative conforms to the management guidelines for Limited Use Class public lands in the CDCA. Limited Use Class is a BLM designation described in the CDCA Plan, as follows: 22-17

  > "Multiple-Use Class L (Limited Use) protects sensitive, natural, scenic, ecological, and cultural resource values. Public lands designated as Class L are managed to provide for generally lower-intensity, carefully controlled multiple use of resources, while ensuring that sensitive values are not significantly diminished."[10]

  In recognition of the sensitive resources occurring in the region where the proposed MSEP is located, BLM designated public lands as Limited Use Class specifically to protect sensitive resources that occur on and surrounding the proposed MSEP. We consider the BLM's Preferred Alternative to be inconsistent with the provisions of the CDCA Plan because of the size, intensity and duration of the proposed MSEP and its significant adverse impacts on sensitive public lands and resources.

- The Reduced Acreage Alternative would provide for a successful, reasonably-sized project that entails the use of approximately 2,200 acres of public land and 470 acres of adjacent private land, which the applicant has acquired and proposes to utilize in support of the MSEP. This portion of the proposed MSEP is referred to as Unit 1 and would generate approximately 250 MW using PV technology. It is noteworthy that NextEra has a power purchase agreement with the Southern California Edison Company for 250 MW, which corresponds to the planned power output of Unit 1 of the proposed MSEP. It makes little sense to entertain a project greater than 250 MW at this time (i.e., the Reduced Acreage Alternative) considering the significant public land resources that would be lost due to the MSEP as proposed by the applicant, and the number of renewable energy projects available to the utilities at a lesser environmental (and likely economic) cost. At this time it is uncertain whether any investor-owned utility ("IOU") has the interest or capacity to procure renewable energy resources on this scale, given that the IOUs have more than met California's 2020 renewable portfolio standard goals and many of the larger public land projects have had high failure rates. 22-18

Comment: The DEIS for the MSEP fails to consider an obvious "Disturbed Lands Alternative" using neighboring disturbed lands to the east of the proposed project location. Instead of siting the 22-19

solar plant mostly on public land with only a small portion on private lands, as the MSEP is currently proposed, BLM could consider shifting portions of the project eastward so that a larger percentage of the project would be on disturbed, private lands and a smaller percentage would be on native, public lands. This would allow BLM to preserve for resource protection significant natural vegetation communities, undisturbed habitat and areas of great diversity and density of biological resources.

The most reasonable location for this alternative would involve eliminating from the project the public lands on its western portion that are proposed for MSEP Solar Unit 2, and replacing them with the disturbed private lands to the southeast that comprise the southern piece of the project labeled "X" and "CUP03677" in Figure 4.1-1 and Table 4.1-4 of the DEIS. The southern portion of these "CUP03677" lands is adjacent to the Blythe Solar Power Project site, which is contiguous to MSEP and is controlled by the MSEP applicant, NextEra.

22-19 cont.

Since at least the fall of 2011, the company that controls the "CUP03677" lands, Renewable Resources Group (RRG), has openly discussed its solar development plans for those lands with several non-profit public interest conservation organizations (and presumably with others). According to RRG, the southern portion of the "CUP03677" lands are previously disturbed by agricultural use, are the site of a conditional use permit application submitted to Riverside County for solar photovoltaic development of up to 486 megawatts, and are available to other solar developers and have been since fall of 2011.

This alternative would clearly constitute a feasible and reasonable Disturbed Lands Alternative. This Disturbed Lands Alternative would achieve the environmental benefits of the Reduced Acreage Alternative (see above) in the DEIS, which proposes use of only the eastern half of the MSEP project site, and would use previously disturbed lands to preserve the project's ability to produce up to 750 MW of renewable power.

BLM's duty to consider such a Disturbed Lands Alternative arises under both the California Desert Conservation Plan and under NEPA. The Desert Plan requires, for lands such as the Project site that carry the Multiple-Use Class L designation, that "all State and federal listed species and their critical habitat *will be fully protected*." (MUC L Guidelines ## 10 and 17, DEIS pages 3.10-5 and 3.10-6; emphasis added) Due to uncertainties regarding desert tortoise counts and mitigation effectiveness, avoiding impacts to valuable desert tortoise habitat achieves the Desert Plan's goals far more effectively than continuing to allow such development when other sites on disturbed land are readily available.

22-20

NEPA also requires analysis of feasible alternatives to the proposed action. As explained below, the Disturbed Lands Alternative is feasible, it would enable production of up to 750 MW of renewable energy, and it would avoid the most environmentally damaging impacts of the project. It is BLM's responsibility to study such an alternative in a Supplemental DEIS for the McCoy project.

22-21

The Disturbed Lands Alternative would be beneficial for the same reasons the Reduced Acreage Alternative is preferred; primarily because it would allow BLM to avoid the most biologically sensitive areas of the MSEP site (see this letter, Section 3, Sensitive Resources), avoid the Lands with Wilderness Characteristics designations, and avoid the Class L (Limited Use Class) BLM lands in the Western portion of the project area (Unit 2). Additionally this proposed Disturbed Lands Alternative should be considered for the following reasons:

- This alternative would implement the screening criteria in BLM Instructional Memorandum 2011-61 which places a high priority on previously disturbed sites or areas adjacent to previously disturbed or developed sites.
- This alternative would shift development eastward, away from Solar Unit 2 and avoid the most concentrated areas of cultural resources. (DEIS, Vol. 1, page 3.5-29)
- This alternative would still enable a substantial portion of the solar plant to be sited on BLM lands, and thus achieves BLM mandates to determine appropriate sites on public lands for development of solar energy facilities.
- Since the Preferred Alternative includes 470 acres of private lands, the BLM "anticipates that the Applicant will re-file its [Conditional Use Permit] application [with Riverside County] at a later date" and the DEIS "assumes that the portion of the Project proposed on privately owned land could be implemented. . . ." (DEIS, page 1-1). Thus, the Disturbed Lands Alternative is similar in feasibility to the Preferred Alternative and a similar conclusion is appropriate for the Disturbed Lands Alternative.

22-21 cont.

5. Cumulative Impacts/Relationship to Blythe Solar Power Project

The applicant for the proposed project, NextEra Energy, has recently acquired the adjacent Blythe Solar Power Project which was permitted by the California Energy Commission and BLM in 2010. NextEra intends to develop the Blythe project using photovoltaic technology rather than solar thermal trough technology for which the project was permitted. Thus, the Blythe project will require a new plan of development and environmental review by both the California Energy Commission and BLM.

Comment: The acquisition of the Blythe solar project by NextEra and its plan to convert the project to photovoltaic technology creates significant opportunities for coordinating development and sharing infrastructure such as staging and laydown areas, roads and transmission facilities, thereby minimizing the adverse effects of each project. In addition, the photovoltaic technology that will now be used on both projects provides much greater project layout flexibility compared to solar-thermal trough technology.

22-22

We recommend that BLM expand the range of alternatives, and consider the MSEP and Blythe projects in one NEPA analysis because they are interrelated and interdependent, and plan on sharing common facilities including the gen-tie transmission line to the Colorado River Substation, a common east-west boundary, staging and assembly areas, and the same PV technology. Such an

analytical approach will provide coordinated opportunities for avoiding and minimizing impacts for the entire project area, such as including an alternative that would eliminate the western half of each project area where the biological resource values are significantly higher and reduce the cumulative impacts to sensitive biological resources.

Comment: A revised environmental review and analysis, such as a supplemental DEIS/EIS that addresses both projects as a single development should be prepared, and issued for public review and comment for 90 days. This is required by NEPA because the projects share a common purpose and need, affect the same biological resources, share common technology and infrastructure and are proposed by the same applicant, NextEra. The projects are clearly connected actions and should be analyzed as such. 22-22 cont.

Conclusion: This concludes our comments on the DEIS for the MSEP. Please contact us if you have any questions, and thank you again for the opportunity to participate in the analysis of this proposed project. We would welcome an in-person meeting with BLM management and staff to discuss our issues and recommendations contained in this letter.

Sincerely,

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National Parks Conservation Association
Natural Resources Defense Council * Sierra Club * The Nature Conservancy
The Wilderness Society * The Wildlands Conservancy

Renewable Siting Criteria for California Desert Conservation Area

Environmental stakeholders have been asked by land management agencies, elected officials, other decision-makers, and renewable energy proponents to provide criteria for use in identifying potential renewable energy sites in the California Desert Conservation Area (CDCA). Large parts of the California desert ecosystem have survived despite pressures from mining, grazing, ORV, real estate development and military uses over the last century. Now, utility scale renewable energy development presents the challenge of new land consumptive activities on a potentially unprecedented scale. Without careful planning, the surviving desert ecosystems may be further fragmented, degraded and lost.

The criteria below primarily address the siting of solar energy projects and would need to be further refined to address factors that are specific to the siting of wind and geothermal facilities. While the criteria listed below are not ranked, they are intended to inform planning processes and were designed to provide ecosystem level protection to the CDCA (including public, private and military lands) by giving preference to disturbed lands, steering development away from lands with high environmental values, and avoiding the deserts' undeveloped cores. They were developed with input from field scientists, land managers, and conservation professionals and fall into two categories: 1) areas to prioritize for siting and 2) high conflict areas. The criteria are intended to guide solar development to areas with comparatively low potential for conflict and controversy in an effort to help California meet its ambitious renewable energy goals in a timely manner.

Areas to Prioritize for Siting

- Lands that have been mechanically disturbed, i.e., locations that are degraded and disturbed by mechanical disturbance:
    - Lands that have been "type-converted" from native vegetation through plowing, bulldozing or other mechanical impact often in support of agriculture or other land cover change activities (mining, clearance for development, heavy off-road vehicle use).[1]
- Public lands of comparatively low resource value located adjacent to degraded and impacted private lands on the fringes of the CDCA:[2]
    - Allow for the expansion of renewable energy development onto private lands.
    - Private lands development offers tax benefits to local government.
- Brownfields:
    - Revitalize idle or underutilized industrialized sites.
    - Existing transmission capacity and infrastructure are typically in place.

- Locations adjacent to urbanized areas:[3]
    - Provide jobs for local residents often in underserved communities;
    - Minimize growth-inducing impacts;
    - Provide homes and services for the workforce that will be required at new energy facilities;
    - Minimize workforce commute and associated greenhouse gas emissions.
- Locations that minimize the need to build new roads.
- Locations that could be served by existing substations.
- Areas proximate to sources of municipal wastewater for use in cleaning.
- Locations proximate to load centers.
- Locations adjacent to federally designated corridors with existing major transmission lines.[4]

High Conflict Areas

In an effort to flag areas that will generate significant controversy the environmental community has developed the following list of criteria for areas to avoid in siting renewable projects. These criteria are fairly broad. They are intended to minimize resource conflicts and thereby help California meet its ambitious renewable goals. The criteria are not intended to serve as a substitute for project specific review. They do not include the categories of lands within the California desert that are off limits to all development by statute or policy.[5]

- Locations that support sensitive biological resources, including: federally designated and proposed critical habitat; significant[6] populations of federal or state threatened and endangered species,[7] significant populations of sensitive, rare and special status species,[8] and rare or unique plant communities.[9]
- Areas of Critical Environmental Concern, Wildlife Habitat Management Areas, proposed HCP and NCCP Conservation Reserves.[10]
- Lands purchased for conservation including those conveyed to the BLM.[11]
- Landscape-level biological linkage areas required for the continued functioning of biological and ecological processes.[12]
- Proposed Wilderness Areas, proposed National Monuments, and Citizens' Wilderness Inventory Areas.[13]
- Wetlands and riparian areas, including the upland habitat and groundwater resources required to protect the integrity of seeps, springs, streams or wetlands.[14]
- National Historic Register eligible sites and other known cultural resources.
- Locations directly adjacent to National or State Park units.[15]

EXPLANATIONS

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[1] Some of these lands may be currently abandoned from those prior activities, allowing some natural vegetation to be sparsely re-established. However, because the desert is slow to heal, these lands do not support the high level of ecological functioning that undisturbed natural lands do.

[2] Based on currently available data.

[3] Urbanized areas include desert communities that welcome local industrial development but do not include communities that are dependent on tourism for their economic survival.

[4] The term "federally designated corridors" does not include contingent corridors.

[5] Lands where development is prohibited by statute or policy include but are not limited to:

National Park Service units; designated Wilderness Areas; Wilderness Study Areas; BLM National Conservation Areas; National Recreation Areas; National Monuments; private preserves and reserves; Inventoried Roadless Areas on USFS lands; National Historic and National Scenic Trails; National Wild, Scenic and Recreational Rivers; HCP and NCCP lands precluded from development; conservation mitigation banks under conservation easements approved by the state Department of Fish and Game, U.S. Fish and Wildlife Service or Army Corps of Engineers a; California State Wetlands; California State Parks; Department of Fish and Game Wildlife Areas and Ecological Reserves; National Historic Register sites.

[6] Determining "significance" requires consideration of factors that include population size and characteristics, linkage, and feasibility of mitigation.

[7] Some listed species have no designated critical habitat or occupy habitat outside of designated critical habitat. Locations with significant occurrences of federal or state threatened and endangered species should be avoided even if these locations are outside of designated critical habitat or conservation areas in order to minimize take and provide connectivity between critical habitat units.

[8] Significant populations/occurrences of sensitive, rare and special status species including CNPS list 1B and list 2 plants, and federal or state agency species of concern.

[9] Rare plant communities/assemblages include those defined by the California Native Plant Society's Rare Plant Communities Initiative and by federal, state and county agencies.

[10] ACECs include Desert Tortoise Desert Wildlife Management Areas (DWMAs). The CDCA Plan has designated specific Wildlife Habitat Management Areas (HMAs) to conserve habitat for species such as the Mohave ground squirrel and bighorn sheep. Some of these designated areas are subject to development caps which apply to renewable energy projects (as well as other activities).

[11] These lands include compensation lands purchased for mitigation by other parties and transferred to the BLM and compensation lands purchased directly by the BLM.

[12] Landscape-level linkages provide connectivity between species populations, wildlife movement corridors, ecological process corridors (e.g., sand movement corridors), and climate change adaptation corridors. They also provide connections between protected ecological reserves such as National Park units and Wilderness Areas. The long-term viability of existing populations within such reserves may be dependent upon habitat, populations or processes that extend outside of their boundaries. While it is possible to describe current wildlife movement corridors, the problem of forecasting the future locations of such corridors is confounded by the lack of certainty inherent in global climate change. Hence the need to maintain broad, landscape-level connections. To maintain ecological functions and natural history values inherent in parks, wilderness and other biological reserves, trans-boundary ecological processes must be identified and protected. Specific and cumulative impacts that may threaten vital corridors and trans-boundary processes should be avoided.

[13] Proposed Wilderness Areas: lands proposed by a member of Congress to be set aside to preserve wilderness values. The proposal must be: 1) introduced as legislation, or 2) announced by a member of Congress with publicly available maps. Proposed National Monuments: areas proposed by the President or a member of Congress to protect objects of historic or scientific interest. The proposal must be: 1) introduced as legislation or 2) announced by a member of Congress with publicly available maps. Citizens' Wilderness Inventory Areas: lands that have been inventoried by citizens groups, conservationists, and agencies and found to have defined "wilderness characteristics." The proposal has been publicly announced.

[14] The extent of upland habitat that needs to be protected is sensitive to site-specific resources. For example: the NECO Amendment to the CDCA Plan protects streams within a 5-mile radius of Townsend big-eared bat maternity roosts; aquatic and riparian species may be highly sensitive to changes in groundwater levels.

[15] Adjacent: lying contiguous, adjoining or within 2 miles of park or state boundaries. (Note: lands more than 2 miles from a park boundary should be evaluated for importance from a landscape-level linkage perspective, as further defined in footnote 12).

APPENDIX K
Individual Responses to Comments

Individual Responses

In this section, responses are provided for each comment received. All comment letters, coded to delineate individual comments as described above, are provided in Appendix J.

Letter 1 – Responses to Comments from Mojave Desert Air Quality Management District (MDAQMD)

1-1 The MDAQMD's concurrence with Applicant Proposed Measures (APMs) AIR-1 and AIR-2 is noted.

1-2 The discussion of Rule 403 (page 3.2-8) has been revised to clarify that fugitive dust best management practices are required during both the grading and construction phases of the Project.

Letter 2 – Responses to Comments from the Dean Family

2-1 Support for the Project is noted.

Letter 3 – Responses to Comments from Department of Toxic Substances Control (DTSC)

3-1 The Phase 1 Environmental Site Assessment, which is cited in Section 3.9, *Hazards and Hazardous Materials* (Tetra Tech, 2011) and included in the administrative record for the Draft PA/EIS, describes the database search conducted by Environmental Data Resources, Inc. (EDR) for the Project site and a 0.5- to 1-mile buffer area around the site, depending on the nature of the potential hazard. EDR reviewed the databases noted by DTSC, including: the National Priorities List (NPL); Comprehensive Environmental Response, Compensation; and Liability Information System (CERCLIS); Resource Conservation and Recovery Act (RCRA) Information System (RCRAInfo, formerly RCRIS); federal Emergency Response Notification System (ERNS) list; federal mines master index file; State Hazardous Waste List (i.e., EnviroStar); state landfills and solid waste disposal sites (i.e., the Solid Waste Information System or SWIS); leaking underground storage tank (LUST) and registered underground storage tank (UST) list (i.e., GeoTracker); Toxic Chemical Release Inventory System (TRIS); and several other government records. As

described on page 3.9-2, this search found no "Recognized Environmental Conditions" and no evidence of any releases of hazardous substances or petroleum products on the Project site or in the immediate vicinity.

Because it does not appear that the U.S. Army Corps of Engineers (USACE) Formerly Used Defense Sites (FUDS) database was included in this search, a search was conducted in response to this comment. The FUDS list for California lists 41 sites in Riverside County. Within the vicinity of the Project, only the Blythe Army Airfield is identified (USACE, 2010). This site is now the location of the Blythe Airport, located about 4 miles southeast of the Project site, and is not within the 1-mile search area used for the above described database search (California State Military Museum, 2008). However, the proximity of the Blythe Army Airfield to the Project site and its historic military use was described in the Draft PA/EIS on page 3.22-4.

Section 3.9 acknowledges that "an additional environmental concern at the Project site is the potential presence of unexploded ordnance due to its use as a military practice area during the World War II era," i.e., the California-Arizona Maneuver Area (CAMA), as described in Section 3.22.2, *Unexploded Ordnance*. The potential health and safety risks related to unexploded ordnance are described, and mitigation proposed, in Section 4.22, *Additional NEPA Considerations*.

3-2 Because after an extensive database search, as described in Response 3-1, no evidence was found of any releases of hazardous substances or petroleum products on the Project site or in the immediate vicinity (p. 3.9-2), no further investigation or remediation is required.

3-3 See Responses 3-1 and 3-2. The Phase I Environmental Site Assessment is summarized in the PA/EIS. Because no further investigation, sampling, and/or remediation is required, no workplan for hazardous substance cleanup is necessary.

3-4 No existing buildings, structures, asphalt, or concrete are present on the site, nor would any be demolished as part of the Project.

3-5 See Response 3-1. No evidence of contaminated soils was found on site. However, in response to comments concerning the potential for hazardous materials in soils due to historic military debris, Mitigation Measure HAZ-1 has been added to Section 4.9. Mitigation Measure HAZ-1 requires the Applicant to prepare and implement a site-specific Hazardous Materials Safety Plan that shall identify the chemicals potentially present in on-site soils, health and safety hazards associated with those chemicals, monitoring to be performed during site activities, soil handling and disposal methods required to minimize the potential for harmful exposures, appropriate personal protective equipment, and emergency response procedures. As described on page 2-44, all fill materials brought to the site would be free of hazardous materials.

3-6 As described on page 3.9-4, the nearest sensitive receptors are over 2.5 miles from the Project site. Implementation of dust suppression measures in APMs AIR-1 and AIR-2

would reduce the potential for worker exposure to any hazardous materials that may be present in site soils by reducing the amount of dust released from construction and operation activities. No Health Risk Assessment is required.

3-7 The requirements of the California Hazardous Waste Control Law are described on page 3.9-9 and the Hazardous Waste Control Regulations (California Code of Regulations, Title 22, Division 4.5) on page 3.9-10. As described on page 2-27, the Applicant or its contractor would obtain a hazardous waste generator identification number from DTSC prior to generating any hazardous waste. As described on pages 4.9-4 through 4.9-6, Project construction, operation, maintenance, and decommissioning would require the routine use, storage, transportation, and disposal of hazardous materials. As described on page 4.9-5, "The Applicant must prepare a HMBP that describes the hazardous materials handled and demonstrates facility compliance with applicable handling, storage and disposal regulations. The HMBP must be reviewed and approved by the local CUPA, the Riverside County Department of Environmental Health, which would be responsible for facility inspections."

3-8 As described on pages 4.9-4 and 4.9-6, during construction and decommissioning, the Applicant would store all hazardous materials in the manner specified by the manufacturer and in accordance with local, state, and federal regulations. Additionally, as described on pages 4.9-5, the Applicant would prepare a HMBP that describes the hazardous materials handled and demonstrates facility compliance with applicable handling, storage and disposal regulations.

3-9 Comment noted. No cleanup of the site is required (see Responses 3-1, 3-2, and 3-3).

Letter 4 – Responses to Comments from Palo Verde Irrigation District (PVID)

4-1 The PA/EIS provides a discussion of the Palo Verde Mesa Groundwater Basin (PVMGB) and the Palo Verde Valley Groundwater Basin (PVVGB), and delineates distinctions among them, on pages 3.20-1 and 3.20-4. In some portions of the PA/EIS, these groundwater basins are referred to collectively as the Palo Verde Groundwater Basin (PVGB). As explained in the PA/EIS, this notation is used for some of the analyses because there are no physical constraining features between the two groundwater basins. Similar delineations were used in Appendix G, although with slightly different terminology. In Appendix G, the groundwater model was configured to include both the mesa (PVMGB) and the valley/floodplain (PVVGB) areas. Appendix G uses the term "Valley" to refer to both basins collectively (p. G-13). BLM acknowledges PVID's observations regarding what could potentially be three groundwater basins in the area. However, this characterization does not fit with other available delineations, and is of minimal consequence with respect to modeling assumptions and results, as the existing groundwater model is currently set up.

4-2 The assumptions utilized for the groundwater model with respect to PVID's system are contained in Appendix G. BLM acknowledges that PVID's system of irrigation and groundwater management is complex and encompasses many management and physical details that are affected by PVID operations. However, no groundwater model can observe and account for *all* fluctuations and localized variability in operations within a large system such as the PVGB. Accordingly, key potential sources of variability and influencing factors to be included in the model analysis were selected and modeled. As with any groundwater modeling effort, many potential sources of variability which, based on professional judgment, were not likely to substantially inform Project modeling results, were not accounted for.

As noted on page G-16, the key workings of PVID's system that are most relevant to the groundwater modeling completed for the Project are diversion and return of water via PVID's system for agricultural supply, and PVID's management of water resources that have maintained groundwater levels in the PVVGB as relatively stable since the mid to late 1980s. These were therefore accounted for in the groundwater balance and modeling. Other detailed considerations are not expected to considerably inform either groundwater basin balance or groundwater levels and dynamics, as affected by Project pumping. Most of the details about PVID's system operation fall into this category. Therefore, although select specific details regarding PVID's system operation, such as a localized reduction of groundwater levels by 2.5 feet in the area indicated by the commenter, such details are unlikely to noticeably alter the results of the groundwater model or the anticipated level of impact to groundwater supplies incurred as a result of Project implementation.

4-3 As noted in Response 4-1 and in Appendix G, the PVMGB and the PVVGB were modeled collectively as a single basin. This assumption is consistent with a lack of physical restrictive layers or formations between the two groundwater basins. Delineation and modeling some type of physical boundary between the two basins would not be consistent with on-site geology or groundwater dynamics. For additional information, please refer to Section 3.20 and Appendix G. BLM concurs that groundwater from the Colorado River does not reach the Project site. For additional discussion of this matter, see PA/FEIS Section 5.5.4.3, Common Response 3.

4-4 The BLM understands PVID's concern regarding potential for interference with water accounting policies and requirements along the Colorado River. For a discussion of these issues, see PA/FEIS Section 5.5.4.3, Common Response 3.

4-5 See PA/FEIS Section 5.5.4.3, Common Response 3.

4-6 BLM acknowledges and appreciates PVID's disclosure regarding the potential underestimation of irrigation return flows in the groundwater modeling completed for the Project. However, updating of the groundwater model is not necessary, because increasing irrigation return flows would not change the anticipated effects of the Project.

The existing model assumptions deliberately incorporate lesser agricultural return flows to generate a more conservative analysis, whereby the model will tend to under-predict the total volume of groundwater contained in the groundwater basin. If the groundwater model were updated to account for increased irrigation return flows, groundwater model results would either show no noticeable change or a slight reduction in groundwater drawdown.

4-7 Differences in the values for recharge from precipitation in Draft PA/EIS Tables 3.20-4 and 3.20-5 reflected differences in the approach to estimating infiltration into the basin by CEC (2010) and AECOM (2010b). However, these values (3,086 AFY from Table 3.20-4 and 7,184 AFY from Table 3.20-5) do not vary substantially from the recharge value that was utilized in the groundwater model (5,000 AFY) when compared to the total recharge value from all percolation sources of 196,250 AFY (Appendix G-1, p. G-45). Based on a review by the model authors, updating the annual precipitation recharge rates to either of these infiltration values would not significantly affect groundwater pumping effects predicted by the model. Therefore, no revisions have been made to the model. However, upon reviewing the source of the infiltration value provided in Draft PA/EIS Table 3.20-4, it was determined that a water balance was available that utilizes values more closely resembling those used in the groundwater model and thus, Table 3.20-4 in PA/FEIS Section 3.20 was revised and now uses a value for recharge from precipitation that is closer to that in shown in Table 3.20-5.

4-8 The modeled analysis and the PA/EIS disclose and account for potential effects of evaporation. As shown in Table 3.20-5, the total average annual volume of precipitation that falls within the basin is approximately 102,878 AFY. However, an average of only about 5 percent of this volume, or roughly 5,000 AFY as estimated in the model, actually infiltrates. The remaining volume of water is lost to evaporation and other processes. Note that as discussed in Response 4-7, the groundwater model completed for the Project assumed an infiltration rate of 5,000 AFY (see also Appendix G). No revisions have been made.

4-9 See PA/FEIS Section 5.5.4.3, Common Response 3.

4-10 The BLM acknowledges that, prior to the early 1980s, agricultural related pumping resulted in depressed groundwater levels within the groundwater basin. This is noted in PA/EIS Appendix G, pages G-14 and G-16. However, since that time, as discussed in Section 3.20 and Appendix G, groundwater levels have been maintained at relatively stable levels. The BLM acknowledges that stability may be supported by PVID activity and management actions. However, updating the model to more fully reflect historic reductions in groundwater levels would not change current conditions on site, and therefore would not affect model results. No revisions have been made.

4-11 Upon further review, the estimated volume of inflow from the PVVGB into the PVMGB presented in CEC, 2010 was found to be unsourced and therefore potentially unreliable, and because it is not pertinent to the groundwater model and has no bearing on the analysis of the Project’s effects on groundwater, it has been removed from Section 3.20.

4-12 As noted on PA/FEIS page 3.20-6 the agricultural groundwater use rate includes areas both within PVID's service area and outside of PVID's service area, specifically on the mesa. Upon review of the water balance provided in Draft PA/EIS, Table 3.20-4 has been revised to present values that are more relevant to the groundwater model relied on for the analysis of impacts to groundwater resources. Thus, the 6,600 AFY value previously used in the Draft PA/EIS has been revised to 3,600 AFY. This value is taken from AECOM's water balance as presented in its "Results of Numerical Groundwater Modeling Report" (AECOM, 2011a, Table 1), and is based on an assumption of 724 acres of agricultural land on the mesa that use groundwater for irrigation (364 acres of inside the PVID boundary that use private wells and 360 acres of agricultural land outside the PVID boundary that use groundwater for irrigation). The 3,600 AFY value accounts for considerations of crop efficiency. The PA/FEIS, page 3.20-5, indicates that an assumed 25 to 30 percent of the 3,600 AFY would be recharged to groundwater. The BLM acknowledges that a larger portion of total return flows could conceivably be percolated to groundwater. However, if this is the case, then the model under-predicts agriculture-related infiltration, and therefore is conservatively low in terms of the overall basin balance. This condition would slightly over-predict the Project's potential effects on groundwater levels. Therefore, updating the model to assume a greater portion of infiltrated irrigation return flows would not increase the level of impact indicated by the model.

The BLM acknowledges that the 3,600 AFY value does not account for domestic use. The PA/FEIS has been revised to indicate that municipal and domestic uses of groundwater in the PVGB account for 7,500 AFY, as assumed in AECOM's model.

4-13 Upon review of the water balance given in Draft PA/EIS Table 3.20-4, this table has been revised to present values that are more relevant to the groundwater model relied on for the analysis of impacts to groundwater resources. Thus, the value of 760 AFY previously used in the Draft PA/EIS has been revised to 3,500 AFY. The 3,500 AFY rate is taken from AECOM's water balance as presented in its "Results of Numerical Groundwater Modeling Report" (AECOM, 2011a, Table 1), and is based on estimates of 4.5 to 5.85 AF/ac/year and a crop efficiency of 70 to 75 percent on 2,683 acres on the mesa. The BLM acknowledges that PVID's estimates of percolation to groundwater are higher than the estimates provided in the PA/EIS. However, assuming higher groundwater recharge rates from agricultural return flows would only increase the total modeled supply of groundwater that is potentially available for the Project. Therefore, the existing analysis based on the model is conservative and slightly over-estimates the Project's effect on groundwater levels; increasing recharge rates would not significantly change the outcome of the modeling or the Project impact analysis. See Response 4-12.

4-14 Table 3.20-4 has been revised as described in Responses 4-7, 4-12, and 4-13. For a discussion of potential for groundwater connectivity to the Colorado River, please see PA/FEIS Section 5.5.4.3, Common Response 3.

4-15 Comment noted. Page 3.20-10 of the PA/FEIS has been revised as follows:

The bedrock topography in the study area has not been determined but appears to lie at depths exceeding 1,000 feet bgs in Parker Valley, which is located over ~~approximately~~ 3 miles to the northeast, and is not indicated to be a significant source of water (Metzger et al., 1973).

4-16 Comment noted. Pages 3.20-10 and 3.20-11 have been updated as follows:

Water level elevation contours for the PVMGB and PVVGB drawn from year 2000 water level data gathered from the USGS database and the water level measured south of the MSEP site in October 2009 show that, north of the MSEP site, the groundwater flows to the southeast towards the Colorado River, following the general axial trend of McCoy Wash (AECOM, 2011a). ~~Beneath the MSEP site and in areas south of the MSEP site, groundwater flow "turns" (in response to influence from the Colorado River) towards the south-southeast following the general flow path of the Colorado River (AECOM, 2011a).~~ Based on the 2000 water level data in the USGS and DWR databases (USGS, 2009; as cited in BLM, 2010; DWR, 2009) for wells located approximately 2 to 3 miles east of the MSEP site, the hydraulic gradient is about 0.007 ft/ft. Groundwater from the PVMGB is also influenced by the PVID drain along the toe of the mesa and bedrock extensions associated with the McCoy Mountains to the east.

4-17 BLM acknowledges the difficulties in attempting to determine the root causes of some of the observed trends in groundwater levels in the area. However, the commenter has not presented conclusive data. Therefore, the first paragraph of the subsection titled "Historic Groundwater Levels and Flow" has been updated as follows:

AECOM (2009, as cited in CEC, 2010) reported that the water level data from 1971 show local variations in water level contours in the area east of the MSEP site, which suggests localized pumping in support of agriculture. Water level data from 2000 show that the water levels had recovered in the area due east of the site and show a southerly flow of groundwater coincident with the flow in the Colorado River. Recovery of groundwater levels may have also been influenced by the application of canal water to mesa crops by PVID, in order to manage salinity. Groundwater flow in the PVMGB is from the north, southeast through McCoy Wash at a gradient of 0.001 ft/ft, then south-southwest at gradients of between about 0.0003 and 0.0008 ft/ft in a direction coincident with the flow of the Colorado River (AECOM, 2009).

4-18 The BLM acknowledges that application of PVID irrigation water for recharge could have a net beneficial effect on groundwater quality. The first paragraph of the subsection titled "Groundwater Quality" has been updated to reflect the potential for this to occur.

In general, water quality in the PVMGB is generally higher near the edge of the Palo Verde Mesa adjacent to the Colorado River floodplain. The amount of dissolved solids becomes progressively higher away from the Colorado River

floodplain and with depth (AECOM, 2011c), although the application of surface water in select portions of the PVMGB could result in localized net reductions in dissolved solids concentrations. The groundwater in the area beneath the MSEP site and its vicinity is generally sodium sulfate-chloride in character (DWR, 2003). According to AECOM (2011c), the Total Dissolved Solids (TDS) content of shallow groundwater in the basin ranges from 730 to 3,100 milligrams per liter (mg/L), while the TDS of deeper groundwater is higher at 4,500 mg/L.

4-19 Page 3.20-16 has been revised as follows:

There are no permanent bodies of water located on the MSEP site. Surface water in Palo Verde Mesa drains to the southeast into the Palo Verde Valley floodplain, where it floods fields, canals, and PVID drains ~~Colorado River~~.

4-20 Comment noted. The following text has been added as a footnote to PA/FEIS Table 3.20-9:

Based on the Project's Pre/Post-Development Hydrology Report (AECOM, 2011b), Section 2.4.5, the stormwater flows contained in Table 3.20-9 are based on 10- and 100-year, 24-hour storm events. These precipitation events "were obtained from NOAA's Precipitation Frequency Data Server for the Project vicinity. It is assumed that the 24-hour duration rainfall event is spatially distributed evenly over the hydrologic (HEC-HMS) and hydraulic (FLO-2D) model extents. Precipitation was distributed temporally as a Type II storm, in accordance with the U.S. Soil Conservation Service (now NRCS) Technical Release 55 recommendation for southeastern California. Rainfall depths used for the 10- and 100-year return periods were 2.22 inches and 3.93 inches, respectively" (AECOM, 2011b).

4-21 The BLM acknowledges that many of the sites listed in PA/FEIS Table 3.20-10 are PVID canals or drains. The text on page 3.20-18 has been revised to indicate that, according to PVID, these sites are expected to collect only limited irrigation runoff water. Also, a negative sign has been added the longitudinal coordinates in the table to indicate their direction (West).

4-22 The indicated figures were drawn in accordance with DWR's Bulletin 118. The precise definition of the boundary between the two groundwater basins is of minimal consequence to the analysis provided in the PA/EIS, because there is no physical boundary to groundwater movement between the two basins. Therefore, no changes have been made to the figures.

4-23 The comment is noted. Appendix G-1, *Assessment of Proposed Groundwater Use – Results of Numerical Groundwater Modeling*, was prepared by the Applicant's consultant, not by the BLM. No revisions have been made to that document.

Letter 5 – Responses to Comments from Riverside County Transportation Department

5-1 As described in Section 4.17, construction-related vehicles (passenger cars and haul trucks) would utilize the I-10 freeway and local roadways (i.e., Mesa Drive, Hobson Way, Black Rock Road). Any wear-and-tear to existing roadways would be associated with the number of haul trucks traversing such roadways on a daily basis during construction of the Project (roadway wear-and-tear caused from regular-size, passenger vehicles is negligible, per industry standards). As described on page 4.17-3, construction-related activities associated with the Project would result in approximately 10 to 20 deliveries per day, with an expected peak of approximately 25 to 30 deliveries per day during the months of July 2015 through November 2016 for delivery of the modules, trackers, and cabling. As an interstate freeway, I-10, which carries more than 7,000 heavy vehicles on a daily basis in proximity to the Project site according to the most recent data published by Caltrans (2010), is built to provide adequate load bearing capacity to support heavy vehicle use. While the potential of wear-and-tear to local roads exists, the temporary low-level increase in heavy vehicles would not substantially contribute to the incremental effect of heavy vehicles over the life span of roadway pavement.

5-2 See Response 5-1, regarding the effect of the Project's use of heavy vehicles on pavement conditions on area roadways. Should Project-generated truck trips cause damage, beyond normal wear-and-tear, to area roads, Mitigation Measure TRN-1 (Item 10) requires that the Applicant and/or its contractor repair and restore adversely affected roadway pavements to their pre-construction condition.

5-3 As described on page 2-16, a secondary access gate, similar in construction to the main gate, would be used for emergency purposes only. A Fire Department Knox Box or other access device and emergency contact placard would be provided at the main gate and secondary access gate to provide emergency access. The emergency access gate would be located south of the main entry gate and would be accessed via Black Rock Road.

5-4 The Traffic Impact Analysis report will not be appended to the PA/FEIS, but is available in the administrative record, and the public may obtain it and all other Project-related public records from the BLM by contacting Jeff Childers, Project Manager, California Desert District. Contact information is provided in PA/FEIS Section 5.4.

5-5 There would be no Project-related construction activities within the public right-of-way, and therefore, an encroachment permit and franchise agreement would not be required. Section 4.17.3.1 has been revised to clarify this as follows:

> Construction activities primarily would occur on-site, within the boundaries of the Project; however, construction and installation of the proposed gen-tie line would require construction vehicles to access the tower sites along adjacent roadways. <u>No construction activity would occur within the public right-of-way.</u>

5-6 As stated in Mitigation Measure TRN-1, the Applicant and/or its contractor shall identify truck routes designated by applicable jurisdictions (i.e., Riverside County, City of Blythe, and Caltrans). The "dedicated truck routes within each jurisdiction" would be the jurisdiction-designated roads, which would be subject to the above-cited jurisdiction coordination, but are expected to be I-10, Mesa Drive, Hobson Way, and Black Rock Road.

5-7 As described on page 4.17-4, the average annual growth rate of 1.3 percent was derived based on peak-hour traffic volumes collected by Caltrans in 2004 and 2008 (the last years that traffic counts were conducted, according to Caltrans' web site at the time the analysis was prepared). In order to determine Year 2015 and Year 2016 baseline traffic conditions, the analysis applied the annual growth to the 2010 traffic volumes collected for the analysis. Although a different (and possibly higher) growth rate could occur between 2010 and 2015/2016, the findings of Project impacts would be the same as presented in the Draft PA/EIS, given reported existing and projected LOS A conditions.

5-8 The source of the statements about queuing on the freeway ramps from the I-10 ramp/Mesa Drive intersection referenced by the commenter (on pp. 4.17-4 and 4.17-5) is professional traffic engineering judgment. Such judgment is based on the relatively low traffic volumes (and corresponding good level of service) on the multi-lane I-10 freeway, and implementation of Applicant Proposed Measure (APM) TRANS-1, which would split construction crews with staggered start times to reduce peak arrivals by about half, and schedule Project deliveries and truck trips for off-peak hours, further reducing potential traffic impacts during the peak commute periods. Therefore, queuing analysis is not required.

5-9 See Response 5-8 regarding the basis for the statements about queuing on the freeway ramps from the I-10 ramp/Mesa Drive intersection.

5-10 See Responses 5-1, 5-3, 5-5, and 5-8 regarding potential Project impacts to pavement conditions, emergency access, the absence of need for an encroachment permit, and queuing on freeway ramps. No additional mitigation measures are warranted.

Letter 6 – Responses to Comments from Basin and Range Watch

6-1 As stated on page 1-2, the BLM's purpose and need for the MSEP is to respond to the Applicant's application for a ROW grant to construct, operate, maintain, and decommission a solar facility on public lands *in compliance with FLPMA, BLM ROW regulations, and other applicable federal laws*, including NEPA and the Endangered Species Act. See also PA/FEIS Section 5.5.4.1, Common Response 1.

6-2 FLPMA's "multiple use" mandate charges the BLM with managing the public lands and their various resource values so that they are utilized in the combination that will best meet the present and future needs of the American people. As directed by Secretarial Order 3285, the BLM has identified renewable energy projects on federally managed

lands as a priority use of the lands it manages. Consideration of the proposed renewable energy project on public lands is consistent with this direction. See also PA/FEIS Section 5.5.4.1, Common Response 1.

6-3 See PA/FEIS Section 5.5.4.1, Common Response 1.

6-4 See Response 6-1 and PA/FEIS Section 5.5.4.1, Common Response 1. The BLM's statement of purpose and need includes the need to comply with all applicable federal laws, including NEPA, which requires the consideration and feasible mitigation of potential impacts to biological, hydrological, cultural, visual, and recreational resources, as well as other areas of environmental concern.

6-5 As of October 12, 2012, the Department of the Interior has authorized over 10,000 MW of renewable power projects on public lands. As described on page 1-2, Section 211 of the Energy Policy Act of 2005 directs the Secretary of the Interior to authorize *at least* 10,000 MW of renewable power projects by 2015. Accordingly, the department may continue to approve renewable power projects on the public lands even after reaching this goal. Additionally, at the time of preparation of the Draft EIS, this goal had not yet been met, and is therefore relevant to the purpose and need for the Project. Consideration of the proposed renewable energy project on public lands is consistent with this direction. See also PA/FEIS Section 5.5.4.1, Common Response 1.

6-6 See PA/FEIS Section 5.5.4.1, Common Response 1.

6-7 See PA/FEIS Section 5.5.4.1, Common Response 1.

6-8 See PA/FEIS Section 5.5.4.1, Common Response 1. Potential effects of all of the alternatives on wildlands, biological resources (wildlife and vegetation), cultural resources, recreation, socioeconomics, visual resources, and water resources (including drainage considerations) are analyzed in PA/FEIS Chapter 4. Energy generated by the project, if approved, would interconnect to the grid at SCE's Colorado River Substation. Potential impacts to the ratepayers of publicly owned utilities, such as SCE, are within the purview of the California Public Utilities Commission, not the BLM. The analysis of potential impacts to ratepayers is beyond the scope of the PA/FEIS.

6-9 The comment is noted. The range of alternatives considered in the Desert Renewable Energy Conservation Plan is outside of the scope of this analysis.

6-10 None of the alternatives considered in this PA/EIS would confer a conservation designation on the ROW grant area. Please see Section ES.3.1 and Section 2.2.1 for an explanation of why Alternative 6 has not been carried forward for consideration in the PA/FEIS.

6-11 As described on page 4.2-1, construction is expected to occur over 46 months. The potential air quality impacts and the Applicant Proposed Measures and Mitigation Measures related to air quality are addressed in Section 4.2.

6-12 The Draft PA/EIS addressed the prevalence and risk of Coccidioidomycosis (Valley Fever) in Section 3.9 (p. 3.9-5). Although the incidence of Valley Fever in Riverside County is low compared to other counties, this fungus is known to occur in desert soils. Further discussion of the potential risk to public health associated with Valley Fever has been added to Section 4.9.3.1. These changes, together with other related revisions, are as follows:

Public Health

Construction

As described in Section 3.9.1.4, incidence of WNV in Riverside County, and therefore the risk of public health from this vector-borne disease, is extremely low. Implementation of Mitigation Measure WATER-3, which requires a comprehensive drainage, stormwater, and sedimentation control plan, would reduce the potential for unintentional ponding of water on-site or downstream of the Project. This would reduce the risk of mosquito breeding on or near the site, and would therefore reduce the risk for workers and the public of contracting vector-borne diseases.

Additionally, as described in Section 3.9.1.4, incidence of Valley Fever in Riverside County is also low. However, fugitive dust generated during Project construction could expose workers to Coccidioides fungal spores that may be present in desert soils. Implementation of APM AIR-1 and Mitigation Measure AQ-2 would reduce fugitive dust during the construction phase, which would reduce the risk to workers of contracting Valley Fever.

Operation and Maintenance

Similar to construction, implementation of Mitigation Measure WATER-3 during operation and maintenance would reduce risk of vector-borne diseases. Implementation of APM AIR-2 and Mitigation Measure AQ-2would reduce fugitive dust, which would reduce the risk of Valley Fever infections.

Decommissioning

Similar to construction, implementation of Mitigation Measure WATER-3 during decommissioning would reduce risk of vector-borne diseases. Implementation of APM AIR-1 and Mitigation Measure AQ-2 during decommissioning would reduce fugitive dust, which would reduce the risk of Valley Fever infections.

As discussed on pages 4.2-7 and 4.2-8, the Applicant has proposed measures (APMs AIR-1 and AIR-2) to minimize fugitive dust emissions due to wind erosion during both the construction and operation phases of the Project. APMs AIR-1 and AIR-2 include measures to pave or stabilize access and construction roads; limit vehicle speed on unpaved areas; covering soil storage piles and disturbed areas; and use of wind control erosion techniques, such as windbreaks, and application of water and/or chemical dust suppressants. These measures would limit fugitive dust on high wind days.

6-13 PA/FEIS Mitigation Measure AQ-1 (formerly, Mitigation Measure AQ-2 in the Draft PA/EIS) would require the application of non-toxic soil stabilizers to all areas where desert pavement would be disturbed. Implementation of Mitigation Measure AQ-1 would reduce the Project's contribution to long-term cumulative fugitive dust impacts associated with the potential disruption of desert pavement. Project-related construction emissions, in conjunction with emissions generated by other projects within the MDAB constructed concurrently with the Project would result in short-term PM10 emissions that would exceed the MDAQMD thresholds even with implementation of APMs AIR-1 and AIR-2. However, the closest sensitive receptors (i.e., residences) are at a distance of approximately 2.6 miles from the proposed plant site, and approximately 0.6 mile (3,200 feet) from a location along the gen-tie line south of I-10. Therefore, the Project's contribution to cumulative impacts that would affect public health would be minimal.

6-14 Potential impacts to the groundwater underlying the Project site are discussed on page 4.20-1 for construction, and pages 4.20-2 through 4.20-4 for the operation and maintenance period. As discussed therein, an update to the Palo Verde Groundwater Model was used to evaluate potential impacts associated with groundwater pumping. The model assumes that a total volume of 750 acre-feet would be withdrawn from the aquifer during construction, and that a total of 30 AFY would be withdrawn during operations. Model results are presented in Figures 4.20-1 to 4.20-3. The model predicted that drawdown outside of the solar plant boundary would be less than 0.1 foot, both at the end of construction and at the end of operational pumping. Consequently, potential impacts to groundwater are anticipated to be minimal.

6-15 It would not be practicable to limit construction activities to periods when wind speeds would be less than 10 miles per hour because wind speeds of this or greater happen with relative frequency; however, the Applicant has proposed to implement measures that would minimize fugitive dust emissions due to wind erosion during both construction and operation phases of the Project. For example, APMs AIR-1 and AIR-2 include measures to pave or stabilize access and construction roads; limit vehicle speed on unpaved areas; cover soil storage piles and disturbed areas; and use of wind control erosion techniques, such as windbreaks and application of water and/or chemical dust suppressants. PA/FEIS Mitigation Measure AQ-1 also requires that a non-toxic soil stabilizer be applied to areas of desert pavement disturbed during Project construction. Implementation of these measures would be effective in reducing wind-generated fugitive dust emissions.

The commenter also suggests that construction should be limited during the three hottest months of the year, but offers no explanation as to why this limitation should be applied to the project, or what effect it would have on project emissions.

6-16 Comment noted. As shown in Table 4.15-1 on page 4.15-3, in addition to the direct employment of 324 workers from Riverside County, Project construction would result in approximately 57 jobs due to indirect impacts (business-to-business, or supplier, transactions following expenditures by a project) and 122 jobs due to induced impacts

(expenditures by households of workers employed by the Project and by the chain of suppliers to the Project). Because there is sufficient temporary housing within the local study area to house workers expected to travel from outside this area to work on the Project (p. 4.15-3), many of these indirect and induced jobs could be produced locally in response to spending by construction employees. However, the precise impact on local employment cannot be predicted.

Furthermore, Section 4.15 describes the Riverside County tax revenues that would be generated by the Project; however, the BLM has no jurisdiction over the County's allocation of these revenues.

6-17 The commenter expresses the opinion that other high profile renewable energy projects have fallen short of their mitigation requirements to control dust. Compliance and enforcement monitoring would be key components of any approval of the requested ROW grant.

6-18 The monsoonal flood event that occurred at the Genesis solar site during July, 2012 is characterized as a 100-year event, wherein 5.6 to 6 inches of rain occurred over a 2-day period (Veerkamp and Conway, 2012). Note that a 100-year event refers to a flood event that has a 1 percent chance of occurrence each year. If a 100-year event occurs during a given year, its occurrence does not affect the probability of a similar flood event occurring during the following year. Therefore, although the probability is low, more than one 100-year event could occur within the span of a few years.

As noted by the commenter, damage occurred at the Genesis site (under construction during the flood event) as a result of flooding during this event. More limited damage has also occurred at other sites. The discussion provided below focuses on the Genesis site, because that was the site with the largest amount of damage, and also because more substantial documentation is available for the damage that occurred on that site.

As discussed by Veerkamp and Conway (2012), the flood related damage at the Genesis site was primarily caused by the temporary and partial filling of flood control channels, in order to facilitate the construction process. Briefly, the flood control strategy employed at the Genesis site is substantially different from that proposed for the Project. At the Genesis site, the entire site is protected from flooding by berms and flood control channels that prevent flood water from flowing onto the site and channel floodwaters around the perimeter of the site. At the Project site, as discussed in Chapter 2 and Section 4.20, flood waters would be allowed to pass under the solar arrays with only minimal obstruction. Protective berms would not be deployed around the entire facility. Select flood sensitive facilities on site, such as proposed buildings, would be elevated to above the 100-year flood level.

At the Genesis site, during the construction process, a portion of one of the perimeter flood control channels was filled in to create an earthen bridge. This is shown in

Figure K-1. As shown, the earthen bridge fills nearly the entire flood control channel. Relatively small pipe culverts can be noted at the foot of the earthen bridge, within the flood control channel. However, as shown, these were insufficiently sized to carry the full capacity of the flood control channel. When the July 30-31 storm event occurred, the earthen bridge was still in place and effectively prevented the flood control channel from conveying flood waters. As a result, flood waters backed up behind the bridge and then spilled over the existing flood control structure and onto the Genesis site. This is shown in **Figure K-2**. Other damage on site resulted from ditches that were not yet completed, underground piping filling with water, and the unfinished condition of one of the flood control channels. Direct damage to solar mirrors occurred as a result of wind damage.

Thus, in light of the effects of flooding at the Genesis site, flood related impacts occurred as a result of (1) the concentration of flood flows and their subsequent (accidental) release onto the Genesis site, and (2) by stormwater that was able to enter into unfinished facilities that were still under construction, including drainage ditches and flood control conveyances.

The observed construction period failings at the Genesis site provide an interesting reference point with which to consider potential construction period flood impacts at other sites, including the Project. However, because the Project site employs a different flood management strategy from the Genesis project, the types of flood-related impacts that could occur during construction are different from those that occurred at the Genesis site. For example, the Project would not result in the concentration and conveyance of flows around the margins of the facility, and therefore there are no opportunities to interrupt such flows during the construction process. Instead, flows would fan across the surface of the site, and/or be conveyed in existing natural channels. Concentration of flows does, however, occur naturally in select locations on site, including along more defined channels that cross the site. During flood events, as discussed in Sections 3.20 and 4.20, these waterways could become inundated. It is not anticipated that construction activities would result in the construction of an earthen bridge or other structure in these areas that could restrict or reroute flood flows. Additionally, in areas where flood waters would fan out across the solar array installation area, structures such as elevated roads or other large elevated structures could interfere with flood flows, thereby concentrating flows and causing damage similar to that experienced at the Genesis site.

With respect to the second category of impacts noted at the Genesis site – namely those where damage was caused due to incomplete construction of facilities – such impacts could occur at the Project site during construction. Construction of the MSEP would proceed over time in a step by step process, wherein a major flood could occur at any time during that process. Therefore, a storm event could occur during periods when drainage and stormwater management facilities have not yet been entirely completed, or when facilities are partially excavated or otherwise temporarily susceptible to flood related damage. Therefore, it is difficult to entirely offset or avoid potential damage to facilities due to construction period flooding. However, certain construction period

Figure K-1
Temporary Earthen Bridge Crossing Genesis Solar Energy Project's Engineered Flood Corridor, June, 2012

SOURCE: Veerkamp and Conway, 2012

Figure K-2
Water Overflowing the Genesis Flood Control Channel Due to Earthen Bridge (photo taken Atop the Bridge)

measures can be taken to reduce potential for flood related damage, in the event of a major storm event. For example, timing of the construction of select facilities, especially localized drainage features and features such as trenches and pipelines that could be inundated, should be managed so as to minimize potential for exposure to flooding, to the extent practicable.

As a result of these considerations, the PA/EIS has been updated to include additional discussion of potential construction period flood impacts, and implementation of mitigation that would minimize potential for construction period flood damage to occur on site. The following text has been added to Section 4.20.3.1:

> **Flooding**
>
> In the event that a major storm event occurs during construction of the MSEP, unanticipated flooding could potentially occur on site. Potential for damage to facilities due to on-site flooding would be exacerbated during the construction period. This is because a major flood event could occur at any time, including prior to the completion of the proposed stormwater management facilities on site. Therefore, unless construction practices and procedures are carefully managed, construction period flooding could result in damages to on site facilities, interference with the construction process, and potential exposure of employees to flood conditions. To minimize potential for construction period flooding to affect on site facilities, implementation of Mitigation Measure WATER-6 would be required.

The following mitigation measure has been added to Section 4.20.10:

> **WATER-6:** Construction period flood protection. The Applicant shall ensure that during construction, temporary construction related structures such as bridges, roads, berms, and other facilities, would be constructed so as to avoid interference with 100-year flood flows. Temporary installation of the following types of facilities shall be avoided: temporary elevated earthen structures such as roads and berms; earthen bridges or other structures within a waterway or flood conveyance that could interfere with flood flows; dams; unnecessary ditches; other major structures that could concentrate flood flows. Additionally, to the extent practicable, the Applicant shall ensure that the construction process proceeds in a manner so as to minimize exposure of facilities to construction period flooding. Temporary ditches and trenches (such as for pipes, wires, or other infrastructure) should be completed and backfilled as quickly as possible, and should not be left open for extended periods. Drainage infrastructure should be installed prior to installation of the solar arrays and other facilities on site. Other facilities that may be susceptible to flood damage during construction should be managed so as to minimize construction time of those facilities.

6-19 The PA/EIS does not quantify the area of desert pavement located on-site that could be affected by the Project. However, potential impacts to desert pavement would be minimized to the extent practicable. The Applicant has proposed to avoid the disturbance of desert pavement to the extent feasible (APM AIR-1, item 14, page 4.2-8). Additionally, as noted by the commenter, to the extent that desert pavement promotes infiltration, it is conceivable that some net reduction in infiltration could occur in areas where desert pavement is disturbed. However, due to the sandy nature of soils at the Project site and its vicinity, infiltration capacities in the area are generally quite high. Therefore, while disturbance to existing desert pavement could result in a reduction in infiltration capacity, soils would still remain very permeable, and no noticeable reduction in groundwater levels or overall infiltration capacity within the region is anticipated.

The Project will result in the direct and permanent loss of desert pavement on the solar plant site and the resulting loss or displacement of most wildlife species that presently occur on-site. The cumulative effects discussion in Section 4.4.9.3 (p. 4.4-21), identifies that, "(i)n the context of other existing and reasonably foreseeable projects, the proposed Project has the potential to further reduce wildlife habitat and incrementally degrade adjacent habitat." Furthermore, "(t)he development of numerous large-scale projects such other solar generation facilities would result in the permanent conversion of wildlife habitat to industrial and commercial uses." Most vegetation on the solar plant site including phreatophytes (deep-rooted plants that are characteristic of arid areas) will be directly removed during construction.

6-20 Section 4.15, *Social and Economic Effects*, acknowledges that most construction workers are expected to come from western Riverside County, but that it is possible that some workers will come from the Blythe area or La Paz County, Arizona (p. 4.15-2). As stated on page 2-55, during operation, approximately 20 permanent, full-time personnel would be employed at the solar plant site. Temporary personnel would be employed, as needed, during seasonal periods when panel washing is required. Although the BLM does not have the authority to require that the Applicant use particular hiring practices, this concern will be considered during decision making. See also Response 6-16.

6-21 The visual effects of the MSEP for visitors to the surrounding wilderness areas have been addressed in *Section 4.19.3, Alternative 1: Proposed Action*. As discussed in the subsection titled "Impacts to Special Designations (Wilderness Areas)" on pages 4.19-13 and 4.19-14, the visual impacts on the wilderness areas surrounding the MSEP would be minor to moderate. The presence of microphyll habitat in McCoy Wash is not proper justification for using the wash as a KOP location.

6-22 The criteria for selecting KOPs is not to depict *all* of the visual impact scenarios, but to choose locations that are representative of views experienced by the public. The rationale for the selection of KOPs is fully detailed on page 4.19-3, and the locations of KOPs selected are shown in Figure 3.19-2. The KOPs represent an appropriate range of viewer types, view distances, and view angles. In addition, the effect of glint and glare was

analyzed on pages 4.19-12 and 4.19-13. As discussed in Section 4.19.1.3, the simulations provided in the Draft PA/EIS were created assuming optimal atmospheric conditions, without having blended the facility in with the level of atmospheric haze present at the time the photographs were taken. The degree of visual exposure of the MSEP (i.e., angle of observation, view duration, and relative size/scale) is discussed throughout Section 4.19 at an appropriate level of detail.

6-23 The MSEP is required to conform to the VRM Class III objective, with a limited segment of the gen-tie line required to conform to the VRM Class II objective, as discussed in Section 3.19.1.7, *Interim Visual Resource Management Class Recommendations*. The VRM Class I objective would only apply to land-disturbing activities within areas classified as VRM Class I, such as designated wilderness. The MSEP does not overlie any VRM Class I land.

6-24 See Response 6-23. In addition, compliance (or non-compliance) with VRM objectives is different from an evaluation of the Project's cumulative impacts as required under NEPA. See 4.19.9 for a comprehensive evaluation of cumulative impacts to visual resources.

6-25 As stated in Responses 6-21 and 6-22, the purpose of choosing KOP locations for simulating the Project's effects is to represent views of the Project from locations that the public frequents (i.e., developed areas, highways, local roads, and OHV routes). The simulation from KOP 3 was provided to approximate views for visitors to the surrounding designated wilderness, in recognition that while access is difficult and visitation is very low, the sensitivity is high because visitors seek an unconfined wilderness experience. The lack of a simulation from every potential vantage point, however, does not mean that impacts were not adequately evaluated. Impacts to special designations, such as those listed by the commenter, were evaluated in Sections 4.19.2 and 4.19.9.3; the impacts with respect to lighting and dust were evaluated on pages 4.19-10 through 4.19-13; and the impacts on the night sky were evaluated on pages 4.19-11 and 4.19-12. Further, Mitigation Measure VIS-1 includes a lighting mitigation plan to minimize night-sky impacts during facility construction and operation.

6-26 The comment that non-nesting long-eared owls (*Asio otis*) have been observed locally is noted. The long-eared owl is a California Species of Special Concern that was not detected on-site during avian point count surveys. Mitigation Measures WIL-6 and WIL-7 will protect long-eared owls and other birds that may be encountered on the Project site during the construction, operation and maintenance phases of the Project.

6-27 Consistent with the comment, the PA/EIS (p. 3.4-18) acknowledges the occasional presence of burro deer on the Project site.

6-28 In response to the comment, the following impact discussion is added to the kit fox discussion on page 4.3-15 to address the topic of canine distemper in desert kit fox populations:

In late 2011, the first known cases of canine distemper virus (CDV) were observed in desert kit foxes about 20 miles west of Blythe on public lands managed by the BLM and leased to Genesis Solar LLC to construct the Genesis Solar Energy Project site. CDFG believes that the outbreak originated from an infected host animal entering the site, possibly a wild or domestic dog, American badger, or other carnivore. The rapid spread of CDV within the kit fox population was facilitated by the project-related displacement of infected animals from the Genesis site into new kit fox territories. Subsequently, desert kit foxes were captured for disease testing at the First Solar Desert Sunlight, Solar Millennium Palen, Genesis Ford Dry Lake, and at Southern California Edison's Colorado River substation and CDV was identified at the two later sites, which span a distance of about 40 miles on the I-10 corridor within the Chuckwalla Valley (California Energy Commission, 2012). The CDFG Wildlife Investigations Lab continues to monitor the health of desert kit foxes and is attempting to characterize the spread and significance of the disease on regional kit fox populations. To date, there has been no effort to test desert kit foxes in the Project area for distemper.

The typical practice for solar projects has been to exclude desert kit foxes from project areas during pre-construction clearing of project sites by "passive relocation" methods (i.e., by closing burrows, forcing foxes to locate to new off-site burrows). This practice has the potential to worsen the outbreak, by raising kit fox stress levels and causing increased susceptibility to infection, causing increased movement of diseased animals thereby increasing the spread of disease into new areas, or placing healthy kit foxes into contact with off-site infected animals (California Energy Commission, 2012).

Additionally, Mitigation Measure WIL-8 has been redrafted as follows to provide additional canine distemper protection to desert kit fox populations:

WIL-8: American Badger and Desert Kit Fox Protection. To avoid direct impacts to American badgers and desert kit fox, the Applicant shall implement the following measures:

1. ***Baseline Kit Fox Census and Population Health Survey:*** A qualified biologist with demonstrated mammal experience shall complete a baseline study of desert kit fox populations on the Project site and the anticipated dispersal areas from passive relocation at least 60 days prior to initiation of construction activities. The study shall characterize the demographics (e.g., size, structure, and distribution) of the kit fox population on the site and receiving areas. The Applicant shall coordinate with and fund studies by federal or State wildlife health officials [e.g., the CDFG Wildlife Investigations Lab (WIL)] to establish baseline health conditions.

2. ***Prepare Desert Kit Fox Management Plan*:** At least 45 days prior to construction, the Applicant shall submit a Desert Kit Fox Management Plan that: 1) incorporates baseline desert kit fox census and health survey findings into a cohesive management strategy that minimizes disease risk to kit fox populations; 2) specifically identifies preconstruction survey methods for kit

foxes and large carnivores (e.g., badgers) in the Project area; 3) describes preconstruction and construction-phase passive relocation methods from the site, and; 4) coordinates survey findings prior to and during construction to meet the information needs of wildlife health officials in monitoring the health of kit fox populations. The Plan shall include contingency measures that would be performed if canine distemper were documented in the Project area possible dispersal areas adjacent to the Project site, and measures to address potential kit fox reoccupancy of the site (as documented at the Genesis site). The contents and requirements of the Plan shall be subject to review and approval by the BLM and CDFG.

3. ***Implement Desert Kit Fox Management Plan:*** If canine distemper is not identified in the Project area or relocation areas during baseline surveys, the mitigation strategy may utilize passive means or active means with appropriate CDFG authorization to relocate kit foxes from the site. The approach below assumes that canine distemper is not detected during baseline surveys.

   a. *Pre-Construction Surveys:* Biological Monitors shall conduct pre-construction surveys for desert kit fox and American badger no more than 30 days prior to initiation of construction activities. Surveys shall also consider the potential presence of dens within 100 feet of the project boundary (including utility corridors and access roads) and shall be performed for each phase of construction. If dens are detected each den shall then be further classified as inactive, potentially active, or definitely active.

   b. Inactive dens that would be directly impacted by construction activities shall be excavated by hand and backfilled to prevent reuse by badgers or kit fox.

   c. Potentially and definitely active dens that would be directly impacted by construction activities shall be monitored by the Biological Monitor for three consecutive nights using a tracking medium (such as diatomaceous earth or fire clay) and/or infrared camera stations at the entrance.

   d. If no tracks are observed in the tracking medium or no photos of the target species are captured after three nights, the den shall be excavated and backfilled by hand.

   e. If tracks are observed, the den shall be progressively blocked with natural materials (rocks, dirt, sticks, and vegetation piled in front of the entrance) for the next three to five nights to discourage the badger or kit fox from continued use. After verification that the den is unoccupied it shall then be excavated and backfilled by hand to ensure that no badgers or kit fox are trapped in the den. BLM approval may be required prior to release of badgers on public lands.

   f. If an active natal den (a den with pups) is detected on the site, the BLM AO and CDFG shall be contacted within 24 hours to determine the appropriate course of action to minimize the potential for animal harm or mortality. The course of action would depend on the age of the pups, location of the den on the site (e.g., is the den in a central area or in a perimeter location), status of the perimeter site fence (completed or not),

and the pending construction activities proposed near the den. A 500-foot no-disturbance buffer shall be maintained around all active dens.

g. The following measures are required to reduce the likelihood of distemper transmission:

i. No pets shall be allowed on the site prior to or during construction, with the possible exception of vaccinated kit fox scat detection dogs during preconstruction surveys, and then only with prior CDFG approval;

ii. Any sick or diseased kit fox, or documented kit fox mortality shall be reported to CDFG and the BLM AO within 8 hours of identification. If a dead kit fox is observed, it shall be collected and stored according to established protocols distributed by CDFG WIL, and the WIL contacted to determine carcass suitability for necropsy.

6-29 The comment that Yuma mountain lion populations should be monitored in the Project area is noted. Mountain lions are secretive, highly mobile species with and expansive range that is described between 150 to 625 sq. mi. (Kucera, 1998). Given the large range of this species and protection of wildlife access and movement corridors at the base of the McCoy Mountains, no direct or indirect effects on mountain lions are anticipated from the proposed action. Therefore, no protective measures or long-term monitoring are required for this species. In the unlikely event that Yuma mountain lions are identified in the Project area prior to or during construction, including during any pre-construction surveys required for other resources, the data will be conveyed to the Designated Biologist who will determine if action is necessary to avoid potential effects to this species. No specific mitigation measures are needed to avoid effects to this species.

6-30 The nearest reported CNDDB occurrence is a 1943 record of a banded Gila monster captured 25 miles northwest of the Project area by General Patton's tank Corps during maneuvers at the base of the Granite Mountains. Focused wildlife surveys of the Project area led by a qualified herpetologist failed to detect banded Gila monster. Based on its absence in the Project area, no protective measures are required for this species.

6-31 The PA/EIS requires that desert tortoise compensation lands be acquired within the Colorado Desert Recovery Unit, as identified in the USFWS 2011 *Revised Recovery Plan for the Mojave Population of the Desert Tortoise Colorado Desert Recovery Unit* (USFWS, 2011e). The 2001 Recovery Plan combined the formerly separate Northern and Eastern Colorado recovery units into the single Colorado Desert Recovery Unit due to minimal genetic differentiation within the recovery unit. Based on this finding, the mitigation requirement to site lands within the Colorado Desert Recovery Unit is considered appropriate.

6-32 Section 4.3, *Biological Resources – Vegetation*, discusses the potential impacts that invasive weeds on the solar plant site and other portions of the Project area, including the portions of the gen-tie line that include stabilized and partially stabilized sand dunes.

Specific measures addressing the need for weed management are provided in APM BIO-2n and Mitigation Measure VEG-9. All required biological resource plans would be finalized and made publicly available prior to the initiation of construction activities.

6-33 The commenter does not provide supporting information for the view that additional dust controls are needed for the Project, nor is any evidence provided concerning the inadequacy of APM AIR-1, APM AIR-2, or PA/FEIS Mitigation Measure AQ-1 to control fugitive dust generated by the Project. Compliance and enforcement monitoring, which would be key components of any approval of the requested ROW grant, would assure that these measures are implemented appropriately. If the BLM determines that adjustment of the mitigation measures is appropriate, the agency could adjust them.

6-34 All required biological resource plans would be finalized and made publicly available prior to the initiation of construction activities.

6-35 Response 8-14 and Response 11-20 address the identification and mapping of desert dry wash woodland habitat. While focused botanical surveys identified big galleta grass on the solar plant site, this plant was not present in sufficient density to be characterized as the Creosote-Big Galleta Grass vegetation association.

6-36 The comment that transplanting and reseeding have a low success rate is noted, as is the recommendation to avoid botanical impacts in the Project area.

6-37 The mitigation requirements for rare plants are identified in Mitigation Measure VEG-10 of the PA/EIS, which describes the off-site compensation requirements for special-status plants. As identified by the commenter, compensatory mitigation shall consist of acquisition of habitat supporting the same target species as those affected by the proposed action. The amount of required compensation shall relate to the rarity of the identified species. With the posting of an appropriate security to BLM, the Applicant is required to acquire mitigation lands, in fee or in easement, no more than 18 months after the start of Project ground-disturbing activities. Due to the revision made to Mitigation Measure VEG-10, funding for a special-status plant distribution study may no longer qualify as compensatory mitigation (see Response 11-77).

6-38 The draft Desert Tortoise Translocation Plan is available as Appendix F of the February 2012 *McCoy Solar Energy Project Biological Assessment* (TetraTech EC Inc., 2012a), which is included in the Project administrative record.

6-39 The 25 mph speed limit described in APM BIO-2e is considered appropriate to minimize project effects to Mojave fringe-toed lizards from vehicle collision hazards. Construction workers will additionally receive specific environmental awareness training in response to APM BIO-2c to recognize the potential hazards to lizards in sand dune habitat. Further, the BLM could adjust these requirements if, even with their implementation, impacts are unacceptable.

6-40 The draft McCoy Solar Energy Project Raven Management and Control Plan is available as Appendix G of the February 2012 *McCoy Solar Energy Project Biological Assessment* (TetraTech EC Inc.,2012a), which is included in the Project administrative record.

6-41 The draft Avian and Bat Protection Plan that is required for the Project was completed on October 5, 2012.

6-42 See Response 6-28.

6-43 In response to the comment, the total amount of occupied Mojave fringe-toed lizard habitat was revisited and an error was detected in the original calculation that greatly overestimated the total cumulative impact and cumulative contribution of the Proposed Action. Following the updated analysis, the total amount of potentially occupied sand dune and sand sheet habitat in the Palo Verde Valley was revised upward from 1,098 acres to 12,911 acres, which is considered a small portion of the available habitat based on the large amount of similar habitat available locally. Additionally, the total cumulative impact from future projects, including the Proposed Action, was revised downward from 655 acres to 76 acres. The anticipated contribution of the Proposed Action to cumulative effects, 38 acres, includes both temporary and permanent effects. Thus, the permanent impact of the Project, 19 acres, constitutes a permanent effect to less than 0.2 percent of sand dune and sand sheet habitat in the Palo Verde Valley study area that may support this species. It is also likely that other unidentified Mojave fringe-toed lizard populations occur in the cumulative resource study area and are not included in this assessment.

In the Palo Verde Valley, the MSEP and the BSPP could potentially affect a total of 76 acres of habitat for Mojave fringe-toed lizard. The cumulative effect of these projects on Mojave fringe-toed lizard and its habitat constitutes about 0.6 percent of potential Mojave fringe-toed lizard habitat in the study area. Since over 99 percent of habitat would not be affected, the 3:1 mitigation ratio presented in the PA/EIS is appropriate to offset impacts of the Proposed Action.

The comment that the Project should be delayed until genetic studies are performed is noted. The Mojave fringe-toed lizard receives protection as a BLM Sensitive species and California Species of Special Concern. The 3:1 mitigation for habitat effects exceeds that provided to listed species in the Project area such as desert tortoise. There are no proposals to list the Mojave fringe-toed lizard as state- or federally listed species. Thus, the level of protection and compensatory mitigation provided in the PA/EIS is appropriate.

The cumulative impact analysis for Mojave fringe-toed lizard in Table 4.4-3 (p. 4.3-11) is revised as follows:

Mojave fringe-toed lizard Occupied sand dune/ sand sheet habitat in the ~~Chuckwalla and~~ Palo Verde V~~v~~alley~~s~~	~~1,098~~ 12,911 acres	35.0 acres (0.3%)	76 acres (~~59.7~~0.6 %)	38 ~~46~~ acres (~~7.0~~ 50%)	0 acres (0%)	38 ~~46~~ acres (~~7.0~~ 50%)	38 ~~46~~ acres (~~7.0~~ 50%)

In addition, potential effects to Mojave fringe-toed lizard are clarified on page 4.4-24 as follows:

> The analysis of cumulative Project effects to Mojave fringe-toed lizard habitat focused on known and CNDDB-documented populations within the ~~Chuckwalla Valley and~~ Palo Verde Valley. In these areas, populations are dependent upon areas with fine aeolian sand that occur in association with dunes, margins of dry lakes and washes, and isolated sand patches. The cumulative effects analysis identified approximately ~~1,098~~ 12,911 acres of occupied Mojave fringe-toed lizard habitat in the study area, of which approximately ~~655~~ 76 acres (~~59.7~~0.6 percent) occurs in areas where future projects are proposed (Table 4.4-3). Under Alternatives 1 and 3, approximately ~~46~~38 acres of habitat would be disturbed for the gen-tie line and associated access road. This represents approximately ~~4.2~~0.3 percent of available Mojave fringe-toed lizard habitat that was identified in the cumulative study area and represents a contribution of about ~~7~~50 percent of the total cumulative effect on this resource. The implementation of Mitigation Measures VEG-7, VEG-8, VEG-10, VEG-11, VEG-12, and WIL-10 would minimize impacts to sensitive dune and sand sheet habitat and provide suitable compensatory habitat for habitat losses.

6-44 As identified in Comment 6-31, desert tortoise compensation lands shall be located acquired within the Colorado Desert Recovery Unit, as identified in the USFWS 2011 *Revised Recovery Plan for the Mojave Population of the Desert Tortoise Colorado Desert Recovery Unit*.

6-45 No geoglyphs have been identified within the Project area. The geoglyph referenced by the commenter is not located within the Project area.

6-46 Alternatives to the proposed location were considered. See PA/FEIS Section 2.9.2.1, Site Alternatives, and Section 5.5.4.1, Common Response 1.

6-47 Comment noted. The cumulative impacts on each resource area of the Project in combination with other past, present, and reasonably foreseeable future renewable energy projects are analyzed throughout Chapter 4.

6-48 See Response 6-10.

Letter 7 – Responses to Comments from Jared Fuller

7-1 The comment that the Proposed Action would impact vegetation, wildlife, soils, and visual resources is noted and such impacts are documented in the PA/EIS.

7-2 The commenter is correct that some environmental effects would be greater when considered in the cumulative framework with other nearby proposed actions. The cumulative effects analyses in the PA/EIS identify and disclose the potential sources for cumulative effects in the regional study area.

7-3 The stated preference for Alternative 4 (pursuant to which the MSEP would not be developed), Alternatives 5 and 6 (pursuant to which the MSEP would not have been developed, but which have been removed from the PA/FEIS), and Alternative 2 (the Reduced Acreage Alternative) are noted. Please see Section ES.3.1 and Section 2.2.1 for an explanation of why Alternatives 5 and 6 have not been carried forward for consideration in the PA/FEIS.

7-4 The commenter suggests that the Project could be improved by avoiding populations of two or more sensitive plants that occur on the solar plant site, and specifically by avoiding Las Animas colubrina and Harwood's milk vetch. The distribution of these and other special-status plants in the Project area is illustrated in Figure 3.3-3. As the figure illustrates, Las Animas colubrina is widely distributed across Solar Unit 1 and occurs in perhaps 50 percent of Solar Unit 2; while Harwood's milk vetch is distributed throughout the remaining portions of Solar Unit 2. The commenter's suggestion to avoid these rare plant populations is reflected in the PA/EIS analysis as Alternative 4, the No Action Alternative.

7-5 The stated preference for Alternative 3's western route is noted.

Letter 8 – Responses to Comments from Californians for Renewable Energy (CARE) and La Cuna de Aztlan Sacred Sites Protection Circle Advisory Committee (La Cuna)

8-1 See PA/FEIS Section 5.5.4.1, Common Response 1.

8-2 See PA/FEIS Section 5.5.4.1, Common Response 1.

8-3 See PA/FEIS Section 5.5.4.1, Common Response 1.

8-4 See PA/FEIS Section 5.5.4.1, Common Response 1.

8-5 This comment refers to discussion allegedly set forth on Draft PA/EIS page 2-69; however, Chapter 2 of the Draft PA/EIS contained only 64 pages, and none contains the language quoted in the comment. Regarding the private lands alternative, see PA/FEIS Section 5.5.4.1, Common Response 1.

8-6 Although no land classification system context is provided, the BLM assumes that the comment refers to land that is designated in the CDCA Plan as Multiple-Use Class (MUC) I, which is an "intensive use" class. The CDCA Plan describes the purpose of the MUC-I designation as providing "for concentrated use of lands and resources to meet human needs." Only "reasonable protection" of sensitive natural and cultural values is provided on MUC-I designated lands and "[m]itigation of impacts on resources and rehabilitation of impacted areas… occur[s only] insofar as possible." By contrast, the Project site is located within lands designated "Class L," or limited use. Solar energy facilities are permitted in Class L areas provided that the BLM complies with NEPA and

follows the CDCA Plan Amendment process. For MUC-L lands, applicable guidelines from the CDCA Plan, Table 1 are as included in PA/FEIS Table 3.10-2. Because the BLM's purpose and need for the MSEP is to respond to the Applicant's application under FLPMA Title V for a specific ROW grant (se PA/FEIS Sections ES.2.1 and 1.2.1), consideration of land bearing a different MUC classification would not have satisfied the first of the NEPA alternatives development and screening criteria provided in PA/FEIS Section 2.2.

8-7 Regarding the use of alternative renewable energy generation technologies, see PA/FEIS Section 5.5.4.1, Common Response 1.The Project proposes the use of solar photovoltaic (PV), not solar thermal, technology. As stated on PA/FEIS page 2-21, the primary use of water during the operation and maintenance phase of the Project would be for panel washing and dust control because solar PV technology requires no water for the generation of electricity. Three solar thermal alternative technologies were considered (see Table 2-12 in PA/FEIS Chapter 2) but eliminated from further analysis.

8-8 Alternative 1 is the Proposed Action and would require a CDCA Plan Amendment. Alternatives 2 and 3 also propose to amend the CDCA Plan. Only Alternative 4, the No Action alternative, would not amend the CDCA Plan. Please note that there is no Alternative A for this Project.

The extent to which the Project has been located and designed to avoid sensitive resources is addressed throughout the PA/EIS, and the consideration of the Project's consistency with the CDCA Plan MUC L requirements is provided in Section 4.10, *Lands and Realty*. The comment suggests that the consideration BLM land use planning obligations in the PA/EIS is inadequate; however, it provides no specific examples as a basis for the allegation. Accordingly, the BLM is unable to provide a more detailed response.

8-9 The Draft PA/EIS does address the relationship of the Project to the Programmatic Environmental Impact Statement for Solar Energy Development in Six Southwestern States (Solar PEIS). As stated on page 2-2: "The site proposed for development of the MSEP is located within the area designated as the Riverside East solar energy zone (SEZ) as designated in the Solar Programmatic Environmental Impact Statement (PEIS) Record of Decision (ROD) signed October 12, 2012. However, since the MSEP ROW application is listed as a Pending Application in the PEIS ROD, it is not subject to that ROD (PEIS ROD Section B.1.2) or the Plan Amendments made in that decision. Accordingly, if the BLM decides to grant a ROW for this project, the CDCA Plan would be amended as required." Additional discussion of the Solar PEIS is provided on pages 2-29 (guidance for treatment of vegetation under panels); 3.10-7 through 3.10-9 (withdrawal and study of lands as solar energy study areas), 4.4-26 (portions of MSEP site have low potential for substantial resource conflicts relative to other locations considered in the PEIS); and 4.19-17 and 4.19-18 (PEIS evaluated cumulative scenario for visual resource impacts).

The Final Solar PEIS was not completed until July 2012, after publication of the Draft PA/EIS. As described above, the MSEP ROW application is not subject to the PEIS ROD or the Plan Amendments made in that decision.

8-10 Construction of most of the planned facilities would not require closure of any travel lanes and therefore would not reduce the roadway capacity on roads that provide access to the work sites; however, installation of the gen-tie line, conductor stringing, installation of new poles, and construction of spur roads would require construction adjacent to existing roadways. Although activities associated with construction of the gen-tie line would occur over a short period in each location as construction progresses along the alignment, roadways along or adjacent to the planned alignment may require temporary closures of travel lanes and reduce roadway capacities during installation. As a result, temporary lane closures due to the aforementioned activities would adversely affect traffic conditions along surrounding roadways. Although the PA/EIS does not consider obstructed traffic flow to be an impact to air resources, Mitigation Measure TRN-1 in Section 4.17 requires the preparation and implementation of a traffic control plan to reduce construction-related impacts on local roadways. The traffic control plan includes the use of flaggers and/or signage to guide vehicles through and/or around work zones. These measures would improve traffic flow and, as a result, would reduce excess emissions indirectly resulting from Project construction that may occur due to slower vehicle speeds. Designated truck routes that minimize truck traffic on local roadways would also be utilized, minimizing emissions near sensitive receptors.

8-11 The majority of the electricity needs of the Project during construction would be supplied by extending an existing distribution line approximately 20,000 feet from the eastern border of the Project site. Temporary on-site portable generators would also be used during construction. Two 35-horsepower (hp) standby emergency generators would be used if necessary. Due to the large extent of the Project site (approximately 4,500 acres) it would not be feasible to provide all of the electricity needs during construction via the proposed distribution line, nor is there any evidence to suggest that such a requirement would provide a meaningful reduction in air pollutant concentrations in the region.

8-12 The commenter has not demonstrated a need for additional mitigation; and furthermore, it is not clear what the commenter refers to with regard to clean air engines. However, as described in Section 3.2.2, the federal non-road diesel engines and state on-road and off-road engine emission reduction programs would indirectly reduce emissions from vehicles and equipment used in Project construction through the phasing in of cleaner on-road and off-road equipment engines.

8-13 The geographic scope considered for potential cumulative impacts to regional air quality is the MDAB. Cumulative impacts would occur from short-term Project-related construction PM10 emissions when combined with the emissions associated the cumulative projects described in Section 4.1.5, *Cumulative Scenario Approach*, to the extent such projects would be constructed concurrently with the Project. The PA/EIS

analyzes the cumulative impact of the construction, operation and maintenance, closure, and decommissioning of the Proposed Action, taking into account the effects in common with other past, present, and reasonably foreseeable future actions. The cumulative effects analysis includes reasonably foreseeable future actions, including those for which there are existing decisions, funding, formal proposals, or which are highly probable, based on known opportunities or trends. As disclosed in Table 4.1-4 on page 4.1-9, reasonably foreseeable future projects along the I-10 corridor were included in the cumulative analysis, including the Palen Solar Energy Project and the Genesis Solar Energy Project.

8-14 The Project was designed to minimize and avoid sensitive riparian habitat that occurs to the west of the Project area, including desert dry wash woodland (DDWW) habitat. Botanical surveys identified only 1.5 acres of DDWW on the Project site and an additional 2.7 acres on Project linears (see Table 3.3-1 and Figure 3.3-1). As shown in Figure 3.3-1, the identified DDWW habitat is located in a central portion of the solar plant site and avoidance may not be technically possible due to drainage concerns. However, it is likely that most impacts to DDWW habitat on linears can be avoided or minimized through the implementation of protective measures during construction. Given the small amount of DDWW in the Project area, the anticipated impact to this habitat type is considered small.

8-15 Mitigation Measure VEG-8, Part 17 describes performance criteria that must be met before revegetated areas can be considered restored. The plan requires a description of topsoil salvage and seeding techniques and a monitoring and reporting plan. Restoration requirements include at least 80 percent native species in disturbed areas and at least 60 percent relative cover and density. To achieve these objectives the plan will undeniably need to consider location and climate, and require that restoration efforts continue until restoration objectives are achieved. The PA/EIS is not required to identify and resolve the planting challenges that are specific to the Mojave Desert. These issues will be addressed in the Revegetation Plan and are not considered in the PA/EIS.

8-16 As identified in Figure 3.4-1, the Project site supports mostly medium to low-quality desert tortoise habitat. This finding is verified by the results of focused tortoise surveys on the site that identified a total of 3 desert tortoise burrows and 6 potential burrows on the solar plant site (Table 3.4-2, p. 3.4-8). As the USGS habitat model presented in Figure 3.4-1 illustrates, relatively high quality habitat is available locally. In order to meet USFWS mitigation requirements to mitigate project desert tortoise effects, compensation lands will support higher quality habitat than is currently available on the solar plant site. As a result, 1:1 compensation, as required by the USFWS, is sufficient to mitigate effects to desert tortoise habitat.

8-17 The PA/EIS addresses the potential direct and indirect effects of relocation on desert tortoise, including effects associated with the capture, handling, and relocation of desert tortoises on page 4.4-11 *et seq.*, and 4.4-22. Tortoise stress will be minimized during

relocation by complying with requirements of the Desert Tortoise Relocation/Translocation Plan, which includes surveying for and relocating tortoises only during the period when they are most active in the Project vicinity (March through May or September through mid-November). The technical biological reports provided in Appendix C identify the number or tortoises detected in the Project area and the density of tortoise on the translocation site, located immediately west of the Project area.

8-18 Both the Project site and the primary vehicle access route to the site would be fenced to exclude kit foxes and a relocation program would be implemented to relocate kit foxes off-site prior to construction, as described in Mitigation Measure WIL-8. By excluding foxes from work sites and access routes, and providing continuing environmental monitoring during construction to identify foxes in the work area, interactions between vehicles and foxes would be infrequent. As a result, the likelihood of encountering kit foxes during active construction is considered low.

8-19 In response to this and other comments, the following impact discussion is added to the kit fox discussion on page 4.3-15 to address the topic of canine distemper in desert kit fox populations:

> In late 2011, the first known cases of canine distemper virus (CDV) were observed in desert kit foxes about 20 miles west of Blythe on public lands managed by the BLM and leased to Genesis Solar LLC to construct the Genesis Solar Energy Project site. CDFG believes that the outbreak originated from an infected host animal entering the site, possibly a wild or domestic dog, American badger, or other carnivore. The rapid spread of CDV within the kit fox population was facilitated by the project-related displacement of infected animals from the Genesis site into new kit fox territories. Subsequently, desert kit foxes were captured for disease testing at the First Solar Desert Sunlight, Solar Millennium Palen, Genesis Ford Dry Lake, and at Southern California Edison's Colorado River substation and CDV was identified at the two later sites, which span a distance of about 40 miles on the I-10 corridor within the Chuckwalla Valley (California Energy Commission, 2012). The CDFG Wildlife Investigations Lab continues to monitor the health of desert kit foxes and is attempting to characterize the spread and significance of the disease on regional kit fox populations. To date, there has been no effort to test desert kit foxes in the Project area for distemper.
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> The typical practice for solar projects has been to exclude desert kit foxes from project areas during pre-construction clearing of project sites by "passive relocation" methods (i.e., by closing burrows, forcing foxes to locate to new off-site burrows). This practice has the potential to worsen the outbreak, by raising kit fox stress levels and causing increased susceptibility to infection, causing increased movement of diseased animals thereby increasing the spread of disease into new areas, or placing healthy kit foxes into contact with off-site infected animals (California Energy Commission, 2012).

Additionally, Mitigation Measure WIL-8 on page 4.4-36 has been redrafted as follows to provide additional canine distemper protection to desert kit fox populations:

WIL-8: American Badger and Desert Kit Fox Protection. To avoid direct impacts to American badgers and desert kit fox, the Applicant shall implement the following measures:

1. ***Baseline Kit Fox Census and Population Health Survey:*** A qualified biologist with demonstrated mammal experience shall complete a baseline study of desert kit fox populations on the Project site and the anticipated dispersal areas from passive relocation at least 60 days prior to initiation of construction activities. The study shall characterize the demographics (e.g., size, structure, and distribution) of the kit fox population on the site and receiving areas. The Applicant shall coordinate with and fund studies by federal or State wildlife health officials [e.g., the CDFG Wildlife Investigations Lab (WIL)] to establish baseline health conditions.

2. ***Prepare Desert Kit Fox Management Plan*:** At least 45 days prior to construction, the Applicant shall submit a Desert Kit Fox Management Plan that: 1) incorporates baseline desert kit fox census and health survey findings into a cohesive management strategy that minimizes disease risk to kit fox populations; 2) specifically identifies preconstruction survey methods for kit foxes and large carnivores (e.g., badgers) in the Project area; 3) describes preconstruction and construction-phase passive relocation methods from the site, and; 4) coordinates survey findings prior to and during construction to meet the information needs of wildlife health officials in monitoring the health of kit fox populations. The Plan shall include contingency measures that would be performed if canine distemper were documented in the Project area possible dispersal areas adjacent to the Project site, and measures to address potential kit fox reoccupancy of the site (as documented at the Genesis site). The contents and requirements of the Plan shall be subject to review and approval by the BLM and CDFG.

3. ***Implement Desert Kit Fox Management Plan:*** If canine distemper is not identified in the Project area or relocation areas during baseline surveys, the mitigation strategy may utilize passive means or active means with appropriate CDFG authorization to relocate kit foxes from the site. The approach below assumes that canine distemper is not detected during baseline surveys.

    a. *Pre-Construction Surveys:* Biological Monitors shall conduct pre-construction surveys for desert kit fox and American badger no more than 30 days prior to initiation of construction activities. Surveys shall also consider the potential presence of dens within 100 feet of the project boundary (including utility corridors and access roads) and shall be performed for each phase of construction. If dens are detected each den shall then be further classified as inactive, potentially active, or definitely active.

    b. Inactive dens that would be directly impacted by construction activities shall be excavated by hand and backfilled to prevent reuse by badgers or kit fox.

c. Potentially and definitely active dens that would be directly impacted by construction activities shall be monitored by the Biological Monitor for three consecutive nights using a tracking medium (such as diatomaceous earth or fire clay) and/or infrared camera stations at the entrance.

d. If no tracks are observed in the tracking medium or no photos of the target species are captured after three nights, the den shall be excavated and backfilled by hand.

e. If tracks are observed, the den shall be progressively blocked with natural materials (rocks, dirt, sticks, and vegetation piled in front of the entrance) for the next three to five nights to discourage the badger or kit fox from continued use. After verification that the den is unoccupied it shall then be excavated and backfilled by hand to ensure that no badgers or kit fox are trapped in the den. BLM approval may be required prior to release of badgers on public lands.

f. If an active natal den (a den with pups) is detected on the site, the BLM AO and CDFG shall be contacted within 24 hours to determine the appropriate course of action to minimize the potential for animal harm or mortality. The course of action would depend on the age of the pups, location of the den on the site (e.g., is the den in a central area or in a perimeter location), status of the perimeter site fence (completed or not), and the pending construction activities proposed near the den. A 500-foot no-disturbance buffer shall be maintained around all active dens.

g. The following measures are required to reduce the likelihood of distemper transmission:

   i. No pets shall be allowed on the site prior to or during construction, with the possible exception of vaccinated kit fox scat detection dogs during preconstruction surveys, and then only with prior CDFG approval;

   ii. Any sick or diseased kit fox, or documented kit fox mortality shall be reported to CDFG and the BLM AO within 8 hours of identification. If a dead kit fox is observed, it shall be collected and stored according to established protocols distributed by CDFG WIL, and the WIL contacted to determine carcass suitability for necropsy.

8-20 The commenter states that the PA/EIS fails to address any negative impacts to burrowing owls. Potential adverse effects of the Project to burrowing owls are presented on page 4.4-25, which describes the direct loss of suitable habitat, loss of individual animals, and indirect effects from human presence that result in changes to habitat quality during construction, operation and maintenance, and decommissioning. Mitigation Measure WIL-9, Burrowing Owl Protection and Mitigation Plan, requires the Applicant to implement pre-construction surveys, a burrowing owl mitigation plan, and avoidance measures, and to acquire compensatory burrowing owl habitat.

8-21 The term “cultural resource” is not defined in the National Environmental Policy Act (NEPA) or any other Federal law. The discussion on page 3.5-1 is consistent with the definition of cultural resources provided in the BLM 8100 Manual. Cultural resources on the public lands managed by the BLM are concrete, material places and things. In compliance with several laws including NEPA and the NHPA, the BLM considers the values ascribed to these places and things, and the ways in which these places and things are used, when making decisions on actions that might affect them. The public participation processes followed by the BLM in complying with NEPA and the NHPA afford opportunities for the general public and Indian tribes to identify cultural resources of all kinds, and values relating to them, that they wish BLM to consider in its decision making.

Under the NHPA and its implementing regulations, significant cultural resources are called historic properties. Historic properties are districts, sites, buildings, structures and objects that are listed on, or eligible for listing on, the National Register of Historic Places. This definition is the only technical, operational meaning of the word “significant” as it applies to cultural resources within the context of Section 106. This does not mean that places or things not meeting this definition are unimportant. The BLM recognizes that values ascribed to places or things by social or cultural groups, including Indian tribes, may make them important and worthy of consideration even if those places or things do not meet the NRHP definition of significance. During the preparation of this PA/EIS, the general public and Indian tribes were afforded opportunities to identify cultural resources of importance to them regardless of whether those resources met the NRHP definition of significance. The cultural resources analyzed in the PA/EIS were the only cultural resources identified by the archival and field inventories, public participation opportunities, and tribal consultation efforts.

An Ethnographic Assessment to identify sites to which Tribes may attach cultural or religious significance to, and that would be affected by the Project, is currently underway. The results of that study are not yet available. See Section 5.2.2.

The BLM will continue consulting with Indian tribes throughout the Section 106 compliance process. BLM’s tribal consultation efforts are discussed in Section 5.2.2 and in Appendix D. Tribes have been invited to identify resources and places of traditional cultural and religious importance that might be affected by the project. Tribes have also been invited to participate in consultations to develop a Memorandum of Agreement for the Project that will seek to resolve adverse effects, including visual, audible and atmospheric effects, on any NRHP-eligible traditional cultural properties that may be identified.

The analysis of impacts in Section 4.5 is not restricted to NRHP-listed or eligible cultural resources. All cultural resources identified within the Area of Potential Effects are included in the analysis, regardless of whether they meet the NRHP definition of significance.

8-22 NHPA Section 106 and government-to-government consultation is ongoing, and BLM's Section 106 obligations will be met prior to the Record of Decision. See also Response 8-21.

8-23 See PA/FEIS Section 5.2.2, which describes the APE within which the project could directly or indirectly cause alterations in the character or use of historic properties as contemplated in 36 CFR §800.16(d), discusses cultural resources identified within the APE (see also Table 1 of the draft MOA in PA/FEIS Appendix L, which lists them all), and describes how potentially affected Tribes were identified and thereafter notified and invited to participate in the Section 106 and government-to-government consultation processes. No evidence is provided that appropriate parties have been left out of the consultation processes for this project. As noted in PA/FEIS Section 5.2.2, ongoing consultation is expected to be complete in December 2012 or January 2013; prior to the conclusion of the consultation processes, it would be premature to conclude that they have not been adequate. Input from Tribes is summarized in PA/FEIS Section 5.2.2 and available in full as part of the formal administrative record for this Project. Further, members of the public may review the comments submitted by the Soboba Band of Luiseño Indians and Colorado River Indian Tribes on the Draft PA/EIS (see Letter 10 and Letter 13, respectively).

8-24 To date, based on ongoing NHPA Section106 and government-to-government consultation with interested Indian tribes and preliminary ethnographic studies, no places within the Project area to which tribes attach cultural or religious significance have been identified.

8-25 As shown in Table 3.6-1 on page 3.6-3, the Draft PA/EIS correctly reported the percentage of *non-Hispanic* American Indian and Alaska Native population in each of the geographic areas as reported by the 2010 U.S. Census. The purpose of Table 3.6-1 is to show how the total percentage of minority population is arrived at: it consists of racial or ethnic groups other than non-Hispanic White (p. 3.6-2). The comment correctly states that the total American Indian and Alaska Native population, alone or in combination with one or more races (which includes those also reporting Hispanic origin) is higher, as follows:

Riverside County, CA	Census Tract 469	Census Tract 9810	Blythe CDD	City of Blythe	La Paz County, AZ	Colorado River Indian Reservation
2.0%	2.3%	0.9%	2.3%	1.8%	15.2%	32.3%

SOURCE: U.S. Census Bureau, 2010b

As explained on pages 4.6-1 and 2, a minority population is identified when the percentage of minority population is greater than 50 percent and/or meaningfully greater than that of the general population. None of the areas studied for environmental justice effects has an American Indian and Alaska Native population greater than 50 percent, and

only the Colorado River Indian Reservation has a population meaningfully greater than either Riverside or La Paz County. Therefore, using American Indian and Alaska Native population alone, the selection of the affected areas with respect to environmental justice would be the same as that of the Draft PA/EIS. The same is true for each other ethnic and racial group reported in the U.S. Census. Therefore, the approach taken in Section 4.6 is appropriately conservative in selecting affected areas with respect to environmental justice.

The geographic scope of the analysis in Section 4.6 consists of areas within which potential effects on the local populations could occur. The primary area includes a 6-mile radius, consistent with the range of the Project's air quality impacts, and the secondary area includes a 2-hour travel radius for commute-related effects. Thus, the appropriate larger population to which to compare local populations was the county population, not the state.

8-26 As described on page 4.6-3, the analysis of environmental justice effects was limited to potential health or environmental effects. By comparison, effects to cultural resources, including Native American resources, are discussed in Section 4.5, *Cultural Resources*. Analysis of the cumulative effects to cultural resources that could be caused or contributed to by the Project is summarized in PA/FEIS Section 4.5.9. This cumulative effects analysis considers the potential for impacts caused by the past, present, and reasonably foreseeable projects identified in PA/FEIS Section 4.1 (see, e.g., Tables 4.1-3 and 4.1-4) to combine with those of the MSEP. These other projects primarily include large-scale renewable energy projects that require extensive grading and development. The cumulative projects also include several transmission lines and non-renewable energy projects, as well as residential and commercial developments. As explained in Sections 4.5.10 and 4.5.11, the implementation of Mitigation Measure CUL-1, which would require the execution of an MOA in accordance with the requirements of NHPA §106, would reduce but may not fully avoid Project-related impacts on cultural resources, including Native American resources.

8-27 As explained in Response 8-25, the analysis of environmental justice effects was limited to potential health or environmental effects. Section 4.6, *Environmental Justice*, did not find that the Project's impacts would affect minority or low-income populations in a disproportionately adverse manner. Thus, the Project would not have a contribution to any potential cumulative effect on environmental justice resulting from other Projects. See, for comparison, the analysis of cumulative effects on cultural resources, which did consider the incremental contributory effects of all of the projects identified as BLM Renewable Energy Projects within the cumulative analysis impact area (see, e.g., PA/FEIS Table 4.1-1). These projects include the 1,000 MW BSPP (identified as project "N" in Table 4.1-4), 500 MW Palen Solar Power Project (identified in that table as project "H"), 300 MW enXco McCoy project (identified as project "I"), and other projects ranging in between 100 MW and 250 MW.

8-28 The comment suggests that the consideration of geological resources in the PA/EIS is inadequate; however, it provides no specific examples as a basis for the allegation. Accordingly, the BLM is unable to provide a more detailed response.

8-29 California's Renewables Portfolio Standard (RPS) requires investor-owned utilities (IOUs) to source 33 percent of the electricity they sell from renewable energy sources by 2020; therefore, demand for new sources of renewable energy would exist regardless of changes in consumer demand until the 33 percent renewable generation threshold is met. Thus, Project-generated electricity would replace the demand for electricity generated by existing dispatchable fossil fuel power plants and/or future plants that may be developed in the absence of the Project, as demand for new sources of electricity grows. Additionally, future consumer demand does not need to be quantified to indicate that demand exists for the Project's electrical generation because the Applicant has a Power Purchase Agreement (PPA) with Southern California Edison (SCE), and state-wide, IOUs would be likely to continue to procure electricity from new renewable energy facilities because California's three large IOUs have not yet met the 33 percent target, and must do so by 2020 (CPUC, 2012).

8-30 The Applicant has a PPA with Southern California Edison (SCE) for the electricity generated by the Project, signifying that existing and planned renewable energy projects are not sufficient to meet SCE's demand for electricity generated by renewable energy facilities. Therefore, SCE would be expected to use electricity generated by the proposed Project to meet customer demand and fulfill its obligation to the meet the RPS goals. It is not necessary to quantify the output of existing solar generating facilities to substantiate the PA/EIS's assertion that the Project would displace future GHG emissions because it would supply renewable energy in place of some energy that otherwise would be generated by fossil fuel sources, which emit more GHGs than renewable sources.

8-31 As described in Response 8-29, California's RPS mandates that 33 percent of the electricity sold in California must come from renewable sources by 2020; until this goal has been met, electricity generated by renewable sources will continue to be prioritized over electricity generated by natural gas power plants. When renewable energy is available to the grid, California Independent Systems Operator (CAISO) requests turndown of fossil power production from unspecified dispatchable fossil fuel plants to make way for the use of the renewable energy resources, per the loading order first adopted in California's 2003 Energy Action Plan. Thus, as demand for electricity continues to grow through 2020, renewable energy would be likely to continue to be used throughout the state, displacing electricity that would otherwise come from existing dispatchable fossil fuel sources and/or future plants that may be developed in the absence of the Project.

8-32 As described in Response 8-30, the PPA for the electricity that would be produced by the Project signifies that SCE continues to have sufficient demand for electricity from renewable sources to meet customer needs and its obligation under the RPS, and

consequently that existing renewable energy facilities do not produce enough electricity to meet future energy demand. SCE would be unlikely to enter into an agreement to purchase the electricity generated by the Project in the absence of demand because it would not be profitable. Consequently, the electricity generated would not be excessive and would not cause unnecessary GHG emissions. Section 4.8 provides a quantitative analysis and adequate rationale to support its conclusions. Detailed analysis of future energy demand and the combined output of other sources is not required. As described in Response 8-31, the specific fossil fuel facility or facilities that would be turned down in response to the Project's electricity being available to the grid cannot be identified at this time, but would be determined by the CAISO based on real-time grid requirements.

8-33 To substantiate the claim that "the fact that solar panels can catch on fire is well-documented," the comment cites four articles from local newspapers and online resources. Two of these articles, "Trenton firefighters battle rooftop solar-panel blazes" (Zdan, 2012) and "Solar fire raises questions about panel safety" (Wolff, 2010), describe incidents in which the inverter boxes that convert solar panels' DC output to AC caught on fire, and make no mention of the panels themselves burning. Rather, in both cases, the panels continued to produce electricity during the electrical fire in the inverter box, resulting in danger from electric shock for firefighters because the power could not quickly be disconnected. As described on page 2-6, each 2 MW block of solar panels would feed DC electricity to a PCS, or inverter unit. In the event of a fire, a type of automatic switch would break, isolating the inverter from the panels by breaking the current, and as a result would avoid this potential danger to firefighters.

Another article cited by the comment ("Solar Panels and Fire!", SolarJuice Blog, 2010) also pertains to rooftop solar installations and states that "The risk of a roof or home catching fire because of a solar photovoltaic power installation is very unlikely." Similarly, CAL FIRE's *Fire Operations for Photovoltaic Emergencies* states, "Many of the same hazards associated with PV technology are present at incidents where PV systems are not present. This is because they are general electrical hazards not specific to PV systems. Like other electrical systems, the components are only hazardous if the system is compromised or directly involved in fire or the protective coverings on the components are damaged" (CAL FIRE, 2010).

Mitigation Measure FIRE-1 requires the Applicant to prepare a Fire Safety Plan which, among other requirements, requires the Applicant to coordinate with the RCFD to create a training component for emergency first responders to prepare for specialized emergency incidents that may occur at the Project site, such as fire affecting inverter units that may continue to be powered with DC electricity from operational panels.

8-34 The Multiple Use Class (MUC) Guidelines in Table 1 of the CDCA Plan state that solar electrical generation facilities may be allowed in an MUC Limited (L) area after NEPA requirements are met and the CDCA Plan is properly amended. The Proposed Action, if approved, would amend the CDCA Plan following the process anticipated in the CDCA

Plan to identify the site as suitable for the proposed solar energy use. The CDCA Plan amendment would only apply to the BLM-administered land being evaluated for the Project. Accordingly, the proposed CDCA Plan amendment and the overall amendment process would be consistent with the CDCA Plan.

Furthermore, the Riverside East SEZ includes some Class L lands, indicating that potential solar development is anticipated on such lands.

8-35 The Riverside County General Plan pertains only to the portion of the Project site that is under Riverside County jurisdiction and does not control federal actions on federal land. This portion would be reviewed by the county separately from the BLM's NEPA process. Accordingly, analyzing consistency of the Proposed Action and alternatives with this plan is beyond the scope of analysis for the BLM.

8-36 The PA/EIS addresses potential impacts of noise on wildlife in Section 4.4. Additionally, Mitigation Measure VEG-8 (p. 4.3-23) uses the threshold of 65 dB as the baseline for determining whether or not proposed activities require breeding bird monitoring. This sound level is about equivalent to the volume of normal conversation. As a result, virtually any construction-related activity performed during the nesting season could require nesting bird monitoring.

8-37 As described in Section 4.13, *Paleontological Resources*, a Paleontological Resources Assessment was completed for the Project site, which involved both a literature and records search and a paleontological resources survey. The information was used to assign geologic units within the area to a PFYC class, in accordance with BLM protocol. Previous fossil discoveries on the site are described on pages 3.13-3 and 3.13-4. The PA/EIS discloses that ground-disturbing activities could uncover yet unknown undiscovered but potentially significant fossil resources. APMs Paleo-1 through Paleo-3, described on pages 4.13-1 and 4.13-2, would reduce impacts to sensitive paleontological resources throughout the Project site. The PA/EIS adequately addresses potential impacts to paleontological and fossil resources.

8-38 Regarding consistency with the CDCA Plan MUC Guidelines, see Response 8-34. The CDCA Plan is a comprehensive, long-range plan that was adopted in 1980; it since has been amended many times. The CDCA is a 25-million-acre area that contains over 12 million acres of BLM-administered public lands within the area known as the California Desert. The Plan initially was prepared and continues to provide guidance concerning the use of the California Desert public land holdings while balancing other public needs and protecting resources. More specifically, it establishes goals and specific actions for the management, use, development, and protection of the resources and public lands within the CDCA. It is based on the concepts of multiple use, sustained yield, and maintenance of environmental quality. The Plan anticipated that renewable power generation facilities would be proposed in the California Desert. Accordingly, it made allowances for the review of such applications, including a provision that all proposed applications "associated with power generation or transmission not identified in the

[CDCA] Plan will be considered through the Plan Amendment process." The intention of this provision was to ensure that the BLM would take a planning view of all of the renewable energy applications proposed and that such projects would require an amendment to the CDCA Plan to maintain consistency throughout the plan. Amendments to the CDCA Plan can be site-specific or global, depending on the nature of the amendment. Thus, the Plan Amendment process is not a "loophole," but an intentional aspect of the Plan designed to allow for both flexibility and consistency in the use and protection of public lands and resources.

8-39 Congress specifically recognized multiple use and sustained yield management for the CDCA, through the CDCA Plan, providing for present and future use and enjoyment of the public lands. The CDCA Plan identifies allowable uses of the public lands in the CDCA. In particular, it authorizes the location of solar power generating facilities in MUC L and other land classifications upon NEPA review. See also Responses 8-34 and 8-38.

The mitigation provided throughout the PA/EIS ensures that that public lands under consideration will be occupied only with authorized facilities and only to the extent necessary to construct, operate, maintain, and terminate the Project. Compliance with mitigation measures, the Biological Opinion, and NHPA Section 106 requirements will ensure that the Project will not unnecessarily and unduly degrade these public lands.

8-40 As discussed on page 3.14-1 of the Draft PA/EIS, the site is designated for Multiple-use Class L, or Limited Use. These lands are suitable for a variety of recreation activities, including backpacking and primitive unimproved site camping. Other nearby areas that provide camping opportunities include the Midland and Mule Mountains LTVAs, and the Wiley's Well and Coon Hollow Campgrounds. The Midland LTVA is approximately 4.6 miles from the ROW boundary and the Wiley's Well Campground is approximately 14.3 miles from the boundary. Both Wiley's Well and Coon Hollow Campgrounds, as well as the Mule Mountains LTVA are located south of I-10. The Project would not affect access to these camping areas. Although the Midland LTVA is less than 5 miles from the Project site, access to the Midland LTVA would not be affected by any proposed road closures. Only two routes that traverse the Project site would be closed during operation of the Project: OHV routes No. 661085 and No. 660835. Neither of these routes provides direct access to the Midland LTVA; therefore, public access to the LTVA would not be affected. In addition, Mitigation Measure REC-5 would reduce the public access impact caused by the closure of these two routes by requiring the Applicant to reestablish north/south connectivity to the northeast side of the Palen-McCoy Wilderness Area and the west side of Big Maria Wilderness Area.

During construction and decommissioning these two routes, as well as several other OHV routes listed on page 4.14-1, would be temporarily closed or access would be restricted. Mitigation Measures REC-1, REC-2, and REC-3 on page 4.14-9 list multiple methods to reduce the effects of road closures during construction. These include distribution of

interpretive materials and fact sheets describing the road closures, coordination with the BLM AO regarding construction traffic in and near recreation areas, and coordination regarding OHV road closures. According to the BLM, use of OHV routes on or in the vicinity of the Project site is very low, not exceeding 200 to 300 visits per year. Therefore, temporary or permanent access restrictions would not be anticipated to adversely affect wildlife or result in increased pollution or traffic congestion.

8-41 OHV access on Class L lands, such as the Project site, are restricted to authorized routes of travel. Although approximately 2 miles of OHV route No. 661085 and 1.3 miles of route No. 660835 would be closed during operation of the Project, there are multiple alternative routes that provide access to other OHV routes and recreation areas in the vicinity of the Project site. Mitigation Measure REC-3 requires that the closure of OHV routes would be publically posted, with penalties identified for any off-route OHV activities. The closure of these two routes is not anticipated to induce substantial numbers of OHV users to abandon designated OHV routes for illegal cross-country use that would result in adverse effects on plants and wildlife.

8-42 The California Public Utilities Commission (CPUC) sets utilities rates for all investor-owned utilities every 3 years through general rate case proceedings. Consequently, neither the Applicant nor BLM have authority over any utility rate changes that may occur as a result of the Project. The Applicant has a PPA with SCE for the electricity generated by the Project, but the rate at which the electricity is sold to SCE does not determine the rate at which electricity is sold to consumers; therefore, the Project's effect on utility rates is beyond the scope of analysis for the PA/EIS.

8-43 Although there are National Wilderness Areas in the Project vicinity, the Project site is not located within any designated wilderness area, and therefore is not subject to the Wilderness Act of 1964. As described on page 4.16-1, the Project would have no effect on the wilderness areas in the Project vicinity. As described on page 3.16-2 and shown in Figure 3.16-1, a portion of the northwest quadrant of Unit 2 of the Project has recently been inventoried by the BLM and determined to have wilderness characteristics. However, it has not been designated by Congress as a wilderness area, and is therefore not subject to the Wilderness Act. As described on page 4.16-1, construction, operation, maintenance, and decommissioning of the Project would prevent 1,089 acres of lands with wilderness characteristics from future consideration as wilderness by Congress. However, because these lands are not subject to the Wilderness Act, approval of the Project would not require an Act of Congress, as suggested by the comment. Mitigation Measure LWC-1 has been proposed to mitigate impacts to lands with wilderness characteristics off-site.

8-44 Regarding the status of the Project site as not within a wilderness area, see Response 8-43. Because the Project site is not subject to the Wilderness Act, the Act does not prohibit any uses on the site. The potential impacts of the Project on vegetation, wildlife, dust generation, weed introduction, wildlife migration, traffic, and lighting/visual resources

are addressed throughout the PA/EIR, specifically in Sections 4.2, 4.3, 4.4, 4.17, and 4.19; however, these impacts would not affect wilderness areas in the Project vicinity.

8-45 The comment suggests that compliance with local and regional plans and programs, including the Regional Transportation Plan (Southern California Association of Governments), Riverside County Congestion Management Program, and Riverside County General Plan, is required. However, these plans pertain to the portion of the Project site under Riverside County jurisdiction and to other non-federal land in the vicinity of the site, and do not control federal actions on federal land. Accordingly, analyzing consistency of the Proposed Action and alternatives with these plans is beyond the scope of analysis for the BLM.

8-46 The main access road to the Project site would include approximately 2 miles of existing, unimproved road installed by the Blythe Solar Power Project. The Applicant would improve this access road and extend it approximately 5.5 miles from its current terminus to the MSEP power plant site. An additional approximately 2.6 miles of the main access road would be located within the solar plant site boundary. The Project would also include approximately 2.25 miles of gen-tie maintenance road and 1.0 mile of distribution line maintenance road. Other roads constructed for the Project include limited length gen-tie and distribution line spur roads. The main access road within the solar plant site and the perimeter/fence maintenance road would be located within the fenced-in solar plant site boundary; therefore, these roads would not be accessible by the public. The portion of the main access road constructed outside the solar plant boundary would be located just east of the Blythe Solar Power Project site boundary, which would also be fenced, thereby preventing illegal OHV cross-country access to areas west of the main access road. Areas east of the road (and north of the Blythe Airport) are currently accessible by several existing OHV open routes in the vicinity, including Nos. 660839, 661186, 662002, and 660835. Therefore, construction of the new access road proposed by the Project is not anticipated to provide substantial new access to areas of the open desert that are not currently accessible by other routes. Finally, Mitigation Measure REC-3 would also include notification of penalties for any off-route OHV activities.

8-47 Solid waste generation, water consumption, and air pollutant emissions associated with the life cycle of PV panels are not included in the analysis. It is acknowledged that there would be additional indirect solid waste generation, water consumption, and air pollutant emissions associated with these materials; however, as described on page 2-6, solar energy technologies are continuing to advance at a rapid rate, and the Applicant is continuing to evaluate the evolving benefits of various options. Thus, the assumptions that would be required to develop the analysis of life-cycle impacts would be speculative and would not likely provide an accurate representation of such waste. In addition, if thin film CdTe panels are used, the Applicant would ensure that the vendor offers a PV module recycling program through which any module may be returned for recycling (p. 2-8), and most of the components of the solar array would be reused or recycled at the end of the ROW grant period (p. 2-56 and 2-57).

8-48 See Response 8-47. As noted on pages 2-56 and 2-57, the Applicant anticipates that the used PV panels would be sold to secondary users when the Project authorizations expire. Panels and equipment not sold for reuse would be recycled.

8-49 The visual resource analysis in the Draft PA/EIS adequately identifies the potential nighttime lighting impacts of the MSEP (pp. 4.19-10 through 4.19-12), and provides a mitigation measure to reduce both construction-related and operational lighting impacts (item 10 of Mitigation Measure VIS-1).

8-50 The Project's water consumption is described in Chapter 2, pages 2-19 through 2-21, and throughout Section 4.20. As described in Chapter 2, the Project proposes to use solar photovoltaic technology, not concentrating solar power technology. Therefore, the report on methods to reduce the water consumption of concentrating solar power systems mentioned by the commenter (DOE, 2009) is not applicable to the Project.

8-51 Other commenters have expressed concern regarding potential connectivity between groundwater underlying the Project site and the Colorado River. For additional discussion regarding the lack of demonstrated connectivity of the proposed groundwater supply to the Colorado River, see PA/FEIS Section 5.5.4.3, Common Response 3.

As discussed in Section 4.20, water supply for the Project is groundwater; however, the source of that groundwater is not the Colorado River. The Project would not remove water from the Colorado River, or otherwise affect Colorado River flows. The proposed withdrawal of groundwater would minimally affect aquifer levels, as noted on pages 4.20-1 to 4.20-4, which is not considered an adverse impact of the Project.

8-52 Regarding the low risk of fire associated with a solar PV facility, see Response 8-33. As stated on page 3.21-3, the Project site is wholly within a moderate FHSZ as mapped by CAL FIRE. Despite the comment's suggestion that "the fire hazard risk in Riverside County is severe," as shown in CAL FIRE's Fire Hazard Severity Zone Map, nearly all of Eastern Riverside County is within a moderate FHSZ, and no high or very high FHSZs exist near the Project site (CAL FIRE, 2007). However, as acknowledged on page 4.21-3, although the probability of a wildfire to occur as a result of Project operation would be low, a wildfire that escapes control and spreads beyond the Project could result in a high level of damage to biological resources and other natural resources, such as air quality and water quality, in addition to the potential for loss of life and destruction of property. To minimize the potential for this impact to occur, the provisions of Mitigation Measure FIRE-1 would be implemented during all Project phases.

The comment cites Exhibits WF-1 through WF-3, which were neither provided with the letter nor described in the Index of Exhibits beginning on page 18 of Letter 8, so the BLM cannot provide more specific responses at this time.

8-53 The PA/EIS identifies cumulative projects and provides quantified and detailed information about them. See Table 4.1-1 (Cumulative Scenario). Specifically, the

cumulative analysis considers the acreage and total generating capacity of all renewable energy (solar and wind) projects existing or under consideration by the California Desert District (Table 4.1-2), which is the BLM District overseeing the CDCA. Also part of the cumulative scenario, existing projects along the I-10 corridor in eastern Riverside County are identified in Table 4.1-3 and future foreseeable projects in this area, including renewable energy projects on state and private lands, are identified in Table 4.1-4.

On an issue-by-issue basis, Chapter 4 identifies the geographic and temporal scope of the cumulative impacts analysis area, provides a basis for the boundaries of each, identifies existing conditions within each cumulative impacts assessment area, identifies the direct and indirect effects of the Project and alternatives, and identifies past, present and reasonably foreseeable future actions making up the cumulative scenario. See, for example, Section 4.3.9 (discussion of cumulative impacts on vegetation resources), Table 4.3-5 (Summary of cumulative impacts on native vegetation communities). The PA/EIS analyzes cumulative impacts of past, present and reasonably foreseeable future actions, including utility-scale renewable and other development projects, on each of the resource areas in Chapter 4, including mitigation measures to avoid or minimize cumulative impacts.

The CDCA Plan is the comprehensive, long-range plan for the management, use, development, and protection of the CDCA envisioned by Congress. The CDCA Plan amendment process, as described in PA/EIS Section 1.5.1 and in Response 8-38. maintains the CDCA Plan as vital, comprehensive, and up-to-date.

8-54 The area of cumulative effects varies by resource. As described in Response 8-26, the Project's contribution to potential cumulative impacts consists of impacts on the archaeological sites identified in Section 4.5, and no sacred sites or places of traditional cultural or religious importance to Indian tribes were identified within the area that would be affected by the Project. Consequently, the geographic scope used for the cumulative impacts analysis in Section 4.5 is appropriate for the cumulative impacts to which the Project's incremental effects could contribute.

8-55 The BLM NEPA Handbook does not, as the comment suggests, require a programmatic EIS to be prepared for the level of review being performed for this and other renewable energy projects proposed on BLM-administered lands. As stated in the handbook, "Actions are connected if they automatically trigger other actions that may require an EIS; cannot or will not proceed unless other actions are taken previously or simultaneously; or if the actions are interdependent parts of a larger action and depend upon the larger action for their justification" (BLM, 2008, p. 45). The Project does not automatically trigger, nor is it automatically triggered by, other renewable energy projects proposed on BLM-administered lands; it can and may proceed if approved by the BLM independent of other projects; and, it is not an interdependent part of a larger action that depends on the larger action for justification. Other existing, proposed, and reasonably foreseeable future renewable energy projects within the appropriate

geographic scope for the cumulative analysis for each resource are analyzed throughout Chapter 4. Additionally, see Response 8-56 regarding the Solar Programmatic EIS (PEIS) that has been prepared to assess program-level renewable energy actions in California and other western states.

8-56 As described in Response 8-9, the MSEP ROW application is pending, and so not subject to the PEIS ROD or the plan amendments made in that decision.

However, although this PA/EIS was prepared prior to finalization of the Solar PEIS, the cumulative effects of the Project in combination with other renewable energy and other projects in the immediate vicinity and in the CDCA are discussed throughout Chapter 4.

8-57 The comment suggests that the consideration of mitigation measures in the PA/EIS is inadequate; however, it provides no specific examples as a basis for the allegation. Accordingly, the BLM is unable to provide a more detailed response. Note that throughout Chapter 4, the effectiveness of mitigation measures is described for each potential Project impact, and summarized in the subsections entitled "Residual Impacts after Mitigation Incorporated" (e.g., Sections 4.2.11, 4.4.11,and 4.5.11).

8-58 The comment refers to a disruption in transmission "recently demonstrated in San Diego." The BLM assumes that this refers to the outages that occurred in primarily in San Diego in September, 2011, when approximately 2.7 million customers went without electricity for up to 12 hours. A FERC/NERC report on this incident (2012) explains that this incident was caused by a disruption in a major high-voltage (500 kV) transmission line, combined with a generation level 29 percent below average peak generation, that resulted in voltage deviations and equipment overloads.

A potential disruption of the Project gen-tie line would not result in a similar disruption in the electrical grid because the grid would not rely on this line for transmission of electricity to load centers or distribution to customers. If a disruption in transmission of Project-generated electricity to the Colorado River Substation occurred, the California Independent System Operator (CAISO) would be responsible for balancing energy flows in the grid. The CAISO typically has an available reserve generation capacity equal to about 7 percent of the current demand (Lawrence Berkeley National Lab, 2012), and the Project's peak generation capacity of 750 MW is well below the reserve capacity. Therefore, it is not anticipated that a disruption of the Project's transmission of electricity to the grid could result in transmission or distribution outages.

8-59 The Project's gen-tie would deliver electricity from each Unit to the Colorado River Substation and, as described in Response 8-58, would not pose a significant risk to the electrical grid in the event of an outage. The PA/EIS does address intentionally destructive acts, including the possibility of an act of terrorism, in Section 4.9. As described on page 4.9-8, the BLM has determined that the MSEP would fall into the "low vulnerability" category based on U.S. Department of Justice Chemical Vulnerability Assessment Methodology, NERC guidelines, and U.S. Department of Homeland Security

regulations. The Applicant's security measures would minimize the potential for power disruptions or hazardous materials release caused by outside parties.

8-60 See PA/FEIS Section 5.5.4.1, Common Response 1.

8-61 See Responses 8-58 and 8-59.

8-62 See PA/FEIS Section 5.2.2, which describes the NHPA Section 106 process and the reasonable, good faith efforts undertaken by the BLM in exercising its responsibilities in implementing it for this Project. As explained therein, individuals from 15 federally recognized tribes formally were notified and invited to participate in the Section 106 and tribal consultation processes. Public involvement also is a key factor in a successful Section 106 consultation; accordingly, the views of CARE, La Cuna, and other members of the public were solicited in the NOI published for this Project in the Federal Register (77 Fed. Reg. 31386-01) and oral and written comments were considered during the scoping process (see, e.g., the Scoping Report included as Appendix B to this PA/EIS), and considered throughout the process.

8-63 As indicated in Sections 1.2.1, 1.4.1, and elsewhere, the BLM processes applications for commercial solar energy facilities as right-of-way authorizations under Title V of FLPMA. FLPMA establishes public land policy; guidelines for administration; and provides for the management, protection, development, and enhancement of public lands. In particular, the FLPMA's relevance to the Project is that Title V, §501, establishes BLM's authority to grant rights-of-way for generation, transmission, and distribution of electrical energy. FLPMA mandates that BLM manage the public lands for multiple uses. Multiple use means the "management of the public lands and their various resource values so that they are utilized in the combination that will best meet the present and future needs of the American people. …" As identified in FLPMA, this includes "providing for the long-term needs for future generations for renewable and nonrenewable resources." The BLM is processing the Applicant's application within the FLPMA framework.

8-64 Regarding conformance with the CDCA Plan, see Responses 8-34 and 8-38.

8-65 The alternatives development and screening process employed in the PA/EIS is described in PA/FEIS Section 2.2, Sections 2.3 through 2.8 describe the alternatives that were analyzed in detail, and Section 2.9 describes those that were considered but not carried forward for more detailed evaluation. Potential impacts of the proposed action and alternatives are analyzed in PA/FEIS Section 4.5. As indicated in that section, Alternative 2 (Reduced Acreage Alternative) would affect a total of 86 fewer archaeological sites when compared to the Proposed Action, including eight fewer NRHP-eligible archaeological sites (PA/FEIS Section 4.5.4). Among the potential gen-tie and access road combinations, the Central Route would affect a total of 20 fewer archaeological sites when compared to the Proposed Action, and the Western Route would affect a total of 24 fewer archaeological sites when compared to the Proposed Action (PA/FEIS

Section 4.5.5). By comparison, Alternative 4 (No Action Alternative) would not result in any of the impacts to cultural resources that were described for the Proposed Action (PA/FEIS Section 4.5.6).

8-66 See Response 8-34.

8-67 The PA/EIS acknowledges that the Project will result in the irreversible and irretrievable commitments of natural and cultural resources in Section 4.23.

Letter 9 – Responses to Comments from NextEra Energy Resources, LLC

9-1 The referenced sentence on page 2-18 has been changed to read: "If required, well permits would be obtained from the Riverside County Department of Public Health, Environmental Health Services, Safe Drinking Water Permit Section."

9-2 Comment noted. The size of the study area on page 3.3-1 was revised to 13,897 acres.

9-3 See Response 9-2.

9-4 Comment noted. The comment that the Desert Dry Wash Woodland plant community is not synonymous with Blue Palo Verde-Ironwood Woodland Alliance is noted. In response to the comment, the second paragraph on page 3.3-5 is revised as follows:

> This community is dominated by an open tree layer of blue palo verde and ironwood. Common understory species include~~, and~~ smoke tree, ~~with an understory of~~ big galleta grass, desert starvine (*Brandegea bigelovii*), creosote bush, desert lavender (*Hyptis emoryi*), catclaw acacia (*Senegalia gregii*), among other species (TetraTech EC Inc, 2011)~~scrub and Russian thistle (*Salsola* sp.) (Solar Millennium, 2009a and AECOM, 2010a as cited in CEC, 2010b)~~.

9-5 Comment noted. In response to data provided in the comment, the last paragraph on page 3.3-8 is revised as follows:

> Mediterranean tamarisk or salt cedar (*Tamarix ramosissima*) is a riparian plant and is therefore restricted to habitats where there is perennial saturation such as springs and seeps, or runoff from poorly maintained water pipelines or well pumps. Botanical surveys detected twenty Mediterranean tamarisk in an engineered swale north of and paralleling I-10, and two plants were found in the southwestern corner of the Solar Plant Site. It was observed ~~interspersed throughout desert dry wash woodland within the study area~~.

9-6 Comment noted. The second sentence of the second paragraph on page 3.3-10 is as follows to reflect the presence of E. harwoodii on the solar plant site. The presence of this species on-site is otherwise correctly reflected in the PA/EIS.

~~Six~~Seven special-status plants were observed within the study area during spring 2011 floristic surveys, and include: desert unicorn plant, Harwood's milk-vetch, Harwood's eriastrum, Las Animas colubrina, ribbed cryptantha, Utah milkvine, and Abram's spurge (Tetra Tech EC and Karl, 2011a; 2011b).

9-7 Comment noted. Based on the findings of completed botanical surveys on the solar plant site and Project linears, the "Presence to Occur or Presence on Site" column of Table 3.3-3 on page 3.3-17 is revised for Arizona spurge as follows:

> Arizona spurge has a low potential to occur within the study area due to the presence of suitable habitat and appropriate elevation range of the Project site. Surveys are pending for this species on the Alternative 3 routes.

9-8 Based on the comment that California ditaxis was observed outside the Project area, the "Presence to Occur or Presence on Site" column of Table 3.3-3 on page 3.3-18 is revised for California ditaxis as follows:

> This species was not observed in the Project area during spring 2011; though it was detected off-site. There is a possibility that populations may occur due to the presence of suitable habitat ~~is present~~ in the study area.

9-9 Comment noted. To clarify the Wildlife Resources study area and maintain consistency with Table 2-1, the second and third sentences of the first paragraph on page 3.4-1 is revised as follows:

> The Wildlife Resources study area describes the area characterized and surveyed for biological resources and included the 4,496-acre Project site with general and focused wildlife surveys performed at 100 percent ground coverage, an additional 500-foot buffer for burrowing owls that was surveyed at 100 percent ground coverage, and two walking transects at 1,310 feet (400 meters) and 1,970 feet (600 meters) for desert tortoise. The 13,897-acre ~~total~~ study area ~~thus~~ included up to approximately 7,700 acres of public land administered by the BLM and approximately 477 acres of private land under the land use jurisdiction of the County.

9-10 Comment noted. It is clear from the PA/EIS text that the 314-square mile golden eagle survey area referred to in the text is specific to golden eagles. This represents the only use of the term "survey area" in Section 3.4, thus, there is little room for ambiguity. The PA/EIS intentionally uses the term "study area" in Section 3.4 to refer to areas that received ground-based surveys of on-site resources.

9-11 In response to the comment that chuckwalla is no longer considered a Species of Special Concern by the California Department of Fish and Game (CDFG), this species has been removed from the wildlife resources analysis in Sections 3.4 and 4.4, including in Table 3.4-1 and the second and third paragraphs on page 3.4-10 has been removed.

The following responses correspond to the portion of Comment 9-11 that related to the protection status of birds in Table 3.4-1 on page 3.4-3:

1. The status of LeConte's thrasher is updated as follows:

Le Conte's thrasher	***Toxostoma lecontei***	**~~WL~~ /BCC/ ~~BLM Sensitive~~**

2. The most recent CDFG Special Animals List (January 2011) identifies California horned lark as a Watch List (WL) species; thus, the status of this species is correctly presented in Table 3.4-1.

3. The status of ferruginous hawk is updated as follows:

Ferruginous hawk	*Buteo regalis*	WL/BCC/BLM Sensitive

4. On May 11, 2011 the USFWS formally withdrew their proposed rule to list the mountain plover as threatened. The status of this bird is correctly presented in Table 3.4-1.

5. Black-tailed gnatcatcher occurrences are mapped by the CNDDB; however, this species presently has no formal federal or state protective status, as correctly identified in Table 3.4-1. Due to CDFG interest in tracking blacktailed gnatcatcher populations, the description of this species is retained in the PA/EIS.

6. The following bird status changes are made to Table 3.4-1 on page 3.4-3:

Golden eagle	***Aquila chrysaetos***	**CFP/BCC/BLM Sensitive**
Gilded flicker	*Colaptes chrysoides*	SE/BCC/__
Yellow warbler	*Dendroica petechia sonorana*	CSC/BCC/__
Prairie falcon	*Falco mexicanus*	WL/BCC/__
American peregrine falcon	*Falco peregrinus anatum*	CFP/BCC/__
Gila woodpecker	*Melanerpes uropygialis*	SE/BCC/__
Brewer's sparrow	***Spizella breweri***	**__/BCC/__**
Bendire's thrasher	*Toxostoma bendirei*	CSC/BCC/BLM Sensitive

9-12 See Response 9-11.

9-13 The August 2011 Biological Resources Technical Report (BRTR) (TetraTech EC and Karl, 2011a; p. 20) specifically identifies that three desert tortoise transects were performed outside the Project boundary at distances of 500 feet, 1,310 feet and 1,970 feet. The comment that four additional burrowing owl transects performed at 100 foot intervals from the Project site additionally characterized desert tortoise sign is noted for the project record; however, this statement was not reflected in the desert tortoise survey methods presented in the BRTR.

9-14 In response to the comment, the third sentence of the second paragraph on page 3.4-7 is revised as follows:

> Spring 2011 surveys of the Project site included 2~~1~~ adult desert tortoise (one of the solar plant site and on the linear corridor), 30 tortoise carcasses, 7 scat, 24~~2~~ known or potential burrows, and 22~~1~~0 tortoise shell fragments or fragment groups ~~remains~~ (Table 3.4-2) (Tetra Tech EC and Karl, 2011a).

9-15 The BRTR (TetraTech EC and Karl, 2011a; p. F-1) states that common chuckwalla were observed in spring 2011 during surveys of the Project site and translocation area; however, the location was not disclosed in the BRTR. The comment that potential habitat occurs west of the solar plant site and gen-tie route clarifies where potential habitat is present but does not clarify the quality of potential habitat on the Project site and does not disclose the location where chuckwalla were observed in 2011. The comment does not provide sufficient detail to maintain that chuckwalla habitat is absent from the Project site, and is noted.

9-16 In response to the comment, the following is added after the first sentence of the first full paragraph on page 3.4-11:

> Additional surveys were performed following fall 2011 rains; however, precipitation was not sufficient to initiate spadefoot breeding.

9-17 In response to the comment, the first sentence of the second full paragraph on page 3.4-11 is revised as follows:

> Potential breeding habitat was detected at seven ~~nine~~ swales ~~pools and ponds~~ on the gen-tie line and access road route and one location in the southwest portion of the solar plant site.

9-18 In response to the comment, the first and second sentences of the third paragraph on page 3.4-12 are revised as follows:

> Focused surveys identified 10 recently active owl burrows and one ~~two~~ burrowing owl pair~~s~~ on the solar plant site, mostly from the eastern portion of the site. Two ~~An~~ owl pairs and one active burrow were also noted on the gen-tie line and access road route north of I-10.

9-19 In response to the comment, the following paragraph is added following the first full paragraph on page 3.4-14:

> In addition to helicopter survey results, two golden eagles were incidentally observed flying overhead south of the solar plant site during wildlife surveys in spring 2011. No eagles were observed during focused avian point counts in 2011 (TetraTech EC, Inc. and Karl, 2011a).

9-20 In response to the comment, the first sentence of the third full paragraph on page 3.4-15 is revised as follows to reflect that black-tailed gnatcatchers were identified on both the solar plant site and gen-tie line:

> Black-tailed gnatcatchers were observed on 11 instances during point count surveys on the solar plant site and gen-tie line, occurring predominantly in association with vegetated areas dominated by creosote bush scrub/desert dry wash woodland.

9-21 The Draft PA/EIS has been revised to remove Mitigation Measure AQ-1 because: 1) the established mass emission indicator and threshold for the identification of adverse emissions of NO_x, as defined in Draft PA/EIS Section 4.2.1.4, would not be exceeded; and 2) the majority of the PM10 that would be generated during construction would be in the form of fugitive dust, and the reductions in PM10 exhaust that would be achieved under Mitigation Measure AQ-1 would be negligible (i.e., less than one percent of total PM10 emissions).Therefore, the measure is unwarranted.

9-22 In response to the comment, the sand dune impact figures from the Biological Assessment have are incorporated into the third sentence of the last paragraph of page 4.3-5, as follows:

> The 240-foot wide study corridor includes 38.0 acres of dune habitat. Half of this area (19 acres) are subject to ~~; however,~~ permanent impacts ~~would be limited to a fraction of this area (e.g., perhaps 10 percent, or about 4 acres)~~ and the remaining area (19 acres) are subject to temporary impacts.

9-23 In response to the comment and other input from the Applicant, impacts to ephemeral drainages have been clarified and the first sentence of the first full paragraph on page 4.3-6 is revised as follows:

> Direct impacts include permanent loss of hydrological, geomorphic, and biological functions and values in up to ~~186.0~~165.2 acres of ~~desert dry wash woodland,~~ vegetated ephemeral streams, and unvegetated ephemeral dry washes and 4.2 acres of desert dry wash woodland on the Project site, gen-tie line and distribution line (Figure 3.3-3; Table 4.3-4).

9-24 The statement presented in the PA/EIS is correct. As shown in Table 4.3-2 (p. 4.3-10), overall impacts to Harwood's milkvetch, Harwood's eriastrum, and ribbed cryptantha populations would be slightly less under Alternative 2 compared to Alternative 1.

9-25 In response to the comment, Table 4.3-1 has been clarified to reflect that unvegetated areas are within drainages and not desert pavement.

Additionally in response to the comment that there must be ephemeral drainages with no trees in the Alternative 3 routes, habitat mapping for the alternative routes that was inadvertently omitted from PA/EIS is presented in the revised Figure 3.3-1.

9-26 Electronic data regarding the distribution of vegetation communities on the Blythe Solar Power Project was provided for the PA/EIS analysis by the BLM. Vegetation communities on the BSPP site are mapped in revised Figure 3.3-1.

9-27 Figure 3.3-3 inadvertently omitted plant distribution data that was presented in the Fall 2011 Plants and Supplemental Wildlife Survey Report (TetraTech EC, Inc. and Karl, 2011b). The figure has been revised to include this information, as shown in PA/FEIS Table 4.3-2.

9-28 The commenter notes that some rare plant species that were identified on the Blythe Solar Power Project (BSPP) site may not be represented in Figure 3.3-3. Specifically, the commenter notes the potential underrepresentation of Las Animas colubrina, Utah cynanchum, and desert unicorn plant in the figure. As noted in Response 9-27, Figure 3.3-3 in the PA/EIS has been updated to include some vegetation data that was inadvertently omitted. Relative to the Alternative 3 routes on the BSPP site, the commenter notes that botanical surveys were performed during a low rainfall year and may not represent the full distribution of this species on the site. Mitigation Measure VEG-10(B) on page 4.3-29 specifically addresses the potential need for additional fall botanical surveys on the Alternative 3 routes.

9-29 In response to the comment, sand dune impacts have been added to Table 4.3-3 on page 4.3-10, as follows:

Desert Dry Wash Woodland (Blue Palo Verde-Ironwood Woodland Alliance)	4.2	0.9[a]	~~3.4 (1.5)[b]~~1.2	10.3 ~~(9.0)[c]~~
Creosote Bush-Big Galleta Grass Association	0.0	0.0	0.0	0.4
Sand Dunes[b]	19 (19)	0.0	19 (19)	19 (19)

NOTES:

[a] The 0.9-acre impact area includes impacts for the solar plant (0.0 acre) and distribution line (0.9 acre); if selected, Alternative 2 could be supported by either the proposed Eastern Route or the alternative Central Route.

~~[b] The Central Route gen-tie line impact area totals 3.4 acres, of which 1.5 is in the area unique to the Central Route~~

~~[c] The Western Route gen-tie impact area totals 10.3 acres, of which 9.0 is in the area unique to the Western Route~~

~~[d] All creosote bush-big galleta grass vegetation occurs within areas unique to the Central and Western alternatives~~

[b] Impacts to sand dunes are equivalent for all gen-tie alternatives and include 19 acres of permanent impacts and 19 acres of temporary impacts.

SOURCE: Tetra Tech EC, Inc. and Karl, 2011a, 2011b; Tetra Tech EC, Inc. 2012a, 2012b

9-30 To clarify the assessment of non-listed cacti and trees on the Project site, the first sentence of the last paragraph on page 4.3-10 is revised as follows:

> Botanical surveys of the Project site ~~reported the occurrence of~~ quantified non-listed cacti and trees on the Project site, but their distribution was ~~did~~ not mapped ~~cacti distribution or quantify abundance on the Project site~~.

9-31 To clarify impacts to native desert trees on the Project site, the fifth sentence of the first paragraph on page 4.3-11 is revised as follows:

> Other native desert trees were described within vegetated ephemeral swales on the Project site, for which 2.8 acres of vegetated ephemeral channel (wash-dependent vegetation with sparsely scattered trees) ~~tree-dominated swale~~ habitat would be impacted on the solar plant site under Alternative 2 (Table 4.3-1).

9-32 The analysis has been revised to be consistent with changes made to Tables 4.3-1 and 4.3-3.

9-33 See Response 9-32.

9-34 Based on the comment, the direct and indirect impact of the Central Route on rare plants (p. 4.3-12) is revised as follows:

> Direct impacts to special-status plants would be incrementally ~~smaller~~ greater under the Central Route compared to the comparable portion of Alternative 1, with slightly ~~reduced~~ greater impacts to Harwood's milk-vetch (seven plants for the Central Route and.three for Alternative 1) and Utah milkvine (about 50 plants for the Central Route and none for Alternative 1) (Table 4.3-2). The Central Route would not impact desert unicorn plant for which one plant occurs on the comparable portion of Alternative 1. Direct impacts to other special-status plants would be largely the same as Alternative 1, and reduced following the implementation of Mitigation Measures VEG-7, VEG-8, VEG-10, and VEG-11.

9-35 Based on the comment, the direct and indirect impact of the Western Route on rare plants (p. 4.3-13) is revised as follows:

> ~~Similar to the Central Route, d~~ Direct impacts to special-status plants would be ~~incrementally smaller under the Western Route compared to the~~ comparable ~~portion of~~ between the Western Route and Alternative 1. The Western Route ~~with slightly~~ would have ~~reduced~~ fewer impacts to Harwood's milk-vetch (no plants for the Western Route and three for Alternative 1) and desert unicorn plant (no plants for the Western Route and one for Alternative 1), and greater impacts to ~~and~~ Utah milkvine (four plants for the Western Route and none for Alternative 1) and Las Animas colubrina (one plant for the Western Route and none for Alternative 1) (Table 4.3-2). Direct impacts to other special-status plants would be largely the same as Alternative 1.

9-36 Mitigation measures included in Section 4.3 include those that apply to the protection of both vegetation and wildlife resources. For ease of presentation, mitigation measures that pertain to protection of vegetation resources (such as minimizing the Project footprint) are presented in Section 4.3. The measures identified by the commenter (Measures 4, 8,

9, 10, 11, and 12) include both vegetation and wildlife protection provisions, which cannot easily be separated.

9-37 Measure VEG-8.8 provides avian monitoring to minimize construction impacts to nesting birds. Given that several drainages extend into the west side of the active construction area and potential breeding areas therefore occur near work areas, bird monitoring is required to confirm that nesting birds are not affected by construction activities.

9-38 In response to the comment addressing the handling of collected dead animals, the first sentence of Measure VEG-8.12 on page 4.3-24 is revised as follows:

> ***Dispose of Road-killed Animals.*** Road-killed animals or other carcasses detected on roads near the Project area shall be ~~picked up~~ immediately reported to the Designated Biologist and picked up within 24 hours~~and delivered to the Biological Monitor~~. The Designated Biologist shall be responsible for securing all required federal or State permits to handle and dispose of collected animals, including handling and disposal for scientific use.

9-39 Based on the comment that importation of materials onto the site may be necessary, Measure VEG-9 (1c) on page 4.3-26 is revised as follows:

> *Weed-free Products*: Any use of hay or straw bales on the Project site will be limited to certified weed-free material. Other products such as gravel, mulch, and soil may also carry weeds and these products, too, will be certified weed-free. If needed, mulch will be made from the local, on-site native vegetation cleared from the Project area. ~~Soil will not be imported onto the Project site from off-site sources.~~

9-40 Based on the comment that mechanical weed removal may be impractical in some areas, Measure VEG-9 (1e) on page 4.3-26 is revised as follows:

> *Mechanical Weed Removal*: The Applicant primarily will use mechanical weed removal techniques with the use of herbicides restricted to BLM-approved usage in areas that are not accessible through mechanical means or where mechanical weed removal is impractical.

9-41 In response to the comment, Item C of Mitigation Measure VEG-10 on page 4.3-31 has been revised to reflect conditions on the project, as follows:

> C) **Avoidance Requirements for Special-Status Plants**
>
> ~~This measure outlines the level of avoidance required for plants detected during the summer-fall surveys, based on the species' rarity and status codes.~~
>
> ~~The Applicant shall apply the following avoidance standards to late blooming special-status plants that might be detected during late summer/fall season surveys. Avoidance and/or the mitigation measures described in Mitigation Measure VEG-10.D below would reduce impacts to these special status plant species.~~
>
> The Applicant shall avoid impacts to special-status plant populations whenever possible, as described below.

1. ~~Mitigation for CNDDB Rank 1 Plants (Critically Imperiled) – Avoidance Required: If late blooming species with a CNDDB rank of 1 are detected within the Project Disturbance Area, the Applicant shall prepare and implement a Special-Status Plant Mitigation Plan (Plan). The goal of the Plan shall be to retain at least 75 percent of the local population of the affected species. The Plan shall include, at a minimum, the following components and definitions:~~

   a. ~~A description of the occurrences of the CNDDB rank 1 species on the Project, ecological characteristics such as micro-habitat requirements, ecosystem processes required for maintenance of the habitat, reproduction and dispersal mechanisms, pollinators, local distribution, a description of the extent of the population off-site, the percentage of the local population affected, and a description of how these occurrences would be impacted by the Project, including direct and indirect effects. The "local population" shall include the number of individuals occurring within the Palo Verde Watershed boundaries. Occurrences shall be considered impacted if they are within the Project footprint, and if they would be affected by Project-related hydrologic changes or changes to the local sand transport system.~~

   b. ~~A description of the avoidance and minimization measures that would achieve complete avoidance of occurrences on the Project linear corridors and construction laydown areas, unless such avoidance would create greater environmental impacts in other resource areas (e.g. Cultural Resource Sites) or other restrictions (e.g., Caltrans ROW or other restrictions for placement of transmission poles).~~

   c. ~~A description of the measures that would be implemented to avoid or minimize impacts to occurrences on the solar facility. Avoidance is generally considered not feasible if the species is located within the Permanent Project Disturbance Area (bounded by the permanent tortoise exclusion fence and the drainage channels).~~

   d. ~~If avoidance on the linear corridors, construction laydown areas, and solar facility combined protect less than 75 percent of the local population of the affected species, the Applicant shall implement off-site mitigation that demonstrates that the impacts will not cause a loss of viability for that species. Implementation of the compensatory off-site mitigation must meet the performance standards described in Mitigation Measure VEG-10.D, and may include land acquisition or implementation of a restoration/enhancement program for the species.~~

   e. ~~"Avoidance" shall include protection of the ecosystem processes essential for maintenance of the protected plant occurrence. For all but one of the late blooming plant species with potential to occur, the plant species are annuals that depend on a viable seed bank to maintain population health and persistence. The primary goal of avoidance for these annual species will be protection of the soil integrity and the seed bank that is closely associated with undisturbed soils. Any impacts to the soil structure or surface features will be considered an impact, but measures like temporary mowing or brush removal that does not disturb the soil will not be considered impacts to the population. Isolated 'islands' of protected plants disconnected by the Project from natural fluvial, aeolian (wind), or other processes essential for~~

~~maintenance of the species, shall not be considered to be protected and shall not be credited as contributing to the 75 percent avoidance requirement because such isolated populations are not sustainable.~~

1~~2~~. Mitigation for CNDDB Rank 1, 2, and 3 Plants ~~(Imperiled)~~ – Avoidance on Linear Corridors Required: If species with a CNDDB rank of 1, 2, or 3 are detected within the Project Disturbance Area, the Applicant shall prepare and implement a Special-Status Plant Mitigation Plan (Plan) that describes measures to ~~achieve complete~~ avoid~~anc~~e and minimize impacts to plant populations ~~of occurrences~~ on the Project linear corridors and construction laydown areas, unless such avoidance would create greater environmental impacts in other resource areas (e.g. Cultural Resource Sites) or other restrictions (e.g., FAA or other restrictions for placement of transmission poles). The Applicant shall provide compensatory mitigation~~, at a ratio of 2:1,~~ as described below in Mitigation Measure VEG-10.D for impacts to Rank1, 2, and 3 plants that cannot~~could not~~ be avoided. The content of the Plan and definitions shall be as described above in Mitigation Measure VEG-10.C (1).

~~3. Mitigation for CNDDB Rank 3 Plants – No On-Site Avoidance Required Unless Local or Regional Significance: If species with a CNDDB rank of 3 are detected within the Project Disturbance Area, no on-site avoidance or compensatory mitigation shall be required unless the occurrence has local or regional significance, in which case the plant occurrence shall be treated as a CNDDB rank 2 plant species. A plant occurrence would be considered to have local or regional significance if:~~

~~a. It occurs at the outermost periphery of its range in California;~~

~~b. It occurs in an atypical habitat, region, or elevation for the taxon that suggests that the occurrence may have genetic significance (e.g., that may increase its ability to survive future threats), or;~~

~~c. It exhibits any unusual morphology that is not clearly attributable to environmental factors that may indicate a potential new variety or sub-species.~~

~~4. Pre-Construction Notification for State- or Federally Listed Species, or BLM Sensitive Species. If a state- or federally listed species or BLM Sensitive species is detected, the Applicant immediately shall notify the CDFG, USFWS, and the BLM AO.~~

2~~5~~. Preservation of the Germplasm of Affected Special-Status Plants. For all significant impacts to special-status plants, regardless of whether compensatory mitigation is required, mitigation shall include seed collection from the affected special-status plants on-site prior to construction to conserve the germplasm and provide a seed source for restoration efforts. The seed shall be collected under the supervision or guidance of a reputable seed storage facility such as the Rancho Santa Ana Botanical Garden Seed Conservation Program, San Diego Natural History Museum, or the Missouri Botanical Garden. The costs associated with the long-term storage of the seed shall be the responsibility of the Applicant. Any efforts to propagate and reintroduce special-status plants from seeds in the wild shall be carried out under the direct supervision of specialists such as those listed above and as part of a Habitat Restoration/Enhancement Plan approved by the BLM AO.

9-42 The BLM has determined that the continued use of CNDDB State Rank is appropriate to the analysis and required mitigation for the McCoy Solar Energy Project. The August 29, 2011 Notice of Intent established the analytical baseline for the Proposed Action; however, if the CNDDB officially reduced the State rank of special-status plants prior to issuance of the Notice of Determination based on plant distribution data collected since the Notice of Intent was filed, BLM would be willing, but not required, to entertain a reduced mitigation requirement.

9-43 In response to the comment, the following sentence is added at the end of Mitigation Measure VEG-11, Provision 1 (Acquire Off-Site State Waters) on pages 4.3-40 to 4.3-41:

> If security is posted in accordance with Provision 2 below (Security for Implementation of Mitigation), the Applicant shall acquire, in fee or in easement, the land, no more than 18 months after the start of Project ground-disturbing activities.

9-44 Based on the comment, references to 213.3 acres of state jurisdictional waters for mitigation lands in Measure VEG-11 have been revised to 215.2 acres.

9-45 Based on the comment, a timeline for preparing a Channel Decommissioning and Reclamation Plan has been provided in VEG-12 on page 4.3-42 as follows:

> **VEG-12: Channel Decommissioning and Reclamation Plan.** At least 12 months prior to ~~Upon~~ Project closure, the Applicant shall prepare ~~implement~~ a draft ~~final~~ Decommissioning and Reclamation Plan to remove the engineered diversion channels from the Project site, and implement the final plan upon site closure.

9-46 Based on the comment, the first two sentences on page 4.3-43 have been deleted, as follows:

> ~~The disturbance area for each project Phase and resource type is provided in the tables below. This table shall be refined prior to the start of each construction phase with the disturbance area adjusted to reflect the final Project footprint for each phase.~~

9-47 In response to the comment and other information provided by the Applicant, impacts to state-jurisdictional ephemeral drainages have been revised and clarified on page 4.3-43, as follows:

> The Project would have major impacts to vegetation resources, eliminating all of the Sonoran creosote bush scrub and other native plant and wildlife communities within the disturbance area of Alternatives 2 and 3. The Project also would directly and indirectly affect an extensive network of desert washes comprising approximately 165.2 acres of vegetated ephemeral streams and unvegetated ephemeral dry washes and 4.2 acres of desert dry wash woodland, which are regulated

as ~~60.4 to 194.3 acres of~~ state-jurisdictional ephemeral drainages. Alternatives 1 and 3 would impact vegetation resources on the more biologically diverse west side of the Study Area, which would be avoided under Alternative 2. The APMs and proposed mitigation measures would avoid, minimize, or compensate for the loss and would offset many of the impacts in varying, but unquantified degrees, though net losses in waters of the state ~~wetland~~ and vegetation resources would occur.

9-48 In response to the comment, a minor text correction was made to the first sentence of the third paragraph on page 4.4-4, as follows:

> ***Construction Monitoring*:** No construction will occur in unfenced areas (see BIO-1[b], *Desert Tortoise Exclusion Fencing*) or on the linear facilities without BMs present.

9-49 In response to the comment, impact acreages for the solar plant site Units 1 and 2, string pulling, the distribution line, and the Alternative 3 Central Route presented in Table 4.4-1 have been revised to reflect the recent impact acreages presented in Table 1 of the *Supplemental Information to the Biological Assessment for the McCoy Solar Energy Project* prepared by TetraTech EC, Inc. (2012c), which reflects recent changes in the Project boundaries based on consultation with the USFWS. Permanent impacts in the revised Table 4.4-1 include 38 acres of impact to sand dune habitat that do not provide desert tortoise habitat. Therefore, the impacts presented in the revised Table 4.4-1 do not precisely mirror Table 1 in the Biological Assessment. Additionally, the impact acreages for the Alternative 3 Western Route have been revised to be consistent with disturbance acreages presented in Table 4.3-1, and are estimated for the entire gen-tie line alignment at the ROW width of approximately 100 feet in the absence of more specific information about where disturbance would occur within that ROW. Revisions to Table 4.4-1 are presented below.

	Project Alternative Disturbance Area (Acres) (Permanent/Temporary)			
Project Component	**Alternative 1**	**Alternative 2**	**Alternative 3 Central Route**	**Alternative 3 Western Route**
Solar Plant Site Unit 1 and Ancillary Facilities	2,259 ~~138.0~~ / 0.0	2,259 ~~138.0~~/ 0.0	--	--
Solar Plant Site Unit 2 and Ancillary Facilities	2,178 ~~057.0~~ / 0.0	--	--	--
Gen-Tie Line, Access Road, and 230 kV Switchyard	53.5 ~~103.8~~ / 50.3 ~~0.0~~	--	94.3 ~~190.5~~ / 0.0	148.7 ~~200.0~~ / 0.0
String Pulling Sites	0.0 / 34.5 ~~4.2~~	--	0.0 / 34.5 ~~4.2~~	0.0 / 34.5 ~~4.2~~
Distribution Line	5.5 ~~7.3~~ / 1.9 ~~0.0~~	5.5 ~~7.3~~ / 1.9 ~~0.0~~	--	--
Total Disturbance Acreage	**4,496 ~~306~~ / 86.7 ~~4.2~~**	**2,264.5 ~~38.0~~ / 1.9 ~~0.0~~**	**94.3 ~~190.5~~ / 34.5 ~~4.2~~**	**148.7 ~~200.0~~ / 34.5 ~~4.2~~**

9-50 Based on the comment, the following portions of the PA/EIS are revised to reflect information presented in the *McCoy Solar Energy Project Biological Resources Technical Report* (TetraTech EC Inc., and Karl, 2011a) that potential pallid bat (and not big free-tailed bat) habitat may occur on site:

1. The third sentence of the second paragraph on page 4.4-9 is revised as follows:

   Also, potential roosting habitat for pallid ~~big free-tailed~~ bat and California leaf-nosed bat is restricted to a single location on the solar plant site.

2. A portion of Table 4.4-2 on page 4.4-10 is updated to correctly indicate the potential presence of pallid bat:

Pallid ~~Big-free tailed~~ bat	P	P	P

9-51 In response to the comment, Table 4.4-2 on page 4.4-10 has been updated as follows:

~~Chuckwalla~~	~~C~~	~~C~~	~~C~~
Swainson's hawk	C (non-breeding)	C (non-breeding)	C (non-breeding)
Vaux's swift	C	C	C
Northern harrier	P (foraging only)	P (foraging only)	P (foraging only)
Yellow warbler	C (non-breeding)	C (non-breeding)	P (non-breeding
Prairie falcon	P (foraging only)	P (foraging only)	P (foraging only)
American peregrine falcon	P (foraging only)	P (foraging only)	P (foraging only)
Nelson's bighorn sheep	U ~~P~~	U	U

9-52 In response to the comment, the last paragraph on page 4.4-10 and continuing on 4.4-11 is revised as follows to reflect acreage changes identified in Response 9-49.

The permanent and temporary removal of habitat would have a direct effect on wildlife species through habitat loss (see below for separate discussions of impacts on special-status wildlife species and wildlife movement and breeding). Impacts include the permanent removal of 4,437 ~~4,195~~ acres of habitat on the solar plant site (Table 4.4-1). An additional 59 ~~111~~ acres of habitat would be permanently impacted and 87 acres temporarily impacted by construction of the gen-tie line, access road, 230 kV switchyard, and distribution line ~~and string pulling would result in temporary disturbance of 4.2 acres of habitat~~. In addition to disturbance-related impacts, the exclusion fence that would preclude most terrestrial wildlife species from using the solar plant site would encompass approximately 4,437 acres ~~(of which 4,195 are the disturbance-related impacts described above), resulting in an additional 597-acre loss of habitat on the solar plant site~~.

9-53 See Response 9-52.

9-54 In response to the comment, the first sentence of the fourth paragraph on page 4.4-12 is updated as follows:

The capture, handling, and relocation of desert tortoises from the Project site following the installation of perimeter wildlife exclusion fencing could ~~would~~ result in the harassment and mortality of juvenile and adult desert tortoises during relocation.

9-55 In response to the comment, the last sentence of the fifth paragraph on page 4.4-12 is updated as follows:

The addition of external site fencing also could present a movement barrier to off-site tortoises that would alter ~~decrease~~ their home range and could separate individuals from the regional tortoise population.

9-56 Because chuckwalla is no longer considered a California Species of Special Concern, the discussion of potential Project effects to this species are removed from Section 4.4.4, These changes are reflected in the following locations:

1. Page 4.4-13 (includes revisions to identified in Comment 9-56 related to Mojave fringe-toed lizard):

Mojave Fringe-toed ~~and Chuckwalla~~ Lizard~~s~~

The Mojave fringe-toed lizard has wide distribution in portions of the gen-tie line alignment located south of I-10, with 263 ~~188~~ lizards identified in the study area during surveys. This species does not occur on the solar plant site. Chuckwalla were also casually noted during wildlife surveys, though their distribution was not specifically mapped in the Project area (Tetra Tech EC, Inc. and Karl, 2011a; 2011b). Direct impacts to Mojave fringe-toed lizards during construction of the gen-tie line, distribution line, and associated access roads would occur due to the permanent loss of 19.0 ~~28.7~~ acres and temporary disturbance to an additional 19.0 acres of undifferentiated sand and sand sheet habitat that is occupied by Mojave fringe-toed lizards, and accidental mortality of lizards from vehicle strikes (see Table 4.3-3). Indirect Project impacts include increased predation on lizards by raptors, ravens, and other birds such as loggerhead shrike; the introduction and spread of exotic vegetation species; fragmentation and degradation of occupied dune habitat; and hazards associated with the spraying of herbicides and dust suppression chemicals within occupied habitat.

~~Direct and indirect construction impacts to chuckwalla would be similar to those described for the desert tortoise.~~

2. The first paragraph on page 4.4-16 is revised to read:

Similar impacts would be anticipated to Mojave fringe-toed lizard ~~and chuckwalla~~.

3. The first paragraph on page 4.4-21 is revised to remove mention of chuckwalla.

~~4.~~ The last sentence of the second paragraph on page 4.4-27 is removed:

> ~~Similar cumulative effects are anticipated to chuckwalla habitat in the Palo Verde Valley.~~

5. The final paragraph on page 4.4-47 is revised to remove mention of chuckwalla.

9-57 The second sentence of the last paragraph on page 4.4-13 has been updated to reflect changes to Section 4.3, as follows:

> Though not confirmed within the Project area, potential breeding habitat was detected at seven swales on ~~nine shallow pools within~~ the gen-tie line and access road route and at one location in the southwest portion of the solar plant site.

9-58 The third full paragraph on page 4.4-14 is updated based on the comment to distinguish potential burrowing owl impacts on the solar plant site from those on linear corridors, as follows:

> It is anticipated that all identified active burrows on the solar plant site would be removed during Project construction and those on the linear corridor would be avoided where feasible. The entire Project area is considered to provide suitable burrowing owl foraging habitat.

9-59 Based on the comment and other sources, the discussion of Nelson's bighorn sheep use of the Project site is revised on page 4.4-14 as follows:

> **Nelson's Bighorn Sheep and Burro Deer**
>
> The intermountain valley floor within the solar plant site ~~could~~ is unlikely to serve as a potential movement corridor for Nelson's bighorn sheep ~~attempting to move from one mountain range to another during seasonal migration or dispersal~~based on their documented absence from the McCoy Mountains. Presently, the McCoy Mountains are considered an unoccupied portion of the bighorn's range. Repopulation in the McCoy Mountains could happen naturally or could happen deliberately via translocation ~~and development of new water sources~~ of breeding individuals. The CDFG has successfully re-established bighorn in some ranges in the past. ~~The Project area has the potential to be used by bighorn sheep as seasonal foraging habitat and, if reestablished, bighorn sheep could use portions of the Project site as spring foraging habitat. The Project would result in the loss of 186 acres of spring foraging habitat (desert dry wash woodland, vegetated swales, and unvegetated washes), and have a minor impact on a regional connectivity corridor for the bighorn sheep because the corridor is maintained to the west, north, and east of the solar plant site.~~ Due to the absence of bighorn sheep from the Project area, the construction phase of the Project

would not adversely affect habitat for this species or cause effects to individual sheep or sheep populations.

9-60 Based on the suggestion, the discussion of burro deer habitat use in the Project area is revised on page 4.4-14 as follows:

> Direct and indirect construction impacts to burro deer ~~would be similar to those described for the Nelson's bighorn sheep~~ include the loss of foraging habitat in desert dry wash woodlands, vegetated swales, and Sonoran creosote bush scrub habitat, and potential barriers to local and regional deer movement. The Project would not present a barrier to regional movement because deer still could disperse around the site to the west, north, and east.

9-61 Based on changes made to Section 3.3 to reflect potential habitat for pallid bat on the solar plant site, the following revision is made to the fifth paragraph on page 4.4-15:

> One potential bat roost was identified in Unit 2 of the solar plant site. This roost exhibited a small amount of bat guano, but no current use by bats (Tetra Tech EC, Inc. and Karl, 2011a). This cavity may have been used as a roost by California leaf-nosed bat or pallid bat~~, western mastiff bat, or other bat species~~. All habitats within the solar plant site are suitable for bat foraging; though potential roost sites are limited to the single identified cavity. The Project would avoid this potential bat roost, as it is located in a wash that would be avoided ~~could result in direct loss of this bat roosting site during construction~~. Direct and indirect impacts to bat species are expected if construction activities were to disrupt nighttime foraging activities.

9-62 Based on the comment, the level of risk to bats from collisions with structures in the fourth paragraph on page 4.4-17, has been clarified as follows:

> There is a low risk ~~an unquantified~~ risk that special-status bat could collide with new monopoles, H-frame structures, or lines associated with the gen-tie line and distribution line.

9-63 Based on the comment, impact to Mojave fringe-toed lizard have been corrected in the fourth sentence of the first paragraph of page 4.4-24, as follows:

> Under Alternatives 1 and 3, approximately ~~46~~38 acres of habitat would be disturbed for the gen-tie line and associated access road. This represents approximately ~~4.2~~0.2 percent of available Mojave fringe-toed lizard habitat that was identified in the cumulative study area and represents a contribution of ~~7~~5.0 percent of the total cumulative effect on this resource.

9-64 See Response 9-56.

9-65 In response to this and other comments, the BLM has revisited the Project's potential to affect habitat for Nelson's bighorn sheep and has determined that the Project is not located with a Nelson's bighorn sheep WHMA and would not result in the loss of habitat for this species within a WHMA.

9-66 In response to the comment, a typo on page 4.4-27 is corrected as follows:

> PAR for Mojave Fringe-toed ~~Flat-tailed Horned~~ Lizard compensation

9-67 In response to the comment, the purpose of flagging the fencing routes has been clarified in the third sentence of the last paragraph on page 4.4-27, as follows:

> All fencing installation corridors shall be flagged to assist biologists in studying the fence route and surveyed within 24 hours prior to the initiation of fence construction.

9-68 In response to the comment, the desert tortoise survey and clearance discussion on 4.4-28 and 4.4-29 is updated, as follows:

1. ***Desert Tortoise Clearance Surveys within the Plant Site.*** Clearance surveys shall be conducted in accordance with the final USFWS-approved *Desert Tortoise Translocation Plan, McCoy Solar Energy Project* (Appendix F in the Biological Assessment; TetraTech EC Inc., 2012a) ~~*Desert Tortoise Field Manuel* (Chapter 6—Clearance Survey Protocol for the Desert Tortoise—Mojave Population)~~ and shall consist of two surveys covering 100 percent the Project area by walking transects no more than 15 feet apart. If a desert tortoise is located on the second survey, a third survey shall be conducted. Each separate survey shall be walked in a different direction or parallel but offset to allow opposing angles of observation. Clearance surveys for non-linear areas of Phase 1A may be conducted outside the active season. Clearance surveys of the remaining portions of the power plant site may only be conducted when tortoises are most active in the Project vicinity (~~April~~March through May or September through ~~October~~mid-November). Clearance surveys of linear features may be conducted during anytime of the year. Surveys outside of the active season in areas other than Phase 1A require approval by USFWS and CDFG. Any tortoise located during clearance surveys of the power plant site and linear features shall be relocated and monitored in accordance with the Desert Tortoise Relocation/Translocation Plan:

    a. *Burrow Searches*. During clearance surveys all desert tortoise burrows, and burrows constructed by other species that might be used by desert tortoises, shall be examined by the Designated Biologist, who may be assisted by the Biological Monitors, to assess occupancy of each burrow by desert tortoises and handled in accordance with the *Desert Tortoise Field Manual*. To prevent reentry by a tortoise or other wildlife, all burrows shall be collapsed once absence has been determined, but only on the last survey pass and if not occupied by other wildlife. Tortoises taken from burrows and from elsewhere on the power plant site shall be relocated or translocated as described in the Desert Tortoise Relocation/Translocation Plan.

b. *Burrow Excavation/Handling*. All potential desert tortoise burrows located during clearance surveys would be excavated by hand, tortoises removed, and collapsed or blocked to prevent occupation by desert tortoises. All desert tortoise handling and removal, and burrow excavations, including nests, would be conducted by the Designated Biologist, who may be assisted by a Biological Monitor in accordance with the *Desert Tortoise Field Manual*.

c. *Monitoring Following Clearing*. Following the desert tortoise clearance and removal from the power plant site and utility corridors, workers and heavy equipment shall be allowed to enter the Project site to perform clearing, grubbing, leveling, and trenching. A Designated Biologist shall directly monitor site clearing and shall be on-site during grading activities to find and move tortoises missed during the initial tortoise clearance survey. Should a tortoise be discovered, it shall be relocated or translocated as described in the Desert Tortoise Relocation/Translocation Plan.

9-69 In response to the comment, the second paragraph of Measure WIL-4 on page 4.4-31 has been updated as follows:

> The timing of the mitigation shall correspond with the timing of the site disturbance activities. However, if security is posted in accordance with 3.g. below (Mitigation Security), the Applicant shall acquire, in fee or in easement, the land, no more than 18 months after the start of Project ground-disturbing activities. If compensation lands are acquired in fee title or in easement, the requirements for acquisition, initial improvement and long-term management of compensation lands include all of the following:

9-70 Comment noted. The PA/EIS requires the siting of desert tortoise mitigation lands within the Colorado Desert Recovery Unit. The BLM considers that effects to desert tortoise habitat that occurs within one mile of the base of the McCoy Mountains may have affect habitat connectivity or linkages for this species.

9-71 In response to the comment, the introductory sentence of Measure WIL-7 on page 4.4-35 has been clarified as follows:

> **WIL-7: Pre-construction Nest Surveys.** Pre-construction nest surveys shall be conducted if construction activities would ~~occur~~ begin from February 1 through July 31.

9-72 In response to the comment, Measure WIL-8, Part 6 has been clarified to define the term "natal den", as follows:

> If an active natal den (a den with pups) is detected on the site, the BLM AO and CDFG shall be contacted within 24 hours to determine the appropriate course of action to minimize the potential for animal harm or mortality.

9-73 In response to updated impact data reflected in Comment 9-22, the Mojave fringe-toed lizard mitigation requirement in Measure WIL-10 on page 4.4-38 is updated as follows:

> To mitigate for permanent habitat loss and direct impacts to Mojave fringe-toed lizards the Applicant shall provide compensatory mitigation at a 3:1 ratio, which may include compensation lands purchased in fee or in easement in whole or in part, for impacts to stabilized or partially stabilized desert dune habitat (19 acres x 3 = 57.0 ~~86.1~~ acres); or the three times (3X) the acreage of sand dune/partially stabilized sand dune habitat permanently impacted by the final Project footprint, whichever is greater).

9-74 Following discussions with the BLM, the mitigation requirement to compensate for the loss of spring foraging habitat for Nelson's bighorn sheep has been eliminated from the EIS, with mitigation instead focusing on the acquisition and protection of off-site spring foraging habitat. This change was due, in part, to the current unoccupied status of the McCoy Mountain range by bighorns, and other potential wildlife impacts associated with the importing a new water source (e.g., potential attraction of ravens and other desert tortoise predators). The revised mitigation strategy will more greatly benefit bighorns with fewer unintentional effects on other wildlife species.

9-75 The incorporation of habitat survey methods and results (e.g., the location of known and potential breeding sites) is appropriate to include in the Couch's Spadefoot Toad Protection and Mitigation Plan.

The second paragraph of Measure WIL-14 on page 4.4-42 has been revised to reflect that habitat surveys are complete, as follows:

> The Protection and Mitigation Plan shall address methods to achieve this avoidance and minimization, and shall include avoidance, minimization, and mitigation measures that would be required if additional habitat or Couch's spadefoot toad are found during ~~habitat~~ focused wildlife surveys in fall 2012. Habitat surveys in the Project area have been completed.
>
> The absence of demonstrated species presence shall not be used to assume species absence from suitable habitat. Thus, mitigation shall be required as described in WIL-14 for all potential Couch's spadefoot habitat losses, unless appropriately-timed focused surveys can demonstrate species absence.

9-76 See Response 9-56.

9-77 The number of unevaluated sites within the APE has been corrected throughout the PA/EIS.

9-78 The text in paragraph 4 of Section 4.5.9 of the PA/EIS has been corrected in response to this comment.

9-79 The HPTP is a detailed planning document that would document the specific procedures to be undertaken in order to carry out the measures stipulated in the MOA. The HPTP would be appended to the MOA.

9-80 Avoidance to historic resources is the preferred means of mitigating or avoiding impacts to resources. Should previously unknown resources be encountered during Project construction, the resources should be avoided if feasible. The MOA and HPTP will provide specific procedures to be followed in the event of inadvertent discoveries.

9-81 The text in subsection "d" of Mitigation Measure CUL-1 has been corrected to change "Data Recovery" to "Additional Measures." Public interpretation may be an appropriate form of mitigation in some situations, and will not be deleted from the text.

9-82 Page 4.9-3 has been revised to indicate that the Applicant must submit FAA Form 7460-1 at least 45 days prior to the proposed start of construction and that a Determination of No Hazard to Air Navigation would be required prior to the start of construction.

9-83 The reference to RWQCB review and approval of the SWPPP has been removed.

9-84 The closure of portions of open route No. 661085 on adjacent areas to the north and south of the Project site on the enXco McCoy and BSPP sites, respectively, is discussed on pages 4.14-8 and 4.14-9 of the Draft PA/EIS. Mitigation Measure REC-5 requires reestablishment of north/south OHV connectivity to areas in the vicinity of the Palen-McCoy Wilderness Area and Big Maria Wilderness Area or instead would allow the Applicant to permit continuous public access along Black Rock Road while providing for separate site security to the solar facilities. The BSPP also requires reestablishment of this connectivity through that project's Mitigation Measure BLM-OHV-2. Therefore, while the link between the Project site and I-10 may be interrupted by the BSPP, connectivity ultimately would be reestablished through the aforementioned mitigation measures.

9-85 Mitigation Measure REC-2 is revised to eliminate the acknowledged redundancy.

9-86 Based on further consideration of the measure and in light of revisions to REC-5, which would address public access, REC-6 has been deleted

9-87 Mitigation Measure VIS-1 has been revised to remove reference to painting the backs of solar panels. The applicant gives compelling reasons for why such a measure would not appreciably reduce visual contrast in most viewing situations and for why the measure may not ultimately be feasible. The elimination of this particular item in Mitigation Measure VIS-1 would not substantially change the significance of the visual impact of the Project. As acknowledged in the Draft PA/EIS, implementation of Mitigation Measure VIS-1 would reduce the visual contrast of the MSEP slightly, but not to such a degree as to substantially change the degree of visual contrast from common viewpoints. Therefore, eliminating the requirement to paint the backs of the solar panels would not result in a substantial change in the visual impact of the MSEP.

9-88 It is acknowledged that New Source Review air quality permitting would not be applicable to the Project. Therefore, Section 5.1.5, *Mojave Desert Air Pollution Management District*, has been removed from PA/FEIS page 5-2.

9-89 Figure 3.3-1 has been updated to reflect the stated revisions.

9-90 Figure 3.3-1 has been updated to reflect the stated revision to dune habitat.

9-91 Figure 3.3-3 has been updated to reflect the stated revision.

9-92 Figure 3.3-3 has been updated to reflect the stated revision.

9-93 Figure 3.4-1 has been updated to show desert tortoise habitat quality on the Project site.

9-94 Abram's spurge data was inadvertently missing from Figure 3.3-3, and has been added.

Letter 10 – Responses to Comments from Soboba Band of Luiseño Indians

10-1 This introductory comment regarding the Soboba Band's traditional ties the Project area is noted.

10-2 The BLM and its environmental consultant have thoroughly reviewed the comments provided by the Soboba Band, and have responded to each comment as indicated herein. The BLM has invited the input and participation of the Soboba Band as indicated in PA/FEIS Section 5.2.2, and representatives from the Soboba Band attended a government-to-government consultation with BLM staff on May 8, 2012. Neither NHPA Section 106 nor Executive Orders nor regulations and policies of the DOI or BLM require more. In any event, in response to this comment, a subsequent Section 106 meeting between several tribes, including the Soboba Band, and the BLM was held on October 10, 2012, and a second government-to-government meeting with the Soboba Band will be scheduled in response to the request received on September 18, 2012.

10-3 This introductory comment regarding the Soboba Band's traditional ties the Project area is noted.

10-4 Comment noted.

10-5 The BLM has defined the APE for the McCoy Solar Energy Project based on consideration of both direct and indirect impacts. The APE was established based on the consultation and identification procedures required in BLM's *Statewide Protocol Agreement* (Protocol) with the California and Nevada SHPO and consistent with 36 C.F.R. § 800.4. The BLM considers a 0.5-mile radius surrounding the Project to be an appropriate APE for indirect impacts to historic properties. The requested change has not been made.

10-6 The 15 federally recognized tribes that formally were notified and invited to participate in the tribal consultation processes are identified in PA/FEIS Section 5.2.2. They are not separately identified in the description of the NHPA Section 106 process in PA/FEIS Section 4.5.1.2 (p. 4.5-2).

10-7 See PA/FEIS Section 5.2.2.1. The BLM acknowledges that a federally recognized tribe does not have to have assumed the responsibilities of the SHPO under NHPA Section 101(d) to participate in the tribal consultation processes described in PA/FEIS Section 5.2.2.

10-8 Although foreclosure could potentially constitute or lead to adverse effects on a historic property, this list of possible adverse effects on page 4.5-3 was intended to represent examples of adverse effects to historic properties, and not to encompass all possible types of adverse effect. The requested change has not been made.

10-9 NEPA requires analysis of effects on not only historic properties, but also other types of cultural resources. As used in the PA/EIS, the term “cultural resources” encompasses the term “historic property” unless explicitly stated otherwise. As stated on page 4.5-4, upon review of the Applicant Proposed Measures, BLM staff determined that these measures were not sufficiently detailed to be considered in the analysis, and were not included in the PA/EIS for this reason.

10-10 NEPA requires analysis of effects on not only historic properties, but also other types of cultural resources. As used in the PA/EIS, the term “cultural resources” is understood to encompass the term “historic property” unless explicitly stated otherwise.

10-11 The requested detail regarding monopole foundations has been added to the text.

10-12 The Project has not yet been approved by BLM; therefore, it is not certain that Project impacts will occur. The word “will” implies certainty and inevitability and is not appropriate in the context of this statement. The requested change has not been made.

10-13 See Response 10-12.

10-14 Five archaeological sites located within the APE have not been evaluated for eligibility to the NHRP; however, as discussed on page 4.5-5, impacts to these sites would be avoided by Project design and through the imposition of site management conditions. These archaeological sites would be treated as eligible for the NRHP under Criterion D and their significant values would be avoided. Because the sites would not be impacted, and would be treated as eligible for the NRHP, they will not be formally evaluated for eligibility to the NRHP.

10-15 The Native American government-to-government consultation process is ongoing and the BLM plans to conduct further government-to-government consultation between now and publication of a ROD. Any information the Soboba would like to provide regarding the

traditional importance of the Project area to the Soboba will be taken into account by the BLM.

10-16 Neither NEPA nor the NHPA require complete avoidance of all Project-related impacts on cultural resources. Section 106 of the NHPA requires that the federal lead agency "to seek ways to avoid, minimize or mitigate adverse effects" (36 CFR 800.6). Implementation of the HPTP required by Mitigation Measure CUL-1 will ensure that affected historic properties are treated consistent with the values that make them significant. The requested changes have not been made.

10-17 Please see Response 10-10.

10-18 As stated on page 4.5-6, because operation and maintenance activities would be limited to the approved construction footprint of the Project, no additional direct or indirect impacts to cultural resources are anticipated during operation and maintenance. The requested change has not been made.

10-19 Please see Response 10-18.

10-20 The 15 federally recognized tribes that formally were notified and invited to participate in the government-to-government consultation process are identified in PA/FEIS Section 5.2.2. They are not separately identified in the discussion of operation and maintenance related effects of Alternative 1.

10-21 See Response 10-15.

10-22 See Response 10-10.

10-23 See Response 10-10.

10-24 See Response 10-16. The word "resolve" is used in the regulations implementing the NHPA (36 CFR Part 800.6) in reference to avoiding, minimizing or mitigating adverse effects on historic properties. In addition, as stated in Section 4.5.11, the BLM acknowledges that implementation of Mitigation Measure CUL-1 would reduce, but may not fully avoid, Project-related impacts on cultural resources, and that residual effects would remain after mitigation.

10-25 See Response 10-10.

10-26 See Response 10-20.

10-27 See Response 10-7.

10-28 The last sentence of the first paragraph of page 4.5-9 contains examples of measures to resolve adverse effects that may be developed through the Section 106 consultation

process; the use of the word “may” in this context is appropriate. The requested change has not been made.

10-29 Paragraph 2 on page 4.5-10 has been modified to clarify that the HPTP will contain measures to avoid, minimize, or mitigate effects to historic properties.

10-30 The HPTP will contain measures to avoid, minimize, or mitigate effects to historic properties. Avoidance of resources is one, but not the only, method of accomplishing this and may not be operationally feasible. The requested change has not been made.

10-31 See Response 10-10.

10-32 As indicated in the draft MOA included as PA/FEIS Appendix L, an Historic Properties Treatment Plan (HPTP) would be included as an appendix to the MOA. The second paragraph of page 4.5-10 has been clarified to reflect this. The SHPO would be a signatory party to the MOA, and its participation in the Section 106 process and in the development of the MOA is described in PA/FEIS Section 5.2.2.

10-33 The government-to-government consultation with Indian tribes is ongoing. Specific details regarding the necessity, timing, duration, and location of possible participation of tribal cultural consultants have yet to be established through development of the HPTP and MOA.

10-34 See Response 10-33.

10-35 The requested change has been made.

10-36 Regarding tribal consultants, see Response 10-33. Regarding notification of the find to the BLM, a plan to manage the inadvertent discovery of cultural resources during project implementation will be developed through consultation as part of the MOA. Regarding appropriate treatment measures, these would be contingent upon the type and significance of the find. The requested change has not been made.

10-37 See Response 10-10.

10-38 The discussion of effects to cultural resources in the PA/EIS satisfies the requirements of NEPA, and the execution of an MOA, which is being prepared through consultation with SHPO, Indian tribes, and other interested consulting parties, and which will be executed prior to the ROD, will signify the completion of the BLM’s requirements under Section 106 of the NHPA.

The regulations implementing the National Historic Preservation Act (NHPA), found at 36 CFR Part 800, provide for the use of a Memorandum of Agreement (MOA) to describe measures designed to resolve adverse effects on historic properties. MOAs are commonly used to comply with Section 106 of the NHPA on projects like the MSEP. Development of the MOA for the Project will provide an opportunity for determining

mitigation consistent with the values of the historic properties involved, prior to construction or other activities that could affect them.

Neither NEPA nor the NHPA require complete avoidance of all Project-related impacts on cultural resources. However, implementation of the HPTP required by Mitigation Measure CUL-1 will ensure that affected historic properties are treated consistent with the values that make them significant. In addition to addressing known historic properties, the HPTP will include provisions for monitoring construction activities and identifying, evaluating and treating buried cultural resources that may be discovered during construction.

The MOA will be completed and signed prior to approval of the ROD. Consulting parties and stakeholders, including the State Historic Preservation Officer and Indian tribes, will have an opportunity to participate in consultations on the terms and provisions of the MOA before the Project is approved. Final measures to avoid, minimize, and mitigate impacts to cultural resources will be developed as a result of that consultation.

If cultural resources that are not historic properties are identified prior to approval of the ROD, measures to avoid, minimize or mitigate impacts on them will be developed in consultation with the people to whom they are culturally important.

10-39 The discussion in 3.5.1.6 referring to interrelated sites that may be part of a prehistoric trails network has been revised to clarify the nature of the resources involved. No cultural landscapes have been delineated. Studies are currently underway, independent of this Project, to examine prehistoric trails and associated sites in the Colorado Desert to determine, among other things, what sites might be included within such a network, the cultural behavior they may represent, and the importance they hold for Native Americans today. Until these landscape-level studies have been completed, it would be premature to speculate about NRHP eligibility criteria for the sites that may be included within such a network, whether the interrelated sites might qualify for nomination to the NRHP as a district, or precisely what mitigation strategies might be employed to address impacts to individual sites within the context of a larger complex of interrelated resources.

10-40 See Response 10-38.

10-41 The Soboba Band’s request for the avoidance of all cultural resources is acknowledged. The BLM will take information concerning impacts to cultural resources into consideration prior to its decision to approve or deny the Project.

10-42 The Soboba Band’s preference of Alternative 1 as the alternative which least impacts cultural resources is acknowledged. The BLM will take information concerning impacts to cultural resources into consideration prior to its decision to approve or deny the Project.

10-43 Comment noted. Consistent with its government-to-government consultation responsibilities, the BLM welcomes and invites open and candid discussion of tribal concerns about the alternatives under consideration.

10-44 See Response 10-2.

Letter 11 – Responses to Comments from California Unions for Reliable Energy (CURE)

11-1 NEPA requires federal agencies to assess and consider the environmental effects of proposed actions before making decisions, and to disclose information about the proposed action, alternatives, and environmental effects to the public. As explained in Section 6.8.1.2 of the BLM NEPA Handbook, "The effects analysis must demonstrate that the BLM took a "hard look" at the impacts of the action. The level of detail must be sufficient to support reasoned conclusions by comparing the amount and the degree of change (impact) caused by the proposed action and alternatives (40 CFR 1502.1)." An EIS is prepared for all "major Federal actions significantly affecting the quality of the human environment" (42 U.S.C. §4332).

Steps to be followed in the preparation of an EIS include scoping, consultation and coordination with other agencies, news releases, circulation of a Draft EIS for agency and public comment, one or more public meetings about the Draft EIS, and circulation of the Final EIS. Each of these steps was followed for the MSEP. See, e.g., Appendix B (Scoping Report); PA/FEIS Section 1.7, identifying areas of controversy addressed in the document that were identified during the scoping process; Chapter 2, which describes the proposed action and alternatives; Chapter 3, which describes the Affected Environment; Chapter 4, which describes the direct, indirect and cumulative environmental effects of the MSEP and alternatives, identifies mitigation measures to address effects, and discusses the relationship between short-term uses and long-term productivity of the BLM-administered public land now under consideration; and Chapter 5, which describes consultation, coordination and public involvement efforts undertaken in connection with the MSEP; and public notices published in the Federal Register for the Project, including the August 29, 2011, Notice of Intent to Prepare a Joint EIS/EIR and Possible Land Use Plan Amendment (76 Fed. Reg. 53693) and the May 25, 2012, Notice of Availability of a Draft EIS and Possible Land Use Plan Amendment (77 Fed. Reg. 31386-01). Public meetings were held on June 27, 2012, University of California Riverside's Palm Desert Campus and on June 28, 2012, at the City of Blythe Multi-Purpose Room to assist the public in preparing comments for the Draft PA/EIS. MSEP-specific notices, announcements, and public participation opportunities also are available on the BLM's webpage dedicated to the Project (http://www.blm.gov/ca/st/en/fo/palmsprings/Solar_Projects/McCoy.html).

For these and other reasons, the BLM disagrees with the suggestion that the Draft PA/EIS does not comply with NEPA. More specific bases for this general suggestion are provided as they appear in the letter. See also PA/FEIS Section 5.5.4.4, Common

Response 4, which explains that a Supplemental PA/EIS is not being prepared (and the Draft PA/EIS is not being recirculated) for the MSEP.

11-2 To the extent that the comment letter quotes from and cites the technical appendices provided, the BLM has provided responses to these appendices. The BLM has considered all of the information provided, including in the appendices, but has not provided specific responses to items in the appendices not specifically addressed in the commenter's letter.

11-3 The cumulative impacts of the Project and other projects in the cumulative scenario, including other renewable energy projects proposed and approved on BLM-administered lands (see Tables 4.1-1 through 4.1-4), are described throughout Chapter 4.

11-4 This comment regarding the discovery of cultural resources and human remains at the Genesis Solar project site does not directly address the adequacy of the Draft PA/EIS. However, regarding buried resources, see Response 11-105.

11-5 Impacts to air resources are disclosed in PA/EIS Section 4.2. See, for example, Section 4.2.11, which states, "There would be a substantial residual Project-specific and cumulative impact related to short-term construction emissions of PM10 after mitigation measures have been incorporated because emissions would not be reduced to below MDAQMD thresholds."). Impacts to biological resources are disclosed in PA/EIS Section 4.3 and 4.4. Impacts to cultural resources are disclosed in PA/EIS Section 4.5. See, for example, Section 4.5.11, which concludes in part that, "given the scale and potential significance of the resources identified, impacts may remain significant under NEPA despite implementation of the MOA" that would be required by Mitigation Measure CUL-1. Impacts to water resources are disclosed in PA/EIS Section 4.20. Impacts related to hazards and hazardous materials are disclosed in PA/EIS Section 4.9.

As discussed in Chapter 2 and Section 4.20, existing natural channels, as well as overland flow, would provide the primary means of drainage on site, as opposed to engineered channels. Limited engineered drainages within the site would be used to convey stormwater, but note that these do not refer to major flood conveyance channels. Final engineering will not be completed until closer to construction; however, the effects of site drainage have been addressed in Section 4.20.

11-6 In response to discussions with the Applicant, the requirement to provide a supplemental water source for bighorn sheep was eliminated from the EIS (see Response 9-74). Removing this water source from the Project reduces the potential for unintentional effects on desert tortoise and other wildlife species. For Couch's spadefoot, if seasonal pools that would be impacted by the Project are shown to support this species, the creation or restoration of comparable nearby pools would not substantially alter site conditions or create additional Project effects. Created spadefoot pools would be required to pool water for at least 9 days to facilitate spadefoot breeding. As designed, pools would be very short-lived and would fill with water at times when standing water would be available in comparable natural pools located nearby. It is unlikely that any the

addition of between 1 and 9 small ephemeral pools will alter wildlife behavior patterns or jeopardize wildlife populations.

11-7 See Responses 11-5 and 11-6. As explained in PA/FEIS Section 5.5.4.4, Common Response 4, the Draft PA/EIS for the MSEP is not being recirculated for public review and comment.

11-8 See Response 11-1 regarding the BLM's compliance with NEPA in the PA/EIS; PA/FEIS Chapter 2, which provides an adequate and sufficiently complete description of the MSEP and alternatives; PA/FEIS Chapter 4 and these responses to comments regarding the analysis and mitigation of impacts; and PA/FEIS Section 5.5.4.4, Common Response 4, which explains that the Draft PA/EIS is not being recirculated for public review and comment.

11-9 Botanical surveys were completed for the solar plant site and Project linears and the full survey results are incorporated into the EIS. Botanical surveys are partially available for the Alternative 3 routes that traverse the BSPP site; however, surveys were performed during a low rainfall year and may not fully represent the distribution of some special-status species within the alignments. The updated botanical survey needs for the Project are reflected in Response 23-46. The PA/EIS acknowledges known and potential impacts to special-status plants and provides adequate mitigation for anticipated effects.

11-10 Couch's spadefoot surveys were performed in spring and fall 2011, as reflected in Response 9-16. Based on survey findings, the scale of the potential Project effect to Couch's spadefoot is well described; this species may be affected in seven swales on the gen-tie line and access road route and one location in the southwest portion of the solar plant site. Surveys in fall 2012 will additionally be performed to determine whether or not toads are present within identified potential suitable habitat. The mitigation strategy is to verify species presence or absence, avoid potential habitat, and mitigate for impacts to occupied habitat will fully mitigate potential Project effects to Couch's spadefoot toad.

11-11 Impacts to cultural resources are fully and adequately analyzed in Section 4.5 of the PA/EIS. As explained therein, a Class III pedestrian survey covering 6,321 acres, including the 4,792-acre APE, was conducted for this Project, and the resources identified during this survey are analyzed in Section 4.5. Additionally, landscape-level studies currently underway, independent of this Project, are disclosed in Section 3.5. However, the PA/EIS has been revised to eliminate discussion of draft cultural landscapes because there can be no adverse effect upon a delineated cultural landscape until the delineation process is complete. Until these landscape-level studies have been completed, it would be premature to speculate about NRHP eligibility criteria for the sites that may be included within such a network, whether the interrelated sites might qualify for nomination to the NRHP as a district, or precisely what mitigation strategies might be employed to address impacts to individual sites within the context of a larger complex of interrelated resources.

The execution of an MOA, which is being prepared through consultation with SHPO, Indian tribes, and other interested consulting parties, and which will be executed prior to the ROD, will signify the completion of the BLM's requirements under Section 106 of the NHPA. The MOA will detail the process for activities to proceed in areas where historic properties are not now known to exist, such as buried cultural resources, and that will contain procedures for treatment of inadvertent discoveries. However, Sections 3.5 and 4.5 of the PA/EIS have been modified in order to clarify and emphasize the Project area's sensitivity for buried resources and the potential impacts to buried resources. A draft of the MOA is provided in PA/FEIS Appendix L.

The regulations implementing the National Historic Preservation Act (NHPA), found at 36 CFR Part 800, provide for the use of a Memorandum of Agreement (MOA) to describe measures designed to resolve adverse effects on historic properties. MOAs are commonly used to comply with Section 106 of the NHPA on projects like the MSEP. Development of the MOA for the Project will provide an opportunity for determining mitigation consistent with the values of the historic properties involved, prior to construction or other activities that could affect them.

The MOA will be completed and signed prior to approval of the ROD. Consulting parties and stakeholders, including the State Historic Preservation Officer and Indian tribes, will have an opportunity to participate in consultations on the terms and provisions of the MOA before the Project is approved. Final measures to avoid, minimize, and mitigate impacts to cultural resources will be developed as a result of that consultation.

11-12 Residual impacts that may remain after recommended mitigation measures are implemented are described in each resource- and issue-specific section of PA/FEIS Chapter 4. See, for example, PA/FEIS Section 4.5.11, which states: "Implementation of Mitigation Measure CUL-1 would reduce but may not fully avoid Project-related impacts on cultural resources. Cultural resources damaged or destroyed by construction activities, even if subjected to mitigation measures, would be permanently lost from the archaeological record. These cultural resources therefore would be unavailable for future study to address future research needs when more advanced investigative techniques and methods of analysis might be available. Unavoidable adverse effects on cultural resources would result from construction, operation, maintenance, and decommissioning of all of the Project components under Alternative 1. Consultations may raise issues that cannot be resolved through the implementation of mitigation measures. Prescribed treatments may resolve adverse effects under NHPA §106. However, given the scale and potential significance of the resources identified, impacts may remain significant under NEPA despite implementation of the MOA."

The PA/EIS establishes the environmental setting in Chapter 3, Affected Environment, for each resource and issue area considered in the analysis; describes the proposed Project and alternatives in Chapter 2, Proposed Action and Alternatives, and discusses direct, indirect, and cumulative effects of the Project and alternatives throughout

Chapter 4, Environmental Consequences. Mitigation Measures also are identified in PA/EIS Chapter 4 where they are relevant, reasonable, and could improve the Project. No specific examples, facts, reasonable assumptions predicated upon facts, or other evidence are provided in support of the comment's suggestions that the Draft PA/EIS failed to: adequately establish the environmental setting, fully or fairly describe the Proposed Action, discuss impacts, and recommend adequate mitigation measures. Without more information, the BLM is unable to provide a more detailed response to these concerns. For these reasons and as explained in PA/FEIS Section 5.5.4.4, Common Response 4, the Draft PA/EIS is not being recirculated for public review and comment.

11-13 As discussed in Response 11-5, limited engineered drainages within the site would be used to convey stormwater, but these do not refer to major flood conveyance channels, as the comment describes. Potential impacts from created Couch's spadefoot toad breeding pools are addressed in Response 11-10. As described in Response 11-6, supplemental bighorn sheep watering sources are no longer proposed.

11-14 It appears that the commenter is making reference to Couch's spadefoot toad surveys in this comment. The comment correctly notes that the spring 2011 survey that characterized the location of potential breeding habitat locations for this species was performed outside of the period of active toad breeding. As identified in Response 11-10, follow-up surveys were performed in fall 2011 during the correct period to identify this species and an additional survey is needed in fall 2012 to accurately characterize species presence or absence in potential habitat that was identified in the Project area.

11-15 Baseline conditions for biological resources are fully and accurately described in the PA/EIS and in the supporting technical reports provided in Appendix C of the PA/EIS.

11-16 The NECO Plan relied upon GIS-based habitat models to identify areas of high ecological value and inform the development of management areas. The analyses resulted in the development of Desert Wildlife Management Areas (DWMAs) for desert tortoise, Bighorn Sheep Wildlife Habitat Management Areas (WHMAs), and Multi-species Wildlife Habitat Management Areas. The solar plant site is not located within one of these special management areas. To facilitate this analysis, the BLM ranked ecological values of BLM lands to identify ecological "Hot Spots." The resulting map set provides a gross-scale regional representation of ecological value that was intended to define target protection levels for natural areas and define the most sensitive areas, which were characterized as DWMAs and WHMAs. The proximity of these areas to the Project site are shown in Figure 3.4-7.

The large-scale "hot spot" mapping effort used one quarter of a USGS 7.5-minute quadrangle sheet as the smallest unit of resolution. Relatively flat, undisturbed portions of the NECO Plan area generally received relatively higher rankings than mountainous areas, with flat sites generally mapped from Class 3 to Class 6. The solar plant site is within areas identified as Class 0 to Class 6, with the majority of the solar plant site mapped within a Class 5 area. Thus, the somewhat moderate ecological values

on the Project site were increased by their close proximity to McCoy Wash, located downslope from the solar plant site within the same quarter quad area. The ecological values of the Project area are well described in the EIS and reflect a level of site analysis that exceeds the landscape-level "hot spot" GIS analysis.

As the commenter notes, the Project site is located at the fringe of an "unfragmented" area described in the NECO Plan, though the eastern half of the Project site is outside this area.

11-17 As the EIS discloses, the proposed Project would displace nearly 4,500 acres of natural habitat with resulting adverse effects on native plants and wildlife. Measures proposed in the EIS would minimize direct and indirect Project effects on sensitive species and habitats, largely through a program of animal relocation, habitat compensation, and preservation. The off-site habitat compensation requirement will partially offset lost ecological values from site development. Long-term site reclamation following site decommissioning would additionally improve on-site ecological values from the as-built condition and assist in restoring affected habitat values.

11-18 The EIS was revised to reflect the presence of three sensitive vegetation communities in the Project area: Desert Dry Wash Woodland (Blue Palo Verde-Ironwood Woodland Alliance), Creosote Bush-Big Galleta Grass Association, and sand dunes (see Table 4.3-3). Despite the presence of desert lavender in the Project area, Desert Lavender Scrub habitat does not occur in the Project area. An artificially created borrow pit immediately north of I-10 supports 0.5 acre of honey mesquite-palo verde bosque-ironwood bosque habitat; however, this area does not fall into the Sawyer, Keeler-Wolf and Evens' (2009) Mesquite Woodland Alliance; where groundwater is naturally available and hosts a suite of different species in addition to honey mesquite. Due to its artificial origin, this vegetation community is not considered sensitive.

The Creosote Bush-Big Galleta Grass Association was mapped in drainages throughout the Blythe Solar Power Project (BSPP), south of the solar plant site; however, habitat on the solar plant site are sufficiently different from the BSPP site that the Creosote Bush-Big Galleta Grass Association does not occur on the former site. Therefore this vegetation community not characterized in supporting biological reports provided in Appendix C of the PA/EIS. Data regarding the distribution of this vegetation community on the BSPP site was assembled from the BLM and is presented in the revised Figure 3.3-1 in this PA/FEIS.

11-19 While big galleta grass (*Pleuraphis* (=*Hilaria*) *rigida*) is present on the solar plant site, as described in the Biological Resources Technical Reports provided in Appendix C of the PA/EIS, this species was not prevalent enough to constitute a vegetation community that was distinct from creosote bush scrub. Big galleta grass occurs more commonly to the south of the solar plant site, to the extent that a Creosote Bush-Big Galleta Grass Association was described in large portions of the BSPP site. This community, however, does not occur on the solar plant site.

11-20 While there is extensive desert dry wash woodland (DDWW) habitat within the study area for vegetation resources, the distribution of this vegetation community on the solar plant site and Project linears is limited. As identified in Response 8-14, the Project was designed to minimize and avoid sensitive riparian habitat that occurs to the west of the Project area, including DDWW habitat. The biological resources technical reports provided in Appendix C of the PA/EIS identify the distribution of habitat on the Project site and within the greater study area and describe the methodology used to arrive at the conclusions made. The analysis distinguished between "desert dry wash woodland" habitat and non-woodland areas characterized as "Wash-Dependent Vegetation with Sparsely-Scattered Trees" and vegetated ephemeral channels with no trees based on the density and character of vegetation. As identified in Table 4.3-1 of the PA/EIS, 40.9 acres of sparse tree habitat were mapped on the solar plant site, mostly in the western portion of the site, which supported 38.1 acres of the total. Consistent with the analysis of the adjacent Blythe Solar Power Project, drainages on the solar plant site with sparsely scattered trees were not considered "wooded" and were not classified as DDWW habitat.

11-21 See Response 11-20.

11-22 The study area for special-status plants extended to the edges of the solar plant site and did not include a buffer around the site. The linear corridor botanical surveys were a minimum of 240 feet wide. The plant survey protocol was approved by BLM, the U.S. Fish and Wildlife Service, and California Department of Fish and Game prior to performing the survey. Vegetation communities were characterized within the larger study area for vegetation resources. Potential indirect Project effects on special status plants are discussed on page 4.3-7 and include the spread of potential for spread of invasive plants and downstream hydrologic and geomorphic alterations. These considerations are addressed in the PA/EIS through APM BIO-2n, Mitigation Measure VEG-9, and APM HYDRO-1. As identified in Section 4.3, the implementation of these measures would reduce effects on off-site botanical resources.

11-23 The commenter is correct that the Applicant's consultant did not perform botanical surveys on the Alternative 3 routes. These areas were surveyed in support of the Blythe Solar Power Project (BSPP) and rare plant survey results were included in PA/FEIS Figure 3.3-3. The results of BSPP surveys of the Alternative 3 routes were inadvertently omitted from PA/EIS Figure 3.3-1. As a result, this figure is revised to reflect plant communities on the Alternative 3 routes. As identified in Responses 9-28 and 11-9, additional botanical surveys may be needed to adequately characterize the distribution of special-status plants on the Alternative 3 routes. However, the EIS acknowledges known and potential impacts to special-status plants and provides adequate mitigation for anticipated effects.

11-24 Botanical surveys described in Comment 11-23 confirm that there are fewer populations of Harwood's milk-vetch and Utah milkvine on the Alternative 3 linear Project route compared to the Alternative 1 gen-tie line, which can be confirmed by reviewing plant

distribution in Figure 3.3-3. The PA/EIS conclusion is valid and is substantiated by botanical survey findings.

11-25 The biological survey data for the BSPP included public lands that are managed by the BLM; therefore, data collected for BSPP can be used for the Proposed project. The survey data for that project present the best available scientific data available for the review of potential Project impacts to rare plants on the two proposed Alternative 3 routes. Figure 3.3-3 has been revised to add a note indicating that only partial survey data is available for the Alternative 3 routes due to low rainfall during BSPP surveys. If either of the Alternative 3 routes is selected as a preferred linear corridor, additional surveys may be needed, as identified in Mitigation Measure VEG-11B, to corroborate and update BSPP survey findings.

11-26 The *Biological Resource Technical Report* provided in Appendix C of the PA/EIS clearly identifies the plant variety as pebble pincushion (*C. carphoclinia* var. *carphoclinia*) and not as the rarer Peirson's pincushion (*C. carphoclinia* var. *peirsonii*). Pebble pincushion is not identified as a rare species by the CDFG or the California Native Plant Society. The nearest documented population of Peirson's pincushion is greater than 70 miles from the Project area in western Imperial County.

11-27 The rare plant survey methods (pp. 3.3-10 and) and Mitigation Measure VEG-10B (Ensure Adequate Special-Status Plant Surveys and Reporting; pg. 4.3-29) have been updated to reflect that fall botanical surveys are complete on the solar plant site and Project linears; a single survey is outstanding on the Alternative 3 routes. The current botanical survey findings were reported in the *Fall 2011 Plants and Supplemental Wildlife Survey Report*, which was provided as Appendix C of the PA/EIS.

11-28 Botanical surveys were initiated in September 2012 to complete special-status plant surveys on Alternative 3 routes. Thus, surveys will be competed substantially sooner than 30 days prior to construction. Survey results will inform the effects analysis and mitigation approach if the western or central gen-tie routes are selected. It is anticipated that additional populations of Abram's spurge may be identified during surveys, as this specie appears to be locally abundant. The botanical survey data collected to date and anticipated fall 2012 survey findings of the Alternative 3 routes (e.g., additional Abram's spurge populations) adequately describe baseline conditions in the Project area and the PA/EIS provides adequate mitigation for anticipated Project effects.

11-29 See Response 11-28.

11-30 See Response 11-28. The rare plants survey findings presented in the Draft PA/EIS (as revised in this PA/FEIS) are comprehensive for the solar plant site and Project linears. Additional botanical surveys are not proposed or required in these areas. Rare plant distribution on the Alternative 3 routes has been characterized for most plants on the BSPP site through appropriately-timed botanical surveys. The botanical survey data collected to date and anticipated fall 2012 survey findings adequately describe baseline conditions in

the Project area and the PA/EIS provides adequate mitigation for anticipated Project effects.

11-31 The anticipated direct and cumulative effects to Mojave fringe-toed lizard and their habitat will be less than anticipated in the PA/EIS, as described in Response 6-43. The revised assessment identified the local presence of more occupied sand dune habitat in the Palo Verde Valley than characterized by the PA/EIS. The proposed Project would permanently affect about 19 acres and temporarily affect another 19 acres out of a total 12,911 acres that occurs in the local sand dune complex in the Project area. This represents about 0.3 percent of the available habitat for this species; thus, the anticipated impact would be considered minimal and would not subject the Mojave fringe-toed lizard population to significant habitat fragmentation. The presence of the lizard population in the gen-tie line was not known prior to biological surveys that were performed for the Proposed Action and the Blythe Solar Power Project (BSPP). The total cumulative risk to sand dune and sand sheet habitat from the Proposed Action and BSPP, including both temporary and permanent effects, represents about 76 acres, or approximately 0.6 percent of available habitat for this species. No other threats were identified to this Mojave fringe-toed lizard population or its habitat.

11-32 The commenter is correct that the Mojave fringe-toed lizard is an obligate species of sand dunes and sand sheet habitat. In response to the comment, the data layer used to map the distribution of sand dunes in Figure 3.3-1 of the PA/EIS has been revised to reflect the same sand dune area mapped in Figure 7 (p. 83) of the *Biological Resources Technical Report* (BRTR), included in Appendix C of the PA/EIS. Sand dune and sand sheet impact calculations for the Project were derived based on data provided in the BRTR; thus, no adjustments to habitat impact totals are necessary due to the map update.

11-33 See Response 11-32.

11-34 PA/FEIS Section 3.4.1 describes the affected environment for the golden eagle, including information about natural history and survey results. This description is informed by reports that were provided by the Applicant and independently reviewed by the BLM and its NEPA contractor, including: the August 2011 Biological Resources Technical Report prepared by TetraTech and Alice E. Karl (TetraTech and Karl, 2011), which summarizes the results of avian point count surveys that were conducted from April to May, 2011; the August 2011 Golden Eagle Risk Assessment prepared for the MSEP, which is included in the PA/FEIS as Appendix C-3 (Tetra Tech, 2011);[1] and the Winter 2011-2012 Avian Winter Point Count Survey Report (Tetra Tech and Karl, 2012). Golden eagle survey

[1] This report analyzed potential direct, indirect, and cumulative impacts of the MSEP to golden eagles and identified avoidance and minimization measures that could be implemented to minimize or avoid potential risk to eagles. It concludes that the potential impacts of construction and operation of the Project to golden eagles are likely to be low.

results and the golden eagle risk assessment also are summarized in the Avian and Bat Protection Plan submitted by the Applicant on October 5, 2012 (Tetra Tech, 2012b).[2]

The Applicant coordinated with Tannika Engelhard and others at USFWS regarding helicopter and point count surveys to assure that those efforts would be conducted properly and generate adequate and appropriate golden eagle data for purposes of environmental review. The Golden Eagle Risk Assessment summarizes eagle nest survey results from surveys conducted in 2010 and 2011. Spring Phase 1 surveys conducted on March 26-26 and April 2-3, 2010, and a Phase 2 survey conducted on May 14, 2010 collectively identified two nests within a 10-mile-radius of the MSEP: one nest located 9.2 miles northeast, in the Big Maria Mountains, was identified as "active" based only on the presence of fresh nest material; the other nest, located 2.3 miles southwest, in the McCoy Mountains, was identified as "inactive." As disclosed on page 4 of the Golden Eagle Risk Assessment (Tetra Tech, 2011), these surveys were conducted following the USFWS Interim Golden Eagle Inventory and Monitoring Protocols.

The Applicant provided Project-specific survey methods, including aerial golden eagle survey methods, to the USFWS for review and approval on February 11, 2011 (USFWS, 2011b), and received initial comments from USFWS on February 22, 2011 (USFWS, 2011a). The Applicant met on site with USFWS on February 23, 2011 to discuss survey methods, including golden eagle survey methods, and, on March 16, 2011, participated in a conference call with USFWS Ecological Services and Division of Migratory Birds staff members specifically to discuss methods for golden eagle surveys. On March 17, 2011, USFWS provided final comments on the survey methods (USFWS, 2011b; Karl, 2011); no comments were regarding the dates of the helicopter surveys.

Thereafter, in accordance with USFWS input, Spring Phase 1 surveys were conducted on March 23-24, 2011, and Phase 2 surveys were conducted on May 5-7, 2011. These surveys provided a second consecutive year of golden eagle nest data. The spring 2011 surveys identified five golden eagle nests within the search area; the one active nest was occupied by red-tailed hawks and the remaining four were inactive. The spring 2011 surveys also followed the USFWS Interim Golden Eagle Inventory and Monitoring Protocols (Tetra Tech, 2011, p. 4). Two golden eagles were incidentally observed south of the solar plant site on March 28, 2011; no golden eagles were observed during raptor point count surveys or helicopter surveys. No successful breeding by golden eagles was detected within or beyond the 10 mile search radius during the helicopter surveys (TetraTech and Karl, 2011).

Raptor point count surveys were conducted in spring (April/May 2011), summer (June 2011) (see Tetra Tech and Karl, 2011); as well as fall (November 2011) and winter (December 2011- 2012, January 2012) (see TetraTech and Karl, 2012). The report for fall/winter surveys was completed in March 2012; due to timing of the release of the Draft PA/EIS, the results of the fall/winter surveys were not available for inclusion in the

2 This plan was prepared pursuant to Mitigation Measure WIL-6, as presented in the Draft PA/EIS.

Draft PA/EIS. It is attached as PA/FEIS Appendix C-4. As reported in Section 4.1 of the Winter 2011-2012 Avian Point County Survey Report (TetraTech and Karl, 2012), no golden eagles were observed during winter surveys.

Because these surveys were conducted in coordination with USFWS personnel and in accordance with USFWS Interim Golden Eagle Inventory and Monitoring Protocols, BLM believes the baseline for analysis of potential impacts to golden eagle to be accurate and sound.

11-35 The analysis of direct, indirect, and cumulative impacts to golden eagle provided in PA/FEIS Section 4.4 and the identification of Mitigation Measure WIL-12, Measures to Minimize Impacts to Golden Eagles, is based on considered evaluation by the BLM and its NEPA contractor of survey results that have been determined to be adequate. See also Response 11-24.

11-36 Survey protocols for biological resources were reviewed and approved by BLM, USWFS, and CDFG prior to initiating surveys. In the case of bats, biological surveys considered the potential presence of potential roosting habitat to 0.37 mile from the Project site. This distance differs from the NECO Plan requirement; however, because habitat surrounding the Project site consists of flat desert with few trees and minimal relief, the survey methods were approved by the Resource Agencies based the general absence of bat roosting habitat and the related low likelihood that bats would be encountered.

As identified in Table 3.4-1, the Project area is within the described range of several special-status bats; however, the only available bat habitat on the solar plant site is a single roost that was identified in the study area. The location of this potential roost, shown in Figure 13 (pg. 101) in the *Biological Resources Technical Report* (BRTR) included in Appendix C of the PA/EIS, is within the Wildlife Resources study area; however, is outside of the area of direct Project effects. While it is possible that a tree-roosting bat may temporarily seek refuge in a Project area tree, no significant bat roosts occur on the site. Furthermore, biological surveys performed to the south for the Blythe Solar Power Project detected no bat roosts and surveys of the desert tortoise translocation area to the west identified no bat roosts. Direct visual wildlife surveys performed out to 1,970 feet (0.37 mile) north and east of the Project area did not detect bat roosts, and bat habitat observations in the BRTR (p. 25) noted that the flat areas on the solar plant site and surrounding area have few trees, minimal topographic relief, and no nearby reliable water sources. The BRTR concluded that no bats are known to roost or hibernate in the sparse creosote bush scrub that typifies the study area. On the basis of this characterization surveys did not detect bat roosts to the south or west of the solar plant site and it is reasonable to conclude based on field observations that no significant bat roosts occur in areas located within 1.0 mile north and east of the Project site. The presence of small trees and rocks does not constitute significant bat habitat.

11-37 To clarify the commenter's statement, some bat roosts occur within creosote bush habitat; however, creosote bush habitat does not provide bat roosting habitat. For example, the on-site cave roost is technically located within creosote bush habitat. However, the cave is the required element that may attract roosting bats to the Project area. In reviewing the Revised Staff Assessment prepared for the Genesis Solar Energy Project, as cited by the commenter, the 300 California leaf-nosed bats documented "near the McCoy Mountains in creosote bush scrub habitat" were specifically documented in the California Natural Diversity Database (CNDDB) from the SE McCoy Mine, which is surrounded by creosote bush scrub. The bats were encountered in the mine and were not roosting in creosote bushes. Of the 45 California leaf-nosed bat occurrences described in the CNDDB in October 2012, 44 were roosting or night emergence observations associated with mines, caves, tunnels, and one building. The CNDDB describes this species as requiring "rocky, rugged terrain with mines or caves for roosting," which does not occur in the Project area aside from the single described feature.

11-38 See Response 11-36.

11-39 As described in Response 11-36, the potential roost identified during biological surveys is within the Wildlife Resources study area; however, further review indicates that the cave is located in a wash that would be avoided by the Project (see Response 9-61). Surveying wildlife biologists did not find bats in the feature and no mitigation is required for potential impacts to special-status bats or their habitat.

11-40 Morrison's blister beetle (*Lytta morrisoni*) was inadvertently identified in the December 2011 *Fall Plants and Supplemental Wildlife Survey Report* included in Appendix C of the PA/EIS (p. D-4). Despite being listed as on-site, the surveying biologists confirm that this Central Valley species was not detected during surveys. Consequently, no measures are needed to address potential Project effects to this species.

11-41 The CDFG has no specific focused survey protocol for rosy boa, therefore, the potential presence of this species was characterized in the PA/EIS based by reviewing available habitat in the Project area and the findings of walking transect surveys that were performed at 30-foot intervals. The PA/EIS characterized desert rosy boa habitat based on Zeiner et al. (1990c) and the NECO Plan (BLM, 2002) as areas with moderate to dense vegetation and rocky cover, such as desert canyons, washes, and mountains. This species is largely associated with rocky areas, canyons and available a regular water source. The general absence of these habitat features from the solar plant site and Project area make the occurrence of rosy boa unlikely, as presented in Table 3.4-3 (pg. 3.4-21). Additionally, rosy boas were not detected during focused wildlife surveys of the site. The PA/EIS and supporting technical reports provide an adequate basis to predict the potential presence of rosy boa in the Project area.

11-42 While ferruginous hawks do not breed in California, wintering populations are granted identical protection to other non-listed raptor species that occur in the State of California. The potential presence of wintering (foraging) habitat in the Project area was disclosed in

the PA/EIS, as was the low-to-moderate potential to occur at the Project site (Table 3.4-3, pg. 3.4-21). Numerous raptors may occur in the Project area and potential impacts to these species will be addressed through the implementation of Mitigation Measures WIL-6 and WIL-7, which require an Avian Protection Plan and focused bird surveys to avoid direct Project effects to avian species.

11-43 Burro deer occur in the regional Project area in low numbers and are expected to seasonally browse on woody and herbaceous vegetation associated with drainages on the Project site. The commenter indicates that burro deer are highly dependent upon microphyll woodlands, which have been largely avoided though Project design. In addition, the Project maintains at least an approximately 0.5 to 1.0 mile buffer from the base of the McCoy Mountains which provides foraging and movement opportunities for burro deer.

11-44 In response to the comment, the biological reports included in Appendix C were revisited to verify the number of active burrowing owl burrows and owl sightings in the Project area. The commenter notes that 18 active burrows are described; however, a thorough review identified 14 active burrows. A number of additional burrows were described with owl whitewash and pellets present at entrances to active kit fox natal dens. However, these were not enumerated, as kit foxes and burrowing owls do cohabitate.

In response to the comment, the number of detected burrowing owls and active owl burrows has been updated in the third full paragraph on pg. 3.4-12 as follows:

> Within the study area, 14 recently active owl burrows, two burrowing owl pairs, and four individual owls were observed on the solar plant site. Four additional owls were detected in the study area west of the solar plant site boundary. One owl pair and one active burrow also were noted on the gen-tie line and access road route north of I-10 (Tetra Tech EC, Inc. and Karl, 2011a; 2011b). ~~Focused surveys identified 10 recently active owl burrows and two burrowing owl pairs on the solar plant site, mostly from the eastern portion of the site. An owl pair and one active burrow were also noted on the gen-tie line and access road route north of I-10. No burrowing owls or owl burrows were identified within the 500-foot buffer area.~~

In addition, the discussion of anticipated direct and indirect impacts to burrowing owls on page 4.4-14 is revised as follows:

> Within the study area, ~~10~~14 recently active owl burrows, ~~and~~ two burrowing owl pairs, and four individual owls were observed on the solar plant site ~~generally on the eastern portion of the site~~. Four additional owls were detected in the study area west of the solar plant site boundary. ~~An~~One owl pair and one active burrow also were noted on the gen-tie line and access road route north of I-10 (Tetra Tech EC, Inc. and Karl, 2011a; 2011b). It is anticipated that all identified active burrows on the solar plant site would be removed during Project construction and those on the

> linear corridor would be avoided where feasible. The entire Project area is considered to provide suitable burrowing owl foraging habitat.

11-45 Due to a typographical error in the PA/EIS (a missing dash), the commenter misinterpreted that three burrowing owl surveys were performed in the Project area instead of the required four surveys. In response, the burrowing owl survey results in the second paragraph on page 3.4-12 are clarified as follows:

> Three-phase protocol-level burrowing owl surveys were performed from 2007 to 2011 consistent with the current CDFG survey standard, which is the California Burrowing Owl Consortium (CBOC) Guidelines (CBOC, 1993).

The burrowing owl survey methods met the suggested CDFG guidance, and additional burrowing owl survey data collected during desert tortoise and rare plant surveys provided additional data on burrowing owl distribution and habitat use in the Project area.

11-46 As described in the Biological Resources Technical Report included in Appendix C of the PA/EIS, burrowing owl surveys were performed by multiple surveyors from April 18 to 21, 2011 and June 14 to 16, 2011 following the 1993 Burrowing Owl Consortium Guidelines. Additional burrowing owl surveys are not needed to characterize site use by this species.

11-47 As identified in Appendix C of the PA/EIS, focused surveys for Gila woodpecker were performed in all possible available habitat in the Project study area. As the commenter describes, nesting sites may be available in the near-Project vicinity; however, no nesting habitat was detected on the solar plant site or along most of the Project linears and Gila woodpeckers were not observed during focused woodpecker surveys. Suitable habitat was detected east of the solar plant site in well-developed palo verde/ironwood woodland habitat in McCoy Wash. Additionally, the BRTR cites the findings of a 5-year study in McCoy Wash that detected no Gila woodpeckers between 2004 and 2008. Thus, available scientific data on local Gila woodpecker population indicates that this species is unlikely to occur and does not nest on the Project site. An occasional vagrant can be expected to the area, the commenter notes was detected at the Blythe Solar Power Project; however, such non-breeding observations of rare birds are seldom reported to the California Natural Diversity Database.

11-48 See Response 11-47.

11-49 See Response 11-47.

11-50 Based on the findings of focused surveys, Gila woodpeckers do not occur in the Wildlife Resources study area. No further surveys are warranted for this species.

11-51 See Responses 9-16, 11-6, and 11-10.

11-52 Because some wildlife surveys take multiple years to complete, as do those for the Couch's spadefoot toad, it is common practice during environmental review to anticipate the magnitude of the potential impact based on the greatest amount of potential habitat that may be present, and assemble a "worst case scenario" mitigation strategy that avoids, minimizes, and mitigates potential impacts based on survey results. In the case of Couch's spadefoot toad, a non-listed wildlife species, suitable habitat was identified in the Project area with seven of eight potential breeding locations identified in the gen-tie line corridor. If toads are verified in the swales on the linears it is possible that potential Project effects can be avoided or minimized though Project design. The Applicant is required to survey each of the sites identified as potential Couch's spadefoot habitat; however, such review will occur in fall 2012.

11-53 If Couch's spadefoot toads are identified at one or more breeding sites during focused surveys in fall 2011, Mitigation Measure WIL-14 requires the Applicant to prepare a Couch's Spadefoot Toad Protection and Mitigation Plan to avoid, minimize and mitigate impacts to Couch's spadefoot toads and their breeding habitat during construction and operation of the Project. Following surveys, if it found that toad breeding sites cannot be avoided and may be adversely affected by the Project, the engineering specifications for mitigation pools would be subject to BLM review and approval.

11-54 As identified in Responses 11-27 and 11-30, surveys for special-status plants are complete for the solar plant site and Project linears. Only a single botanical survey (Alternative 3 routes) is outstanding, as indicated in Response 11-28, and a single wildlife survey remains to determine the potential presence or absence of Couch's spadefoot toad in eight distinct locations in the Project area. The PA/EIS set up a clear strategy to address the potential presence of rare plants in the Alternative 3 alignment and Couch's spadefoot toad, and provides measures to avoid, minimize, and mitigate Project effects to sensitive resources that are detected during these fall 2012 surveys.

11-55 The term "cultural resource" is not defined in NEPA or any other federal law. The discussion on page 3.5-1 is consistent with the definition of cultural resources provided in the BLM 8100 Manual. Cultural resources on the public lands managed by the BLM are concrete, material places and things. Cultural resources may be but need not be determined eligible for the NRHP or CRHP to receive consideration under NEPA. In compliance with several laws including NEPA and the NHPA, the BLM considers the values ascribed to these places and things, and the ways in which these places and things are used, when making decisions on actions that might affect them. The public participation processes followed by the BLM in complying with NEPA and the NHPA afford opportunities for the general public and Indian tribes to identify cultural resources of all kinds, and values relating to them, that they wish BLM to consider in its decision making.

Under the NHPA and its implementing regulations, significant cultural resources are called historic properties. Historic properties are districts, sites, buildings, structures and objects that are listed on, or eligible for listing on, the NRHP. This definition is the only

technical, operational meaning of the word "significant" as it applies to cultural resources within the context of Section 106. This does not mean that places or things not meeting this definition are unimportant. The BLM recognizes that values ascribed to places or things by social or cultural groups, including Indian tribes, may make them important and worthy of consideration even if those places or things do not meet the NRHP definition of significance. During the preparation of this PA/EIS, the general public and Indian tribes were afforded opportunities to identify cultural resources of importance to them regardless of whether those resources met the NRHP definition of significance. The cultural resources analyzed in the PA/EIS were the only cultural resources identified by the archival and field inventories, public participation opportunities, and tribal consultation efforts.

An Ethnographic Assessment to identify sites to which Tribes may attach cultural or religious significance to, and that would be affected by the Project, is currently underway. The results of that study are not yet available. See Section 5.2.2.

The BLM will continue consulting with Indian tribes throughout the Section 106 compliance process. BLM's tribal consultation efforts are discussed in Section 3.5.1.6, in Section 5.2.2, and in Appendix D. Tribes have been invited to identify resources and places of traditional cultural and religious importance that might be affected by the project. Tribes have also been invited to participate in consultations to develop a MOA for the Project that will seek to resolve adverse effects, including visual, audible and atmospheric effects, on any NRHP-eligible traditional cultural properties that may be identified.

The analysis of impacts in Section 4.5 is not restricted to NRHP-listed or eligible cultural resources. All cultural resources identified within the Area of Potential Effects are included in the analysis, regardless of whether they meet the NRHP definition of significance.

11-56 See Response 11-55.

11-57 See Response 11-55.

11-58 The Draft PA/EIS correctly stated in the fifth paragraph of page 3.5-1 that "under federal and state historic preservation law, cultural resources generally must be at least 50 years old to have sufficient historical importance to merit consideration of eligibility for listing in the NRHP or in the California Register of Historical Resources (CRHR). A resource less than 50 years of age must be of exceptional historical importance to be considered for listing." The exceptional significance standard for properties under 50 years of age (termed "Criteria Consideration G" in the NRHP) was taken into account by BLM when evaluating the eligibility of cultural resources for listing in the NHRP.

However, as also described on page 3.5-1, cultural resources may be but need not be determined eligible for the NRHP or CRHR to receive consideration under NEPA.

Accordingly, the Draft PA/EIS did not "dismiss" cultural resources not determined eligible for the NRHP. All cultural resources identified within the Area of Potential Effects are included in the analysis, regardless of whether they meet the NRHP definition of significance. To further clarify this point, page 3.5-1 has been revised to remove the discussion of eligibility criteria for the NRHP and CRHR. These criteria are also defined in Section 3.5.2,Applicable Regulations, Plans, and Standards.

11-59 See Response 11-55.

11-60 Suggestions that the PA/EIS does not address impacts to air quality are addressed in Responses 11-61 through 11-68. Responses to concerns about biological resources are provided in Responses 11-69 through 11-100. Responses to concerns about cultural resources are provided in Responses 11-101 through 11-111. Responses to concerns about hazardous materials are provided in Responses 11-112 though 11-122. Responses to concerns about water resources are provided in Responses 11-123 though 11-124. For the reasons explained in those responses and in PA/FEIS Section 5.5.4.4, and on the basis of the analysis provided elsewhere in the PA/FEIS, the BLM has taken a hard look at the environmental consequences of the Proposed Action and alternatives. Although revisions have been made to the PA/EIS based on input received during the environmental review process (including in response to comments provided on the Draft PA/EIS), supplemental environmental review is not being circulated for the MSEP. See PA/FEIS Section 5.5.4.4, Common Response 4.

11-61 As explained in more detail in Responses 11-62 through 11-68, the commenter does not provide adequate documentation to substantiate the claims that the Draft PA/EIS significantly underestimates emissions from Project construction, that it failed to identify significant impacts from nitrogen oxide and particulate matter emissions, or that it failed adequately mitigate the Project's impacts to air quality. Responses to specific air quality-related comments are provided below in Responses 11-62 through 11-66.

11-62 The commenter claims that the construction equipment daily use hours applied in the air quality analysis for the Project are under estimated, and supports this claim based on a reference from the PA/EIS Project Description. However, the commenter mischaracterizes the reference to the Project Description by indicating that it states that construction activities would occur for 12 to 24 hours per day. In fact, the applicable reference in the Project Description states that construction generally would occur between 7 a.m. and 7 p.m., and that the startup phase of the MSEP could require equipment and system testing 24 hours per day, which presumably would not require considerable use of heavy construction equipment.

Although construction activities would be scheduled to occur between 7:00 a.m. and 7:00 p.m., it would be extremely unusual for each piece of construction equipment to operate continually during that period. In addition, it should be noted the construction equipment use assumptions in the air quality analysis came directly from the Applicant's engineering contractor for the Project (i.e., WorleyParsons). Although BLM is currently

not in a position to reject the equipment use factors estimated by the engineering contractor for the Project, if at a later date it is determined that substantially higher equipment daily use hours would be required to construct the Project, BLM would conduct a subsequent review of the Project based on the revised daily use hours, which would be available for additional public review.

11-63 The commenter claims that the round-trip distances applied in the air quality analysis for purposes of determining the total vehicles miles travelled for the Project are under estimated. As with equipment use assumptions, the average daily round-trip mileage assumptions in the air quality analysis came directly from the Applicant's contractor who is in the process of engineering the Project. In addition, for the purposes of comparing criteria pollutant emissions to the Mojave Desert Air Quality Management District thresholds, off-site vehicle trip mileages were estimated from the point of entry into the Mojave Desert Air Basin (MDAB).

However, the air quality technical report prepared for the Project by AECOM (2012) did include greenhouse gas (GHG) emissions estimates associated with vehicle trips that would occur outside of the MDAB using round-trip distances that assume the solar panels would be imported through the Port of Long Beach. The GHG emissions due to these PV panel delivery trips were broken down into the round trip miles outside the MDAB from Long Beach to the air basin boundary, and within the MDAB related to round trips from the boundary to the Project site. Based emission estimates identified in Table 6, *Project Construction GHG Emissions*, of the AECOM air quality technical report (2012), the amount of GHG emissions that would be generated outside of the MDAB would be equivalent to up to 29 percent of the GHG emissions that would be generated within the MDAB. Because the percent of GHG emissions that would be generated outside of the MDAB relative to the amount of GHG emissions that would be generated within the MDAB would be expected to be roughly proportional to the percent of criteria pollutant exhaust emissions that would be generated outside of the MDAB relative to the amount of criteria pollutant exhaust emissions that would be generated within the MDAB, it is estimated that the criteria pollutant emissions that would be generated outside of the MDAB would be equal to approximately 29 percent of the criteria pollutant emissions that would generated within the MDAB. For the sake of this discussion, it is assumed that all of the emissions that would be generated outside of the MDAB would occur within air basins under the jurisdiction of the South Coast Air Quality Management District (SCAQMD).

Table K-1 presents the maximum estimated daily construction emissions that would be generated within the MDAB and the maximum daily construction emissions that would be generated outside of the MDAB (i.e., within the SCAQMD), and compares the emissions that would be generated within the SCAQMD to the SCAQMD's significance thresholds. As described in the table, the emissions that would be generated within the SCAQMD would not exceed any of the applicable significance thresholds. Therefore, it can be concluded that Project emissions that would be generated within the SCAQMD would not result in or contribute to an exceedance of an applicable daily or hourly

ambient air quality standard, and that the associated construction impacts would be adverse, but would not be substantial.

TABLE K-1
PROPOSED ACTION MAXIMUM DAILY CONSTRUCTION EMISSIONS

Emission Source[a]	Maximum Daily Emissions (pounds/day)					
	VOC	NO_X	CO	SO_X	PM10*	PM2.5*
Total Maximum Daily Emissions Generated within the MDAB	23	135	218	0.3	136	34
Total Maximum Daily Emissions Generated within SCAQMD	7	39	63	<0.1	39	10
SCAQMD Thresholds	75	100	550	150	150	55
Exceeds SCAQMD Threshold?	No	No	No	No	Yes	No

NOTE: Total maximum daily NO_x emissions include a slight rounding error.

PM10 and PM2.5 emissions that would be generated within the SCAQMD are overestimated because the majority of PM10 and PM2.5 emissions that would be generated within the MDAB would be fugitive dust, and the majority of the PM10 and PM2.5 emissions that would be generated within the SCAQMD would be exhaust emissions.

SOURCE: based on AECOM, 2012.

11-64 For responses related to the commenter's claim that the air quality analysis equipment use and vehicle commute distance assumptions are under estimated, see Responses 11-62 and 11-63.

11-65 For responses related to the commenter's claim that the air quality analysis vehicle commute distance assumptions are under estimated, see Response 11-63.

11-66 For responses related to the commenter's claim that the air quality analysis equipment use and vehicle commute distance assumptions are under estimated, see Responses 11-62 and 11-63.

11-67 The commenter recommends that a mitigation measure be added to the PA/EIS that requires the presence of an air quality construction mitigation manager to ensure the efficacy of the proposed measures. As discussed in Section 4.1.6, the BLM would compile an Environmental and Construction Compliance Monitoring Plan (ECCMP) if the Project is approved to ensure the effective implementation of the mitigation measures that have been identified to address Project impacts. The comment does not state that the monitoring and enforcement mechanisms anticipated in the PA/EIS would be insufficient to serve this function, and, without more, does not persuade the BLM that the requested resource-specific monitor should be added to the team.

It should be noted that the PA/EIS has been revised to remove Mitigation Measure AQ-1 because: 1) the established mass emission indicator and threshold for the identification of adverse emissions of NO_x, as defined in Draft PA/EIS Section 4.2.1.4, would not be

exceeded; and 2) the majority of the PM10 that would be generated during construction would be in the form of fugitive dust, and the reductions in PM10 exhaust that would be achieved under Mitigation Measure AQ-1 would be negligible (i.e., less than one percent of total PM10 emissions) and unwarranted. The BLM believes that APMs AIR-1 and AIR-2 include comprehensive measures that would reduce construction-related fugitive dust emissions to the reasonable extent feasible, and that additional mitigation measures are not warranted.

11-68 The commenter suggests that the effectiveness of mitigation measures be modeled similar to that for the Genesis Solar Energy Project. However, given that there are no sensitive receptors in the vicinity of any of the Project components, BLM staff has determined that modeling of air pollutant concentrations is not warranted for the MSEP.

11-69 As required in Mitigation Measure WIL-6, the Applicant is required to prepare an Avian Protection Plan to monitor the death and injury of birds from collisions with facility features such as transmission lines. The content of the Plan has been revised to reflect the commenter's statement regarding meteorological towers and potential impacts to bats.

> **WIL-6: Avian and Bat Protection Plan.** The Applicant shall prepare and implement an Avian and Bat Protection Plan to monitor the death and injury of birds and bats from collisions with facility features such as transmission lines and tower structures (e.g., meteorological towers). The monitoring data shall be used to inform an adaptive management program that would avoid and minimize Project-related avian and bat impacts. The study design shall be approved by the BLM AO in consultation with CDFG and USFWS, and shall be incorporated into the Project's Biological Resources Mitigation, Implementation, and Monitoring Plan (BRMIMP; see Mitigation Measure VEG-2) and implemented.

11-70 The topic of night lighting effects on migratory birds and wildlife was discussed in Section 4.4 of the PA/EIS relative to the construction, operation and maintenance, and decommissioning phases of the Project. The description of the Proposed Action and alternatives in Chapter 2 (p. 2-17) describes that the lighting installed on the Project would kept to the minimum required for safety and security; sensors, motion detectors, and switches would be used to keep lighting turned off when not required; and all lights would be hooded and directed to minimize backscatter and off-site light. Generally, any measures that could be taken to minimize the effects of night lighting on wildlife have already been incorporated into the Project design to minimize light pollution.

The environmental setting at Laurel Mountain Substation in West Virginia is very different from the Blythe region. During a period of fog and poor visibility, several hundred birds became confused and continue to circle light sources at the substation. This scenario is relatively unlikely at the Project site because the area has good visibility and the Project will use hooded, downward directed lights that won't attract birds.

11-71 Chapter 2 details the Applicant's proposed construction, operation, maintenance, and decommissioning practices; the Applicant's proposal includes the possibility of blending concentrate from a reverse osmosis treatment unit with water from the on-site water wells to use for dust control. However, the PA/EIS does provide mitigation to avoid potential adverse environmental impacts associated with this practice. Mitigation Measure UTILITIES-1 (p. 4.18-7) prohibits the ground application of reverse osmosis concentrate, alone or blended with other water, in order to ensure that the selected reverse osmosis brine disposal method would not conflict with Colorado River RWQCB requirements or policies. Implementation of this measure would minimize potential for surface and groundwater quality degradation in accordance with Colorado River RWQCB policies and state and federal law.

11-72 The perimeter fencing design must provide site security while simultaneously excluding terrestrial wildlife species such as desert tortoises from the site and allowing unimpeded flow of stormwater runoff and overland flows. It is unlikely that top wire of the perimeter fence poses a risk to Nelson's bighorn sheep as suggested by the commenter; however, it is possible that a bird could become entangled in the barbed wire. The USFWS and BLM are closely involved in the design and approval of the perimeter fence. Thus, any requirements that the resource agencies impress on the fence design will be incorporated into the Applicant's final design. Foremost to the design, perimeter fencing needs to be able to minimize unauthorized site access. Therefore, any substantive design changes such as changes from barbed wire to smooth wire must meet the fence objectives of the Applicant.

11-73 See Response 11-34, which explains that adequate data was gathered and relied upon in the evaluation of impacts to golden eagle behavior and use of the Project site; this includes spring and winter surveys conducted over multiple years in coordination with USFWS personnel and in accordance with USFWS Interim Golden Eagle Inventory and Monitoring Protocols. Based on analysis provided in the PA/FEIS, implementation of the Project is not expected to result in take of golden eagles. Notwithstanding this conclusion, the requirements and obligations of other laws (such as the Bald and Golden Eagle Protection Act) apply to the Applicant and the Project independent of this NEPA analysis; accordingly, if it later is determined that take would result, the Applicant would be subject to all authorizations and approvals otherwise required by law. Documents prepared under federal laws (such as this PA/EIS prepared in accordance with FLPMA and NEPA) are not subject to state law requirements.

The Applicant provided a Project-specific Golden Eagle Risk Assessment in August 2011 (Tetra Tech, 2011) that the BLM and its NEPA contractor independently reviewed. Among other things, the Assessment evaluated Project-related impacts to golden eagles associated with the potential loss of golden eagle foraging habitat. Although it currently is unknown whether golden eagles that might nest in the McCoy, Little Maria, and Big Maria Mountains would utilize the Project Area for foraging in the future, avian point counts conducted for the Project suggest that golden eagles do not currently use the area

for foraging. Even if it is assumed that foraging could occur in the Project area, impacts related to the potential Project-related loss of such foraging habitat are likely to be minimal. This is because the area with the requested ROW represents 3 percent of the area within a 10-mile radius of the nearest eagle nest in the McCoy Mountains, which is an inactive nest located 1.7 miles to the west of the Project Area; 3 percent of the area of the next closest nest, which is an inactive nest located 3 miles to the southwest; and 1.5 percent of the area roughly central to the next closest nests, which are located 5.6 miles west-northwest and 8.4 miles northwest, respectively. Additionally, the requested ROW represents 0.4 percent of the area within a 10-mile radius of the active eagle nest in the Big Maria Mountains that was identified during spring 2010 surveys and determined in spring 2011 surveys to be occupied by red-tailed hawks. Furthermore, the habitat that would be disturbed or removed by development of the Project is neither unique nor limiting on the landscape, and does not represent a known prey concentration. Comparable or better foraging opportunities are expected to be available within the surrounding areas. For these reasons, development and operation of the Project is not expected to disturb the foraging of any eagle pairs within 10 miles of the Project site.

11-74 As quoted in the comment, Section 4.4.3.1 of the PA/EIS (p. 4.4.16) discloses the "potential for mortality due to collision with the gen-tie or distribution lines" based on expert analysis that independently has been reviewed by the BLM and its NEPA contractor. More specifically, as described in the PA/EIS, the Project's approximately 14.5 mile long gen-tie line would consist of a high voltage line and fiber optic telecommunication line. Associated poles would be approximately 70 to 145 feet tall. The high voltage line could pose an electrocution hazard to golden eagles and both lines could pose a collision hazard to birds. In addition to Mitigation Measure WIL-12, Measures to Minimize Impacts to Golden Eagles, the PA/FEIS also identifies Mitigation Measure WIL-6, Avian and Bat Protection Plan. Implementation of WIL-6 would require the Applicant to prepare and implement a plan to monitor the death and injury of birds (including golden eagles) from collisions with facility features such as transmission lines. The resulting monitoring data would inform an adaptive management program to avoid and minimize Project-related impacts to avian species, including golden eagles. The study design would require BLM approval in consultation with CDFG and USFWS. Current Avian Power Line Interaction Committee (APLIC) guidelines and USFWS recommendations for the reduction of bird mortality from collision and electrocution with powerlines are provided in Mitigation Measure WIL-6. Based on relevant subject area expertise, including that which informs the BLM's analysis, APLIC guidelines, and USFWS recommendations, the implementation of Mitigation Measure WIL-6 is expected to reduce impacts to golden eagles such that the potential for mortality due to collision with power lines is considered low.

As summarized in Response 11-34, surveys conducted over multiple years have identified only one active golden eagle nest within 10 miles of the MSEP site that is occupied by golden eagles; the nest is located 9.2 miles northeast, in the Big Maria Mountains. If an occupied nest subsequently is detected within 1 mile of the site

(including but not limited to activities conducted pursuant to the annual inventory that would be required to be conducted during construction pursuant to Mitigation Measure WIL-12), the Applicant would be required to prepare and implement a Golden Eagle Monitoring and Management Plan. As indicated in Response 11-73, the analysis and conclusions of the PA/FEIS have no effect on the applicability of any duty that the Applicant may have comply with otherwise applicable law, including any duty to obtain a permit or other authorization under other federal laws or state law.

11-75 The cumulative effects analysis in Section 4.3.9.3 which is cited by the commenter acknowledges that impacts are anticipated to special-status plants and cacti and that substantial permanent conversion of desert habitat to industrial and commercial uses would remove habitat for many special-status plant species and cacti. The text has been revised to reflect that following the implementation of identified mitigation the direct and indirect effect of the proposed action to special-status plants would be substantial. While the Project would have an adverse effect on special-status plants and cacti, there are no federal or State-listed threatened or endangered plant species on the Project site and many of the identified special-status species appear to be locally abundant and more common outside of the State of California.

In response to this comment, the cumulative discussion of Project effects to special-status plants and cacti on pg. 4.3-16 is revised as follows:

> ~~The Project is not anticipated to substantially affect any populations of special-status plant species or cacti, although a number of individuals would be affected by each Alternative (as described above and summarized in Table 4.3-3).~~ As discussed above, the development of numerous large-scale projects, such other wind and solar generation facilities, would result in a substantial permanent conversion of desert habitat to industrial and commercial uses, which would remove habitat for many special-status plant species and cacti. Therefore, the loss of this habitat is anticipated to result in substantial cumulative impacts on populations of many special-status plant species and cacti. However, preparation of the Habitat Enhancement/Restoration Plan, Revegetation Plan (to restore temporarily disturbed areas), Decommissioning and Reclamation Plan, and other plans as required in APM BIO-2p (*Cleanup and Restoration; Revegetation Plan*), and the implementation of Mitigation Measures VEG-7, VEG-8, VEG-10, VEG-11, VEG-12, WIL-4, WIL-10, WIL-15, and WIL-16, provide for the salvage of rare plants and cacti, avoidance of special-status plants whenever possible, compensatory mitigation, and site restoration following decommissioning and would ~~ensure that~~ minimize the loss of special-status plant species ~~is adequately compensated for~~ and protect similar habitat ~~would be protected~~ off-site. Implementation of these measures would reduce the Project's contribution to a cumulative impact on special-status plant species, but the effect remains substantial following the implementation of mitigation.

11-76 See Response 11-75

11-77 In response to the comment, the off-site special-status plant compensatory mitigation strategy has been revised to reflect that a rare plant distribution study cannot be substituted for special-status plant land acquisition and protection. The second paragraph under Item D, *Off-Site Compensatory Mitigation for Special-Status Plants* on pg. 4.3-33 of the DEIR is updated as follows:

> Where compensatory mitigation is required under the terms of Mitigation Measure VEG-10.C, above, the Applicant shall mitigate Project impacts to special-status plant occurrences with compensatory mitigation. Compensatory mitigation shall consist of acquisition of habitat supporting the target species, or restoration/enhancement of populations of the target species, and shall meet the performance standards for mitigation described below. ~~In the event that no opportunities for acquisition or restoration/enhancement exist, the Applicant can fund a species distribution study designed to promote the future preservation, protection or recovery of the species.~~ Compensatory mitigation shall be at a ratio of 3:1 for Rank 1 plants, with 3 acres of habitat acquired or restored/enhanced for every acre of habitat occupied by the special-status plant that will be disturbed by the Project Disturbance Area (for example, if the area occupied by the special-status plant collectively measured is 0.25 acre, the compensatory mitigation will be 0.75 acre). The mitigation ratio for Rank 2 plants shall be 2:1. So, for the example above, the mitigation ratio would be 0.5 acre for the Rank 2 plants.

Additionally, the following text has been deleted from Mitigation Measure VEG-10 on pg. 4.3-39:

> ~~**III. *Compensatory Mitigation by Conducting or Contributing to a Special-Status Plant Species Distribution Study*:** As a contingency measure in the event that there are no opportunities for acquisition or restoration/enhancement, a Scientific Study of Special-Status Plant Species Distribution Study may be funded. Distribution and occurrence health data is very limited for many of the sensitive species that occur on the Project or have potential to occur on the Project, especially the late summer- and fall-blooming species. Some of these late-blooming species are only known from a few viable occurrences in California, and historic occurrences that have not been re-located or surveyed since they were first documented. The objectives of this study would be to better understand the full distribution of the affected species, the degree and immediacy of threats to occurrences, and ownership and management opportunities, with the primary goal of future preservation, protection, or recovery. This study would include the following:~~
>
> ~~1. *Historical Occurrence Review*. The Study would include an evaluation of historical localities for the species known to occur on the project or with potential to occur. This would include a review of the CNDDB database, herbarium records from regional herbaria (U.C. Riverside, San Diego Natural History Museum, etc.), other biotechnical reports from the region, and information from regional botanical experts.~~
>
> ~~2. *Conduct Site Visits to Historical Localities*. Historical occurrences would be evaluated in the field during the appropriate time of the year for each late~~

~~blooming species. If located, these occurrences would be evaluated for population size, numbers, plant associates, soils, habitat quality, and potential threats, degree and immediacy of threats, ownership and management opportunities. GPS location data would also be collected during these site visits.~~

~~3. Survey Areas with habitat potential that surround each of these species occurrences to better determine the full range of distribution. If additional populations are found, collect data (GPS and assessment) on these additional populations consistent with III.2 above.~~

~~4. *Prepare a Distribution Study Report*. A report that discusses the finding from the historical information and the range extension surveys would be prepared that summarizes the information for each of the late season surveys. This report will provide valuable information and a better understanding of the actual distribution of these late blooming species within California and will help to determine when and when not there is potential for these species to occur. This valuable information will include a better understand of the ecological factors driving the distribution of these species and will help to better target appropriate habitat for both future surveys as well as potential future mitigation lands. All data from this study will be submitted for incorporation into the CNDDB system and the study report will be made available to resource agencies, conservation groups, and other interested parties.~~

~~5. Currently there is no program or study in place that is attempting to address the distributional issues for these late blooming species. If an existing study is identified or if one is developed prior to the study outlined here, an option to fund the existing study may be considered. If an existing study cannot be indentified then one will be developed that follows the guidelines discussed above. The funding provided for the program would be no greater than the cost for acquisition, enhancement, and long-term management of compensatory mitigation lands based on impacts to late blooming sensitive plant species.~~

~~To protect all special-status plants located outside of the Project Disturbance Area and within 100 feet of the permitted Project Disturbance Area from accidental and indirect impacts during construction, operation, and closure, the Applicant shall implement the following measures:~~

~~1. *Designated Botanist*. An experienced botanist who meets the qualifications described in Mitigation Measure VEG-10.B shall oversee compliance with all special-status plant avoidance, minimization, and compensation measures described in this condition throughout construction and closure. The Designated Botanist shall oversee and train all other Biological Monitors tasked with conducting botanical survey and monitoring work. During operation of the Project, the Designated Biologist shall be responsible for protecting special-status plant occurrences within 100 feet of the Project boundaries.~~

11-78 The identification of special-status plants to be established by Measure VEG-10, Item A.b, applies to plant populations located outside of the area of Project Disturbance. Because the project boundary is somewhat rigid, establishing large buffers (e.g., 250 feet as proposed in the comment) would not provide additional protection to special-status

plants that are already located outside the perimeter site fence. The presence of potential temporary, indirect effects to surrounding vegetation was identified in the PA/EIS.

11-79 The targeting of conservation lands that provide suitable habitat for special-status plants based on the nearby presence of populations and suspected presence on-site is a valid means for protecting known rare plant populations, providing protective buffers around known populations, and providing opportunities to enhance habitat connectivity. The Applicant would be required to justify the potential benefit of acquisition lands to target species prior to approval by the BLM.

11-80 The occurrence of mineralized soil crusts and biological soil crusts, and the contribution of these crusts in controlling fugitive dust generated by wind erosion, are discussed in Sections 3.2, *Air Resources*, and 3.7, *Geology and Soils Resources*. The effects of ground disturbance on air quality, including effects related to the presence of fugitive dust, is addressed in Section 4.2, *Air Resources*.

11-81 Mitigation Measure VEG-8, Part 17 describes performance criteria that must be met before revegetated areas can be considered restored. The plan requires a description of topsoil salvage and seeding techniques and a monitoring and reporting plan, and at least 80 percent native species in disturbed areas and at least 60 percent relative cover and density. To achieve these objectives the plan will undeniably need to consider location and climate, and the restoration effort will continue until restoration objectives are achieved. The identification and resolution of planting challenges that are specific to the Mojave Desert will be addressed in the Revegetation Plan and are not considered in the EIS.

The PA/EIS acknowledges that biological soil crusts would be damaged by Project activities. The components of this common desert soil community include cyanobacteria, green algae, microfungi, mosses, liverworts and lichens. The restoration of biological soil crusts is not required, though Mitigation Measure AQ-1 requires the use of non-toxic soil stabilizer in areas where desert pavement has been disturbed during construction.

Mitigation Measure AQ-1does account for the need to reapply soil stabilizers by requiring the Applicant to develop for review and approval by the BLM a plan that outlines the frequency of non-toxic soil stabilizer applications based on the specifications of the selected soil stabilizer. Approval by the BLM prior to the start of construction will ensure that the frequency of applications is adequate to account for the length of time for which the selected soil stabilizer is effective, according to manufacturer specifications.

11-82 See Responses 11-80 and 11-81 regarding the PA/EIS's analysis and mitigation of impacts to biological soil crusts.

11-83 The analytical baseline for the Proposed Action is the date that the Notice of Intent (NOI) was issued: August 29, 2011. The 1995 CDFG *Staff Report on Burrowing Owl Mitigation* was revised on March 7, 2012, after the NOI was issued. Therefore, the PA/EIS did not

incorporate the revised report. In reviewing the 2012 *Staff Report*, CDFG states that burrowing owl exclusion and burrow closure are not recommended where they can be avoided. In cases when owl exclusion cannot be avoided, CDFG recommends that a Burrowing Owl Exclusion Plan be developed and approved by the applicable local CDFG office. Mitigation Measure WIL-9 of the PA/EIS requires that a Burrowing Owl Mitigation Plan is prepared in consultation with CDFG. Thus, while not required to do so, the EIS generally meets with the requirements of the 2012 *Staff Report.*

11-84 The 1993 *Staff Report on Burrowing Owl Mitigation* recommends that 6.5 acres of burrowing owl foraging habitat be acquired and permanently protected per pair or unpaired resident burrowing owl. Based on the observation of four additional owls described in Response 11-44, which are presumed to be separate birds from the initial pair described on the site, an additional 26 acres of compensatory habitat is required for this species. Thus, at least 45 acres of burrowing owl habitat will be required to mitigate Project effects to burrowing owl. As identified in Response 11-44, several additional non-breeding burrowing owls were documented in the study area. If additional owl pairs are detected on the Project site, the amount of required mitigation would be adjusted correspondingly. In response to the increased number of owls documented on the Project site, Mitigation Measure WIL-9.4 on pg. 4.4-38 is revised as follows:

4. ***Acquire ~~19.5 Acres of~~ Compensatory Burrowing Owl Habitat*:** Consistent with CDFG mitigation guidance (CBOC, 1993), the Applicant shall acquire, in fee or in easement, at least 45~~19.5~~ acres of land suitable to support a resident population of burrowing owls and shall provide funding for the enhancement and long-term management of these compensation lands (based on three owl pairs and four unpaired owls observed during focused surveys and 6.5 acres per pair or individual bird; ~~as~~ to be adjusted based on final survey findings). The responsibilities for acquisition and management of the compensation lands may be delegated by written agreement to CDFG or to a third party, such as a non-governmental organization dedicated to habitat conservation, subject to approval by the BLM AO, in consultation with CDFG prior to land acquisition or management activities. Additional funds shall be based on the adjusted market value of compensation lands at the time of construction to acquire and manage habitat.

   a. *Criteria for Burrowing Owl Mitigation Lands*: The terms and conditions of this acquisition or easement shall be as described in Mitigation Measure WIL-4 [Desert Tortoise Compensatory Mitigation], with the additional criteria to include: 1) the ~~19.5~~ acres of mitigation land must provide suitable habitat for burrowing owls, and 2) the acquisition lands must either currently support burrowing owls or be no farther than 5 miles from an active burrowing owl nesting territory. The ~~19.5~~ acres of burrowing owl mitigation lands may be included with the desert tortoise mitigation lands ONLY if these two burrowing owl criteria are met. If the ~~19.5~~ acres of burrowing owl mitigation land is separate from the acreage required for desert tortoise compensation lands, the Applicant shall fulfill the requirements described below in this measure.

b. *Security*: If the ~~19.5~~ acres of burrowing owl mitigation land is separate from the acreage required for desert tortoise compensation lands, the Applicant or an approved third party shall complete acquisition of the proposed compensation lands within the time period specified for this acquisition (see the verification section at the end of this measure). Alternatively, financial assurance can be provided by the Applicant to the BLM AO and CDFG, according to the measures outlined in Mitigation Measure WIL-4. These funds shall be used solely for implementation of the measures associated with the Project. Financial assurance can be provided to the BLM AO in the form of an irrevocable letter of credit, a pledged savings account, or another form of security ("Security") prior to initiating ground-disturbing Project activities. Prior to submittal, the Security shall be approved by the BLM AO in consultation with CDFG and the USFWS to ensure funding. The final amount due will be determined by an updated appraisal and PAR analysis conducted as described in Mitigation Measure WIL-4.

11-85 See Response 11-83.

11-86 See Response 11-83. Additionally, the comment incorrectly states that the 2012 CDFG guidance recommends surveys within 14 days of construction. The 2012 guidance states that "(p)reconstruction surveys of suitable habitat at the project site(s) and buffer zone(s) should be conducted within the 30 days prior to construction to ensure no additional, burrowing owls have established territories since the initial surveys."

11-87 In response to the comment that burrowing owls benefit from mitigation components that are located near the point of impact, Mitigation Measure WIL-9, item 2.a on pg. 4.4-37 is revised as follows:

a. identify suitable sites <u>as close as possible to the Project site (e.g., within 300 feet), and</u> within 1 mile of the Project Disturbance Areas for creation or enhancement of burrows prior to passive relocation efforts;

Consistent with CDFG guidance, habitat compensation is required for all owls that are displaced by the Project, regardless of the success of off-site artificial burrows.

11-88 The PA/EIS already requires that a conservation easement be placed over burrowing owl mitigation lands. Mitigation Measure WIL-9 requires that the terms and conditions of the burrowing owl habitat acquisition or easement equal the requirements of Mitigation Measure WIL-4 (Desert Tortoise Compensatory Mitigation). Mitigation requirement WIL-4.3.b (Title/Conveyance) requires the transfer of a conservation easement or fee title to CDFG; however, a non-profit organization may hold the title to and manage compensation lands provided that a conservation easement is recorded in favor of CDFG.

11-89 See Response 11-83.

11-90 Mitigation Measure WIL-9, Item 4 requires that burrowing owl acquisition lands demonstrate the presence of suitable burrowing owl habitat. Wintering and other seasonally occupied, non-nesting burrowing owl habitat have considerable value to this species. Thus, the absence of owl nesting on compensation lands does not warrant higher compensation ratios.

11-91 As addressed in Response 9-59, due to the absence of Nelson's bighorn sheep in the regional area, the Proposed Action would not affect the movement or foraging opportunities for this species.

Burro deer populations are very sparse in the Project area due to limited available resources, the region's hot climate, and possibly due to hunting pressure. It is anticipated that deer movement patterns will change in response to the proposed action, as deer will need to adjust to the presence of one or more solar projects in order to access the valley floor and direct access through may not be readily available. Forage quality and availability and water sources are believed to be limiting factors for deer populations in the Project area. The solar plant site and McCoy Wash do not provide perennial water sources. As a result, burro deer are expected to remain near areas with available water during dry periods, venturing into other areas when water and high quality forage is available. The upper portions of washes and alluvial fans located west of the Project area will remain available for deer cover and forage following construction. Desert mule deer seasonally move considerable distances, on the order of 10 to 20 miles or farther in response to changing resource availability. As a result of this great mobility, burro deer are expected to continue movement between McCoy Mountains and other portions of the valley floor.

11-92 The western fenced boundary for the proposed Project has been adjusted since the Draft PA/EIS was released to reduce wildlife hazards and promote movement by burro deer and other mobile species along the western Project boundary. This was done by "flattening" the western edge and concurrently reducing the amount of required perimeter fence. The configuration of the enXco site and BSPP site boundaries are not finalized; however, BLM will with the USFWS to find and remove wildlife movement hazards on the western edge these sites as well.

11-93 See Response 11-91.

11-94 As described in Response 9-16, appropriately-timed surveys were performed for Couch's spadefoot toad in fall 2011; however, inadequate rainfall rendered surveys not viable. Surveys will be repeated in fall 2012. As Response 9-17 clarifies, seven swales on the gen-tie line and access road route and one location in the southwest portion of the solar plant site provide potential Couch's spadefoot breeding habitat. Thus, as the PA/EIS identifies, up to eight potential breeding sites could be directly affected by loss during construction phase of the Project. Implementation of the Couch's Spadefoot Toad Protection and Mitigation Plan required by Mitigation Measure WIL-14 will ensure that

swales are avoided as a primary means of avoiding effects to spadefoot toads, and that suitable breading sites will be created if toads are identified during focused surveys.

11-95 See Responses 11-53 and 11-54.

11-96 The Proposed Action would avoid the single identified bat roost that was identified west of the solar plant site, as identified in Response 9-61.

11-97 In response to this and other comments (See Response 6-28), the following impact discussion is added to the kit fox discussion on page 4.3-15 to address the topic of canine distemper in desert kit fox populations:

> In late 2011, the first known cases of canine distemper virus (CDV) were observed in desert kit foxes about 20 miles west of Blythe on public lands managed by the BLM and leased to Genesis Solar LLC to construct the Genesis Solar Energy Project site. CDFG believes that the outbreak originated from an infected host animal entering the site, possibly a wild or domestic dog, American badger, or other carnivore. The rapid spread of CDV within the kit fox population was facilitated by the project-related displacement of infected animals from the Genesis site into new kit fox territories. Subsequently, desert kit foxes were captured for disease testing at the First Solar Desert Sunlight, Solar Millennium Palen, Genesis Ford Dry Lake, and at Southern California Edison's Colorado River substation and CDV was identified at the two later sites, which span a distance of about 40 miles on the I-10 corridor within the Chuckwalla Valley (California Energy Commission, 2012). The CDFG Wildlife Investigations Lab continues to monitor the health of desert kit foxes and is attempting to characterize the spread and significance of the disease on regional kit fox populations. To date, there has been no effort to test desert kit foxes in the Project area for distemper.
>
> The typical practice for solar projects has been to exclude desert kit foxes from project areas during pre-construction clearing of project sites by "passive relocation" methods (i.e., by closing burrows, forcing foxes to locate to new off-site burrows). This practice has the potential to worsen the outbreak, by raising kit fox stress levels and causing increased susceptibility to infection, causing increased movement of diseased animals thereby increasing the spread of disease into new areas, or placing healthy kit foxes into contact with off-site infected animals (California Energy Commission, 2012).

Additionally, Mitigation Measure WIL-8 on page 4.4-36 has been redrafted as follows to provide additional canine distemper protection to desert kit fox populations:

> **WIL-8: American Badger and Desert Kit Fox Protection.** To avoid direct impacts to American badgers and desert kit fox, the Applicant shall implement the following measures:

1. ***Baseline Kit Fox Census and Population Health Survey:*** A qualified biologist with demonstrated mammal experience shall complete a baseline study of desert kit fox populations on the Project site and the anticipated dispersal areas from passive relocation at least 60 days prior to initiation of construction activities. The study shall characterize the demographics (e.g., size, structure, and distribution) of the kit fox population on the site and receiving areas. The Applicant shall coordinate with and fund studies by federal or State wildlife health officials [e.g., the CDFG Wildlife Investigations Lab (WIL)] to establish baseline health conditions.

2. ***Prepare Desert Kit Fox Management Plan*:** At least 45 days prior to construction, the Applicant shall submit a Desert Kit Fox Management Plan that: 1) incorporates baseline desert kit fox census and health survey findings into a cohesive management strategy that minimizes disease risk to kit fox populations; 2) specifically identifies preconstruction survey methods for kit foxes and large carnivores (e.g., badgers) in the Project area; 3) describes preconstruction and construction-phase passive relocation methods from the site, and; 4) coordinates survey findings prior to and during construction to meet the information needs of wildlife health officials in monitoring the health of kit fox populations. The Plan shall include contingency measures that would be performed if canine distemper were documented in the Project area possible dispersal areas adjacent to the Project site, and measures to address potential kit fox reoccupancy of the site (as documented at the Genesis site). The contents and requirements of the Plan shall be subject to review and approval by the BLM and CDFG.

3. ***Implement Desert Kit Fox Management Plan:*** If canine distemper is not identified in the Project area or relocation areas during baseline surveys, the mitigation strategy may utilize passive means or active means with appropriate CDFG authorization to relocate kit foxes from the site. The approach below assumes that canine distemper is not detected during baseline surveys.

   a. *Pre-Construction Surveys:* Biological Monitors shall conduct pre-construction surveys for desert kit fox and American badger no more than 30 days prior to initiation of construction activities. Surveys shall also consider the potential presence of dens within 100 feet of the project boundary (including utility corridors and access roads) and shall be performed for each phase of construction. If dens are detected each den shall then be further classified as inactive, potentially active, or definitely active.

   b. Inactive dens that would be directly impacted by construction activities shall be excavated by hand and backfilled to prevent reuse by badgers or kit fox.

   c. Potentially and definitely active dens that would be directly impacted by construction activities shall be monitored by the Biological Monitor for three consecutive nights using a tracking medium (such as diatomaceous earth or fire clay) and/or infrared camera stations at the entrance.

d. If no tracks are observed in the tracking medium or no photos of the target species are captured after three nights, the den shall be excavated and backfilled by hand.

e. If tracks are observed, the den shall be progressively blocked with natural materials (rocks, dirt, sticks, and vegetation piled in front of the entrance) for the next three to five nights to discourage the badger or kit fox from continued use. After verification that the den is unoccupied it shall then be excavated and backfilled by hand to ensure that no badgers or kit fox are trapped in the den. BLM approval may be required prior to release of badgers on public lands.

f. If an active natal den (a den with pups) is detected on the site, the BLM AO and CDFG shall be contacted within 24 hours to determine the appropriate course of action to minimize the potential for animal harm or mortality. The course of action would depend on the age of the pups, location of the den on the site (e.g., is the den in a central area or in a perimeter location), status of the perimeter site fence (completed or not), and the pending construction activities proposed near the den. A 500-foot no-disturbance buffer shall be maintained around all active dens.

g. The following measures are required to reduce the likelihood of distemper transmission:

i. No pets shall be allowed on the site prior to or during construction, with the possible exception of vaccinated kit fox scat detection dogs during preconstruction surveys, and then only with prior CDFG approval;

ii. Any sick or diseased kit fox, or documented kit fox mortality shall be reported to CDFG and the BLM AO within 8 hours of identification. If a dead kit fox is observed, it shall be collected and stored according to established protocols distributed by CDFG WIL, and the WIL contacted to determine carcass suitability for necropsy.

11-98 The commenter suggests that sound levels of 50 dB, the equivalent of a quiet conversation, may have adverse effects on nesting birds at a distance of 1,000 meters. However, Mitigation Measure VEG-8 (p. 4.3-23) uses the reasonable and slightly higher threshold of 65 dB as the baseline for determining whether or not proposed activities require breeding bird monitoring. This sound level is about equivalent to the volume of normal conversation (not loud construction noise, as the commenter suggests). As a result, virtually any construction-related activity performed during the nesting season could require nesting bird monitoring, and consequently, this threshold is adequate to mitigate potential noise impacts to nesting birds.

11-99 In response to this and other comments, the total amount of occupied Mojave fringe-toed lizard habitat was revisited and an error was detected in the original calculation that greatly overestimated the total cumulative impact and cumulative contribution of the Proposed Action. Following the updated analysis, the total amount of potentially

occupied sand dune and sand sheet habitat in the Palo Verde Valley was revised upward from 1,098 acres to 12,911 acres, which is considered a small portion of the available habitat based on the large amount of similar habitat available locally. Additionally, the total cumulative effect was revised downward from 655 acres to 76 acres. The anticipated contribution of the Proposed Action to cumulative effects, 38 acres, includes both temporary and permanent effects. Thus, the permanent impact of the Project, 19 acres, constitutes a permanent effect to less than 0.2 percent of sand dune and sand sheet habitat in the Palo Verde Valley study area that may support this species. It is also likely that other unidentified Mojave fringe-toed lizard populations occur in the cumulative resource study area and are not included in this assessment.

In the Palo Verde Valley, two projects (the MSEP and the BSPP) could potentially affect habitat for Mojave fringe-toed lizard and total 76 acres. The cumulative effect of these projects on Mojave fringe-toed lizard and its habitat constitutes about 0.6 percent of potential Mojave fringe-toed lizard habitat in the study area. Since over 99 percent of habitat would not be affected, the 3:1 mitigation ratio presented in the PA/EIS is appropriate to offset impacts of the Proposed Action.

The cumulative impact analysis for Mojave fringe-toed lizard in Table 4.4-3 (pg. 4.3-11) is revised as follows:

Mojave fringe-toed lizard Occupied sand dune/ sand sheet habitat in the ~~Chuckwalla and~~ Palo Verde V~~v~~alley~~s~~	12,911 ~~1,098~~ acres	35.0 acres (0.3~~.2~~%)	76~~655~~ acres (0.6~~59.7~~ %)	38 ~~46~~ acres (50~~7.0~~ %)	0 acres (0%)	38 ~~46~~ acres (50~~7.0~~ %)	38 ~~46~~ acres (50~~7.0~~ %)

In addition, potential effects to Mojave fringe-toed lizard are clarified on page 4.4-24 as follows:

> The analysis of cumulative Project effects to Mojave fringe-toed lizard habitat focused on known and CNDDB-documented populations within the ~~Chuckwalla Valley and~~ Palo Verde Valley. In these areas, populations are dependent upon areas with fine aeolian sand that occur in association with dunes, margins of dry lakes and washes, and isolated sand patches. The cumulative effects analysis identified approximately ~~1,098~~ 12,911 acres of occupied Mojave fringe-toed lizard habitat in the study area, of which approximately ~~655~~ 76 acres (~~59.7~~0.6 percent) occurs in areas where future projects are proposed (Table 4.4-3). Under Alternatives 1 and 3, approximately ~~46~~38 acres of habitat would be disturbed for the gen-tie line and associated access road. This represents approximately ~~4.2~~0.3 percent of available Mojave fringe-toed lizard habitat that was identified in the cumulative study area and represents a contribution of about ~~7~~50 percent of the total cumulative effect on this resource. The implementation of Mitigation Measures VEG-7, VEG-8, VEG-10, VEG-11, VEG-12, and WIL-10 would minimize impacts to sensitive dune and sand sheet habitat and provide suitable compensatory habitat for habitat losses.

11-100 As identified in Response 11-99, there was an error in the initial cumulative impact calculation. The cumulative build-out scenario would only affect about 76 acres, and the total amount of potentially occupied sand dune and sand sheet habitat in the Palo Verde Valley was revised to 12,911 acres. Thus, the permanent impact of the Project, 19 acres, constitutes a permanent effect to less than 0.2 percent of sand dune and sand sheet habitat in the Palo Verde Valley study area for this species, and total cumulative impact for all projects would be 0.6 percent of the total acreage.

11-101 The discussion of effects to cultural resources in the PA/EIS satisfies the requirements of NEPA, and the execution of an MOA, which is being prepared through consultation with SHPO, Indian tribes, and other interested consulting parties, and which, when executed prior to the ROD, will signify the completion of the BLM's requirements under Section 106 of the NHPA. The government-to-government consultation with Indian tribes required by Section 106 of the NHPA is ongoing.

11-102 The term "cultural resource" is not defined in the National Environmental Policy Act (NEPA) or any other Federal law. The discussion on page 3.5-1 is consistent with the definition of cultural resources provided in the BLM 8100 Manual. Cultural resources on the public lands managed by the BLM are concrete, material places and things. In compliance with several laws including NEPA and the NHPA, the BLM considers the values ascribed to these places and things, and the ways in which these places and things are used, when making decisions on actions that might affect them. The public participation processes followed by the BLM in complying with NEPA and the NHPA afford opportunities for the general public and Indian tribes to identify cultural resources of all kinds, and values relating to them, that they wish BLM to consider in its decision making.

Under the NHPA and its implementing regulations, significant cultural resources are called historic properties. Historic properties are districts, sites, buildings, structures and objects that are listed on, or eligible for listing on, the National Register of Historic Places. This definition is the only technical, operational meaning of the word "significant" as it applies to cultural resources within the context of Section 106. This does not mean that places or things not meeting this definition are unimportant. The BLM recognizes that values ascribed to places or things by social or cultural groups, including Indian tribes, may make them important and worthy of consideration even if those places or things do not meet the NRHP definition of significance. During the preparation of this PA/EIS, the general public and Indian tribes were afforded opportunities to identify cultural resources of importance to them regardless of whether those resources met the NRHP definition of significance. The cultural resources analyzed in the PA/EIS were the only cultural resources identified by the archival and field inventories, public participation opportunities, and tribal consultation efforts.

An Ethnographic Assessment currently is underway. Results are not yet available. See Section 5.2.2.

The BLM will continue consulting with Indian tribes throughout the Section 106 compliance process. BLM's tribal consultation efforts are discussed in Section 3.5.1.6 and in Appendix D. Tribes have been invited to identify resources and places of traditional cultural and religious importance that might be affected by the project. Tribes have also been invited to participate in consultations to develop a Memorandum of Agreement for the Project that will seek to resolve adverse effects, including visual, audible and atmospheric effects, on any NRHP-eligible traditional cultural properties that may be identified.

The analysis of impacts in Section 4.5 is not restricted to NRHP-listed or eligible cultural resources. All cultural resources identified within the Area of Potential Effects are included in the analysis, regardless of whether they meet the NRHP definition of significance.

11-103 Regarding the definition of the APE, please see Response 10-5. As discussed on page 4.5-3, BLM's analysis of adverse effects to cultural resources took into consideration types of effect other than direct physical impact, and included consideration of auditory, visual, and atmospheric effects. To date, no viewsheds of cultural value have been identified through archival research, field inventory, public comments, and tribal consultation. No sacred sites or places of traditional cultural or religious importance to Indian tribes were identified within the area that would be affected by the Project. No auditory or olfactory impacts to known resources have been identified.

11-104 Please see Response 11-102.

11-105 The PA/EIS adequately evaluates the potential effects of the Project on buried cultural resources. The paragraph on page 3.5-29 excerpted by the commenter reflects the observations concerning the distribution of surface artifacts made by the archaeological field crew during archaeological surveys, and does not directly pertain to the subject of buried cultural resources. As discussed on page 3.5-30, a geoarchaeological study was performed in order to assess the potential for buried resources to exist within the Project area. The study's findings confirmed that Holocene and Pleistocene-aged sediments within the Project area do have a potential to contain buried resources. Mitigation Measure CUL-1 requires the execution of an MOA that will detail the process for activities to proceed in areas where historic properties are not now known to exist, and that will contain procedures for treatment of inadvertent discoveries. However, Sections 3.5 and 4.5 of the PA/EIS have been modified in order to clarify and emphasize the Project area's sensitivity for buried resources and the potential impacts to buried resources.

11-106 The PA/EIS has been revised to eliminate discussion of draft cultural landscapes because there can be no adverse effect upon a delineated cultural landscape until the delineation process is complete. Studies are currently underway, independent of this Project, to examine prehistoric trails and associated sites in the Colorado Desert to determine, among other things, what sites might be included within such a network, the cultural

behavior they may represent, and the importance they hold for Native Americans today. However, until these landscape-level studies have been completed, it would be premature to speculate about NRHP eligibility criteria for the sites that may be included within such a network, whether the interrelated sites might qualify for nomination to the NRHP as a district, or precisely what mitigation strategies might be employed to address impacts to individual sites within the context of a larger complex of interrelated resources.

11-107 The discussion of effects to cultural resources in the PA/EIS satisfies the requirements of NEPA, and the execution of an MOA, which is being prepared through consultation with SHPO, Indian tribes, and other interested consulting parties, and which will be executed prior to the ROD, will signify the completion of the BLM's requirements under Section 106 of the NHPA.

The regulations implementing the National Historic Preservation Act (NHPA), found at 36 CFR Part 800, provide for the use of a Memorandum of Agreement (MOA) to describe measures designed to resolve adverse effects on historic properties. MOAs are commonly used to comply with Section 106 of the NHPA on projects like the MSEP. Development of the MOA for the Project will provide an opportunity for determining mitigation consistent with the values of the historic properties involved, prior to construction or other activities that could affect them.

Neither NEPA nor the NHPA require complete avoidance of all Project-related impacts on cultural resources. However, implementation of the HPTP required by Mitigation Measure CUL-1 will ensure that affected historic properties are treated consistent with the values that make them significant. In addition to addressing known historic properties, the HPTP will include provisions for monitoring construction activities and identifying, evaluating and treating buried cultural resources that may be discovered during construction.

The MOA will be completed and signed prior to approval of the ROD. Consulting parties and stakeholders, including the State Historic Preservation Officer and Indian tribes, will have an opportunity to participate in consultations on the terms and provisions of the MOA before the Project is approved. Final measures to avoid, minimize, and mitigate impacts to cultural resources will be developed as a result of that consultation.

If cultural resources that are not historic properties are identified prior to approval of the ROD, measures to avoid, minimize or mitigate impacts on them will be developed in consultation with the people to whom they are culturally important.

11-108 See PA/FEIS Section 5.2.2, which summarizes the BLM's ongoing government-to-government consultation with federally recognized tribes, including the Cocopah and Quechan tribes. Consistent with the BLM NEPA Handbook (p. 167), public information documents such as letters, notices, and all written correspondence with tribes, appropriately is included in and available as part of the formal administrative record for the Project. Such materials need not be included in the EIS. Insufficient detail is provided

to support the general assertion made in the comment that the PA/EIS "completely fails to evaluate the meaning of tribal concerns" to allow for a detailed response. However, see generally PA/FEIS Section 4.5, which analyzes impacts of the alternatives under consideration to cultural resources, including tribal concerns.

11-109 As stated in the Notice of Intent to prepare the Draft PA/EIS for the Project, 76 Federal Register 167 (29 August 2011), pp. 53693-53694, "Federal, State, and local agencies, along with tribes and other stakeholders that may be interested in or affected by the BLM's decision on this Project, are invited to participate in the scoping process and, if eligible, may request or be requested by the BLM to participate in the development of the environmental analysis as a cooperating agency." Additionally, the BLM sent a press release regarding the Notice of Intent and scoping comment opportunities to numerous local news sources in the region, including the Palo Verde Valley Times, Hi-Desert Star, and Press-Enterprise. No requests to participate in consultation about historic resources were received from interested parties during the scoping period, nor have any been received during the public comment period on the Draft PA/EIS or at any other time to date. The BLM welcomes and invites the participation of other interested parties.

11-110 As described in PA/FEIS Section 5.2.2, the BLM consults with Indian tribes in accordance with several authorities including, for example, NEPA, the NHPA, the AIRFA, and Executive Orders. Government-to-government consultation is ongoing. As described on page 3.5-2, in addition to the Cultural Resources Survey Report, the BLM has initiated consultation with Indian tribes to identify places of traditional religious and cultural importance that may otherwise be left unidentified by these studies. Additionally, an Ethnographic Assessment currently is underway. Results are not yet available. See Section 5.2.2.

11-111 As discussed in PA/FEIS Section 5.2.2.1, the NHPA consultation process will conclude with the execution of an MOA that includes avoidance, protection, and mitigation measures. The draft MOA provided in PA/FEIS Appendix L includes a NAGPRA-compliant Plan of Action that will be finalized as part of the consultation process to ensure the proper treatment and protection of prehistoric human remains should any be discovered. Consistent with BLM Instruction Memorandum No. 2012-108 (April 27, 2012), *Coordinating National Historic Preservation Act and National Environmental Policy Act Compliance*, the BLM "must complete both the NHPA Section 106 process and Tribal Consultation prior to making a final decision on a proposed action." Accordingly, the MOA (including the Plan of Action) will be finalized before the BLM makes a decision on the Project.

11-112 The BLM concurs with the commenter that many conventional modes of floodplain management do not transfer to desert wash or alluvial fan settings, such as are present on the Project site. However, as discussed in Chapter 2, floodplain management for the Project would be different from many of the other major solar projects that have been approved. Notably, as discussed in Section 4.20, flood flows would be permitted to flow across the

site, rather than being concentrated in channels along the edge of the facility. With respect to evaporation ponds being affected by flooding, this potential issues is disclosed and mitigated in Section 4.20 (see to page 4.20-9 and Mitigation Measure WATER-4 on page 4.20-19). With respect to potential for undermining of PV arrays, as discussed in Section 4.20, the PV panels would be located outside of and away from ephemeral channels. These areas would be avoided to preserve the channels as natural floodways. Panel mounts located in areas where overland flows would occur during flooding events could become temporarily inundated, but flow velocities in these areas would be substantially less than in ephemeral channels with concentrated flows, and are not anticipated to be of sufficient velocity to result in substantial scouring or undercutting. Consequently, because the design/layout of the Project would avoid siting of solar panels and other facilities within ephemeral channels or washes, significant impacts to arrays such as toppling is not anticipated.

11-113 Section 4.9 does provide evidence to substantiate its claim that if solar PV modules were damaged at the Project site, CdTe would not mobilize to the environment (Fthenakis, 2003, 2008). The comment presents new information published in July 2012 that was not available to the authors of the analysis at the time it was completed (Sinha et al., 2012). This information has been reviewed and Section 4.9 revised to reflect this new information, as shown below. The Sinha et al. report studies the scenario of commercial rooftop solar PV panels, not a utility-scale solar farm scenario like the Project. However, its findings are relevant to the Project. Sinha et al. find that "Overall, a worst case leaching scenario with screening level fate and transport modeling yields impacts to soil, air, and groundwater that are one to five orders of magnitude below human health screening levels in a California…exposure scenario" (pp. 1674-1675). This new information does not change the conclusions of the hazardous materials impact analysis; however, in response to this and other comments concerning the potential for CdTe leaching from damaged panels, Mitigation Measure HAZ-2, which requires the Applicant to prepare and implement a Broken PV Module Detection and Handling Plan if the Applicant chooses to use CdTe PV panels, has been added to Section 4.9. Implementation of this measure would minimize the potential for CdTe leaching from damaged panels.

> The Applicant is considering use of PV panels that contain a thin semiconductor layer containing cadmium telluride (CdTe). While CdTe itself is a hazardous substance in an isolated form, the CdTe in the PV panels is bound and sealed within the glass sheets and a laminate material (Fthenakis, 2003, 2008). A report by the Norwegian Geotechnical Institute (NGI) notes that "If the modules are destroyed during use and are exposed to rain, emissions can occur; however, a very low vapour pressure and water solubility are expected to result in only trace emissions into the environment" (NGI, 2010, p. 13). Additionally, an article that examined the potential for CdTe leaching from commercial rooftop solar PV installations found the worst-case modeled environmental concentrations in soil, air, and groundwater in a California-based scenario, are one to five orders of magnitude below human health screening levels (Sinha et al., 2012). If the

Applicant chooses to use CdTe PV panels, implementation of Mitigation Measure HAZ-2, which requires the Applicant to prepare and implement a Broken PV Module Detection and Handling Plan, would minimize the potential for CdTe leaching from damaged panels. ~~The CdTe within the PV modules is highly stable and, even if the modules were damaged, CdTe would not mobilize from the glass and into the environment under any plausible Project conditions (Golder, 2010).~~

11-114 The potential for flooding to inundate evaporation ponds is evaluated on page 4.20-9. As discussed therein, implementation of Mitigation Measure WATER-4 would be required, which would require protection of the proposed evaporation pond from flooding via installation of berms that would be no less than two feet above the highest anticipated flows during a 100-year storm event (p. 4.20-19). Therefore, release of water or solids from the evaporation ponds would not occur during a flood event, and no further analysis is warranted.

11-115 See Response 6-18. As discussed therein, the flood noted by the commenter was approximately equivalent to a 100-year event, not a 500-year event. Consideration of 500-year flood is not warranted due to the very low probability of such an event (0.2 percent chance of occurring in a single year) and the lack of previous data regarding the potential effects. Projects are typically not required to design for 500 year events because they are rare and effects of such events cannot be reliably predicted.

11-116 See Response 11-113 regarding the potential for CdTe to be released from PV panels. Because evidence shows that worst-case releases of CdTe from broken panels are well below levels of concern, the risk of release of CdTe during a potential flood event is considered to be very low.

11-117 See Response 11-115.

11-118 See Response 11-113 regarding the potential for CdTe to be released from PV panels. A mitigation measure has been added to Section 4.9 as described therein. Also see Response 11-114 regarding the potential for flooding to inundate evaporation ponds.

11-119 The PA/EIS notes and evaluates requirements for a Title 27 discharge permit and associated waste discharge requirements (WDRs) on page 4.20-10. As discussed therein, adherence to the conditions of this permit would ensure that potential for water quality degradation is minimized, in accordance with state and federal laws. Permits for the placement of fill and other modifications to natural waterways are discussed in Sections 3.3 and 4.3, *Biological Resources - Vegetation*, along with potential environmental impacts associated with the construction activities that are proposed for the Project site. As discussed therein, mitigation measures are applied as warranted to minimize potential impacts. For additional discussion, please refer to Sections 3.3 and 4.3 of the PA/EIS.

In general, with respect to permitting, finalized permits would be acquired prior to the initiation of construction activities on site. Permits would be received following completion of engineering-level site design, and would require adherence to various permitting conditions and requirements, as required by law. To the extent that such permitting conditions would affect or reduce environmental impacts associated with the Project, applicable permitting conditions have already been anticipated and considered within the text of the PA/EIS. The application of further or additional permitting conditions by agencies during the permitting process could result in further restrictions or compliance actions being levied, in order to minimize potential impacts. The permitting process would not, however, result in a slackening of requirements for the protection of natural resources, nor would the permitting process itself result in novel or exacerbated environmental impacts. Therefore, further discussion and analysis of applicable permits beyond that already provided by the PA/EIS is not warranted.

11-120 Section 3.9, *Hazards and Hazardous Materials*, acknowledges that "an additional environmental concern at the Project site is the potential presence of unexploded ordnance due to its use as a military practice area during the World War II era," i.e., the California-Arizona Maneuver Area (CAMA), as described in Section 3.22.2, *Unexploded Ordnance*, in which the Draft PA/EIS disclosed the presence of military exercises and the potential for discarded military munitions, other explosives, and unexploded ordnance to be encountered on the site. The potential health and safety risks related to unexploded ordnance are described, and mitigation proposed, in Section 4.22, *Additional NEPA Considerations*. Portions of the discussion of the site's historic military training use have been moved to Section 3.9 in response to comment 11-121, below.

11-121 As disclosed on page 3.9-2, the Phase I Environmental Site Assessment conducted for the Project site determined that lead debris from shooting target practice could be present on the Project site. Additionally, as had been described in Section 3.22.2, *Unexploded Ordnance*, incendiary and pyrotechnic materials were stored at the former Blythe Army Airfield. The commenter expresses concern about the potential for other metals, including copper, zinc, tungsten, arsenic, antimony, and nickel, as well as perchlorates, to be present in soils on the Project site. The discussion of the site's historic military training use that was in Section 3.22.2 has been moved to Section 3.9.1.2, *Hazardous Materials* to provide context earlier in the PA/EIS for the discussion of potentially hazardous materials in soils, and additional discussion of the potential for metals and perchlorates to be present in site soils has been added to Section 3.9.1.2.

Additional discussion of the potential for worker exposure to hazardous materials in on-site soils has been added to Section 4.9 as follows:

Environmental Site Contamination

Ground-disturbing activities would disturb on-site soils that may contain materials such as metals and perchlorates which, if inhaled, could result in adverse health effects for workers. Although some fugitive dust would result from operation and

maintenance as described in Section 4.2, *Air Resources*, the primary concern if such materials are present on site would be construction workers potentially exposed to more dust. Because construction would be temporary, long-term exposures are not anticipated to occur. Implementation of dust suppression measures in APMs AIR-1 and AIR-2 would reduce the potential for worker exposure to any hazardous materials that may be present in site soils by reducing the amount of dust released from construction and operation activities. In addition, as described in Section 2.3.1.4.12, *Health and Safety*, construction-related safety programs and procedures would include a PPE program and respiratory protection program that would further reduce the potential for exposure to any existing on-site hazardous materials. Finally, implementation of Mitigation Measure HAZ-1, which requires the Applicant to prepare and implement a site-specific Hazardous Materials Safety Plan, would minimize potential exposures to existing hazardous materials if such materials are found to be present on site.

Additionally, Mitigation Measure HAZ-1 has been added to Section 4.9:

HAZ-1: The Applicant shall prepare and implement a site-specific Hazardous Materials Safety Plan. The plan shall identify the chemicals potentially present in on-site soils, health and safety hazards associated with those chemicals, monitoring to be performed during site activities, soil handling and disposal methods required to minimize the potential for harmful exposures, appropriate personal protective equipment, and emergency response procedures. The Plan shall be included in and implemented as part of the Project's larger Safety and Health Program. The plan shall be submitted to the BLM for approval prior to commencement of construction activities and shall be distributed to all construction crew members prior to construction and operation of the Project.

Implementation of Mitigation Measure HAZ-1 would reduce, but not completely avoid, the potential risks to workers from encountering hazardous materials, if such materials are present on site.

11-122 See Responses 11-120 and 11-121.

11-123 The BLM acknowledges the potential for flood flows to occur on site. Potential impacts associated with flooding are discussed on page 4.20-9. As discussed therein, the flood analysis included for the Project site considered potential flood events up to the 100-year event. As discussed briefly in Section 4.20 and more extensively in Chapter 2, flooding on-site would be managed by allowing flood flows to cross the site without imposed constrictions. Flood waters would pass underneath the solar panels. This flood management strategy is in contrast to flood management strategies employed by Genesis and select other solar projects in the region, which seek to concentrate flows and direct those flows around the site and away from solar arrays. Therefore, because no flood protection berms or other flood protection features surrounding the site are proposed, such features would not be installed prior to construction. Note, however, that select

structures on-site would require protection from flooding. These include proposed buildings, maintenance areas, designated parking lots, and the evaporation ponds. These features would require elevation above the floodplain in order to provide flood protection (see page 4.20-9 and Mitigation Measure WATER-4). The fill needed in order to elevate these structures above the floodplain would be placed prior to the installation of these facilities. Therefore, these facilities would be protected from flooding during and after construction. See also Response 6-18.

11-124 As explained in PA/FEIS Section 5.5.4.3, Common Response 3, the Draft PA/EIS has been revised to emphasize the BLM's conclusion that available data do not substantiate the hypothesis from 2009 that groundwater from the Colorado River could potentially flow through the PVVGB to the PVMGB, and to clarify that PVID's drains prevent water flow between the Colorado River and the mesa groundwater. Because there is no connectivity between the Colorado River and mesa groundwater, Project-related groundwater pumping would have no impact on the Colorado River.

11-125 See PA/FEIS Section 5.5.4.1, Common Response 1.

11-126 See PA/FEIS Section 5.5.4.1, Common Response 1.

11-127 Alternatives to the proposed Project are described in PA/FEIS Chapter 2 and analyzed on a resource by resource basis throughout Chapter 4. The alternatives development and screening criteria relied upon in selecting a reasonable range of alternatives is set forth in PA/FEIS Section 2.2. Alternative sites on and off BLM-administered land were considered (PA/FEIS Section 2.9.2). See also PA/FEIS Section 5.5.4.1, Common Response 1.

Regarding the initial siting of renewable energy projects, the BLM has considered the criteria proposed collectively by Audubon California, California Wilderness Coalition, Defenders of Wildlife, Desert Protection Council, Mojave Desert Land Trust, Natural Resources Defense Council, Sierra Club, the Nature Conservancy, the Wilderness Society, and the Wilderness Conservancy, and notes that there is some overlap with those factors emphasized by the BLM in early conversations with potential applicants about possible project proposals. As explained in PA/FEIS Section 2.9.1, the BLM worked closely with the Applicant during the pre-application phase to identify appropriate areas for the Project. BLM discouraged the Applicant from including in its application alternate BLM locations with significant environmental concerns, such as critical habitat, ACECs, DWMAs, designated off-highway vehicle (OHV) areas, wilderness study areas, and designated wilderness areas. BLM encouraged the Applicant to locate its project on public land with few potential conflicts.

11-128 See Response 11-127 and PA/FEIS Section 5.5.4.1, Common Response 1. The affected environment is described on a resource by resource basis in the PA/FEIS (See, e.g., Section 3.3 (Vegetation), Section 3.4 (Wildlife), and Section 3.5 (Cultural Resources)).

Regarding cultural resources, see also PA/FEIS Section 5.2.2, which describes the NHPA Section 106 and government-to-government consultation processes.

11-129 See PA/FEIS Section 5.5.4.1, Common Response 1.

11-130 See PA/FEIS Section 5.5.4.1, Common Response 1.

11-131 Preference for Alternative 3's central gen-tie route is noted. See PA/FEIS Section 2.8, Agency Preferred Alternative.

11-132 See PA/FEIS Section 5.5.4.2, Common Response 2.

11-133 The Multiple Use Class (MUC) Guidelines in Table 1 of the CDCA Plan state that solar electrical generation facilities may be allowed in an MUC Limited (L) area after NEPA requirements are met and the CDCA Plan is properly amended. The Proposed Action, if approved, would amend the CDCA Plan following the process anticipated in the CDCA Plan to identify the site as suitable for the proposed solar energy use. Accordingly, the proposed CDCA Plan amendment and the overall amendment process would be consistent with the CDCA Plan.

The CDCA Plan is a comprehensive, long-range plan that was adopted in 1980; it since has been amended many times. The CDCA is a 25-million-acre area that contains over 12 million acres of BLM-administered public lands within the area known as the California Desert. The Plan initially was prepared and continues to provide guidance concerning the use of the California Desert public land holdings while balancing other public needs and protecting resources. More specifically, it establishes goals and specific actions for the management, use, development, and protection of the resources and public lands within the CDCA. It is based on the concepts of multiple use, sustained yield, and maintenance of environmental quality. The Plan anticipated that renewable power generation facilities would be proposed in the California Desert. Accordingly, it made allowances for the review of such applications, including a provision that all proposed applications "associated with power generation or transmission not identified in the [CDCA] Plan will be considered through the Plan Amendment process." The intention of this provision was to ensure that the BLM would take a planning view of all of the renewable energy applications proposed and that such projects would require an amendment to the CDCA Plan to maintain consistency throughout the plan. Amendments to the CDCA Plan can be site-specific or global, depending on the nature of the amendment. Thus, the Plan Amendment process is an intentional aspect of the Plan designed to allow for both flexibility and consistency in the use and protection of public lands and resources.

Furthermore, the Riverside East SEZ includes some Class L lands, indicating that the development of such lands for solar development is an anticipated use.

11-134 See PA/FEIS Chapter 3, Affected Environment; Chapter 2, Proposed Action and Alternatives; Chapter 4, Environmental Consequences, and responses to prior comments

in this letter. For these reasons, as well as those provided in PA/FEIS Section 5.5.4.4, Common Response 4, the Draft PA/EIS will not be recirculated for public review and comment.

Letter 12 – Responses to Comments from Center for Biological Diversity (CBD)

12-1 The comment is noted.

12-2 The comments submitted by Defenders of Wildlife, Natural Resources Defense Council, Sierra Club, the Wilderness Society, and Audubon California are addressed under Letter 22, Responses 22-1 through 22-22.

12-3 See PA/FEIS Section 5.5.4.2, Common Response 2.

12-4 See PA/FEIS Section 5.5.4.2, Common Response 2.

12-5 The comment is noted.

12-6 The stated preference for an alternative that avoids areas that are sensitive ecologically and hydrologically is noted. Conversations between the BLM, other resource agencies, and the Applicant are ongoing as to a potential realignment of the westernmost fence line of Unit 2. The ultimate decision on this point will be reflected in the ROD.

12-7 The comment that desert tortoise impacts would be lessened under Alternative 2, which avoids the western portion of the Project area, is consistent with the analysis in the PA/EIS and is noted.

12-8 The number of kit foxes identified in the Project area is presented in the technical reports provided in Appendix C, and summarized on page 3.4-16.

12-9 In response to this and other comments, the following impact discussion is added to the kit fox discussion on page 4.3-15 to address the topic of canine distemper in desert kit fox populations:

> In late 2011, the first known cases of canine distemper virus (CDV) were observed in desert kit foxes about 20 miles west of Blythe on public lands managed by the BLM and leased to Genesis Solar LLC to construct the Genesis Solar Energy Project site. CDFG believes that the outbreak originated from an infected host animal entering the site, possibly a wild or domestic dog, American badger, or other carnivore. The rapid spread of CDV within the kit fox population was facilitated by the project-related displacement of infected animals from the Genesis site into new kit fox territories. Subsequently, desert kit foxes were captured for disease testing at the First Solar Desert Sunlight, Solar Millennium Palen, Genesis Ford Dry Lake, and at Southern California Edison's Colorado River substation and

CDV was identified at the two later sites, which span a distance of about 40 miles on the I-10 corridor within the Chuckwalla Valley (California Energy Commission, 2012). The CDFG Wildlife Investigations Lab continues to monitor the health of desert kit foxes and is attempting to characterize the spread and significance of the disease on regional kit fox populations. To date, there has been no effort to test desert kit foxes in the Project area for distemper.

The typical practice for solar projects has been to exclude desert kit foxes from project areas during pre-construction clearing of project sites by "passive relocation" methods (i.e., by closing burrows, forcing foxes to locate to new off-site burrows). This practice has the potential to worsen the outbreak, by raising kit fox stress levels and causing increased susceptibility to infection, causing increased movement of diseased animals thereby increasing the spread of disease into new areas, or placing healthy kit foxes into contact with off-site infected animals (California Energy Commission, 2012).

Additionally, Mitigation Measure WIL-8 on page 4.4-36 has been redrafted as follows to provide additional canine distemper protection to desert kit fox populations:

WIL-8: American Badger and Desert Kit Fox Protection. To avoid direct impacts to American badgers and desert kit fox, the Applicant shall implement the following measures:

1. ***Baseline Kit Fox Census and Population Health Survey:*** A qualified biologist with demonstrated mammal experience shall complete a baseline study of desert kit fox populations on the Project site and the anticipated dispersal areas from passive relocation at least 60 days prior to initiation of construction activities. The study shall characterize the demographics (e.g., size, structure, and distribution) of the kit fox population on the site and receiving areas. The Applicant shall coordinate with and fund studies by federal or State wildlife health officials [e.g., the CDFG Wildlife Investigations Lab (WIL)] to establish baseline health conditions.

2. ***Prepare Desert Kit Fox Management Plan*:** At least 45 days prior to construction, the Applicant shall submit a Desert Kit Fox Management Plan that: 1) incorporates baseline desert kit fox census and health survey findings into a cohesive management strategy that minimizes disease risk to kit fox populations; 2) specifically identifies preconstruction survey methods for kit foxes and large carnivores (e.g., badgers) in the Project area; 3) describes preconstruction and construction-phase passive relocation methods from the site, and; 4) coordinates survey findings prior to and during construction to meet the information needs of wildlife health officials in monitoring the health of kit fox populations. The Plan shall include contingency measures that would be performed if canine distemper were documented in the Project area possible dispersal areas adjacent to the Project site, and measures to address potential kit fox reoccupancy of the site (as documented at the Genesis site). The contents and requirements of the Plan shall be subject to review and approval by the BLM and CDFG.

3. ***Implement Desert Kit Fox Management Plan:*** If canine distemper is not identified in the Project area or relocation areas during baseline surveys, the mitigation strategy may utilize passive means or active means with appropriate CDFG authorization to relocate kit foxes from the site. The approach below assumes that canine distemper is not detected during baseline surveys.

   a. *Pre-Construction Surveys:* Biological Monitors shall conduct pre-construction surveys for desert kit fox and American badger no more than 30 days prior to initiation of construction activities. Surveys shall also consider the potential presence of dens within 100 feet of the project boundary (including utility corridors and access roads) and shall be performed for each phase of construction. If dens are detected each den shall then be further classified as inactive, potentially active, or definitely active.

   b. Inactive dens that would be directly impacted by construction activities shall be excavated by hand and backfilled to prevent reuse by badgers or kit fox.

   c. Potentially and definitely active dens that would be directly impacted by construction activities shall be monitored by the Biological Monitor for three consecutive nights using a tracking medium (such as diatomaceous earth or fire clay) and/or infrared camera stations at the entrance.

   d. If no tracks are observed in the tracking medium or no photos of the target species are captured after three nights, the den shall be excavated and backfilled by hand.

   e. If tracks are observed, the den shall be progressively blocked with natural materials (rocks, dirt, sticks, and vegetation piled in front of the entrance) for the next three to five nights to discourage the badger or kit fox from continued use. After verification that the den is unoccupied it shall then be excavated and backfilled by hand to ensure that no badgers or kit fox are trapped in the den. BLM approval may be required prior to release of badgers on public lands.

   f. If an active natal den (a den with pups) is detected on the site, the BLM AO and CDFG shall be contacted within 24 hours to determine the appropriate course of action to minimize the potential for animal harm or mortality. The course of action would depend on the age of the pups, location of the den on the site (e.g., is the den in a central area or in a perimeter location), status of the perimeter site fence (completed or not), and the pending construction activities proposed near the den. A 500-foot no-disturbance buffer shall be maintained around all active dens.

   g. The following measures are required to reduce the likelihood of distemper transmission:

      i. No pets shall be allowed on the site prior to or during construction, with the possible exception of vaccinated kit fox

scat detection dogs during preconstruction surveys, and then only with prior CDFG approval;

ii. Any sick or diseased kit fox, or documented kit fox mortality shall be reported to CDFG and the BLM AO within 8 hours of identification. If a dead kit fox is observed, it shall be collected and stored according to established protocols distributed by CDFG WIL, and the WIL contacted to determine carcass suitability for necropsy.

12-10 See Response 12-9.

12-11 See Response 12-9.

12-12 See Responses 12-8 and 12-9.

12-13 See Response 12-9.

12-14 The cumulative analysis prepared in support of the PA/EIS identified 286,084 acres of potential burrowing owl habitat in creosote bush scrub and desert pavement habitat types in the Palo Verde watershed, of which the proposed action would affect approximately 4,496 acres (1.6 percent of the total area). A formal field study of the cumulative resources study area is beyond the scope of the biological resources analysis prepared for the PA/EIS. While much of the public land in the regional area is available for study, such a large-scale effort would be hampered by the presence of inaccessible private lands and the long period of time and extensive financial resources that would required. As a result, the PA/EIS analysis of burrowing owl distribution and potential impacts relied on focused, site-specific burrowing owl surveys, technical reports for the surrounding area (e.g., for the BSPP), and other available scientific literature.

12-15 The analytical baseline for the proposed action is the date that the Notice of Intent (NOI) was issued: August 29, 2011. The 1995 CDFG *Staff Report on Burrowing Owl Mitigation* was revised on March 7, 2012, after the NOI was issued. Therefore, the PA/EIS did not incorporate the revised report. In reviewing the 2012 *Staff Report*, CDFG states that burrowing owl exclusion and burrow closure are not recommended where they can be avoided. In cases when owl exclusion cannot be avoided, CDFG recommends that a Burrowing Owl Exclusion Plan be developed and approved by the applicable local CDFG office. Mitigation Measure WIL-9 of the PA/EIS requires that a Burrowing Owl Mitigation Plan is prepared in consultation with CDFG. Thus, while not required to do so, the EIS generally meets with the requirements of the 2012 *Staff Report.*

The 1993 *Staff Report on Burrowing Owl Mitigation* recommends that 6.5 acres of burrowing owl foraging habitat be acquired and permanently protected per pair or unpaired resident burrowing owl. Based on the observation of four additional owls described in Response 11-44, which are presumed to be separate birds from the initial pair described on the site, an additional 26 acres of compensatory habitat is required for this species. Thus, at least 45 acres of burrowing owl habitat will be required to mitigate

Project effects to burrowing owl. As identified in Response 11-44, several additional non-breeding burrowing owls were documented in the study area. If additional owl pairs are detected on the Project site, the amount of required mitigation would be adjusted correspondingly. In response to the increased number of owls documented on the Project site, Mitigation Measure WIL-9.4 on page 4.4-38 has been revised.

12-16 In response to the comment, a template for the Burrowing Owl Mitigation Plan is added to Mitigation Measure WIL-9 on page 4.4-37, as follows:

2. ***Implement Burrowing Owl Mitigation Plan*:** The Applicant shall prepare and implement a final Burrowing Owl Mitigation Plan. The Plan shall be approved by the BLM AO in consultation with USFWS and CDFG, and shall:

   b. identify suitable sites as close as possible to the Project site, and within 1 mile of the Project Disturbance Areas for creation or enhancement of burrows prior to passive relocation efforts;

   c. provide guidelines for creation or enhancement of at least two natural or artificial burrows per relocated owl;

   d. provide detailed methods and guidance for passive relocation of burrowing owls occurring within the Project disturbance area; and

   e. describe monitoring and management of the passive relocation effort, including the created or enhanced burrow location and the Project area where burrowing owls were relocated from and provide a reporting plan.

   f. <u>include the following elements related to artificial burrow relocation:</u>

      i. <u>A brief description of the project and project site pre-construction;</u>

      ii. <u>The mitigation measures that will be implemented;</u>

      iii. <u>Potential conflicting site uses or encumbrances;</u>

      iv. <u>A comparison of the occupied burrow site(s) and the artificial burrow site(s) (e.g., vegetation, habitat types, fossorial species use in the area, and other features);</u>

      v. <u>Artificial burrow(s) proximity to the project activities, roads and drainages;</u>

      vi. <u>Artificial burrow(s) proximity to other burrows and entrance exposure; Photographs of the site of the occupied burrow(s) and the artificial burrows;</u>

      vii. <u>Map of the project area that identifies the burrow(s) to be excluded as well as the proposed sites for the artificial burrows;</u>

      viii. <u>A brief description of the artificial burrow design;</u>

ix. Description of the monitoring that will take place during and after project implementation including information that will be provided in a monitoring report.

x. A description of the frequency and type of burrow maintenance

g. address the following elements related to the exclusion plan:

i. Confirm by site surveillance that the burrow(s) is empty of burrowing owls and other species by use of a fiber-optic endoscope or comparable device;

ii. Describe the type of scope and appropriate timing of scoping to avoid impacts;

iii. Describe occupancy factors to look for and what will guide determination of vacancy and excavation timing (e.g., one-way doors should be left in place 48 hours to ensure burrowing owls have left the burrow before excavation, visited twice daily and monitored for evidence that owls are inside and can't escape);

iv. Identify how the burrow(s) will be excavated (excavation using hand tools with refilling to prevent reoccupation is preferable whenever possible (may include using piping to stabilize the burrow to prevent collapsing until the entire burrow has been excavated and it can be determined that no owls reside inside the burrow);

v. Describe removal of other potential owl burrow surrogates or refugia on site; Photographing the excavation and closure of the burrow to demonstrate success and sufficiency;

vi. Describe required monitoring of the exclusion site to evaluate success and, if needed, to implement remedial measures to prevent subsequent owl use to avoid take;

vii. Identify how the impacted site will continually be made inhospitable to burrowing owls and fossorial mammals (e.g., by allowing vegetation to grow tall, heavy disking, or immediate and continuous grading) until development is complete.

12-17 The commenter summarizes the PA/EIS finding that adverse effects to burrowing owl would be lower under Alternative 2 compared to Alternative 1.

12-18 As summarized in Response 11-34, surveys conducted over multiple years have identified only one active golden eagle nest within 10 miles of the MSEP site that is occupied by golden eagles: it is located 9.2 miles northeast, in the Big Maria Mountains. In one case, a golden eagle nest identified by prior surveys as "active" was determined to be occupied by another species; in all other cases, the golden eagle nests were determined to be inactive. Two golden eagles were incidentally observed south of the solar plant site on March 28, 2011; no golden eagles were observed during raptor point count surveys or helicopter surveys and no successful breeding by golden eagles was detected within or

beyond the 10 mile search radius during the helicopter surveys (TetraTech and Karl, 2011).

The Applicant provided a Project-specific Golden Eagle Risk Assessment in August 2011 (Tetra Tech, 2011) that the BLM and its NEPA contractor independently reviewed. This Assessment evaluated potential direct, indirect, and cumulative impacts to golden eagles from development of the MSEP, including impacts related to the potential loss of golden eagle foraging habitat. Although it currently is unknown whether golden eagles that might nest in the McCoy, Little Maria, and Big Maria Mountains in the future would utilize the Project Area for foraging, avian point counts that have been conducted for the Project suggest that golden eagles do not use the area for foraging. Nonetheless, if it is assumed that they would forage in the Project Area, impacts related to the potential Project-related loss of such foraging habitat are likely to be minimal. This is because the area with the requested ROW represents 3 percent of the area within a 10-mile radius of the nearest eagle nest in the McCoy Mountains, which is an inactive nest located 1.7 miles to the west of the Project area; 3 percent of the area of the next closest nest, which is an inactive nest located 3 miles to the southwest; and 1.5 percent of the area roughly central to the next closest nests, which are located 5.6 miles west-northwest and 8.4 miles northwest, respectively. Additionally, the requested ROW represents 0.4 percent of the area within a 10-mile radius of the active eagle nest in the Big Maria Mountains that was identified during spring 2010 surveys and determined in spring 2011 surveys to be occupied by red-tailed hawks. Furthermore, the habitat that would be disturbed or removed by development of the Project is neither unique nor limiting on the landscape, and does not represent a known prey concentration. Comparable or better foraging opportunities are expected to be available within the surrounding areas. For these reasons, development and operation of the Project is not expected to disturb the foraging of any eagle pairs within 10 miles of the Project site. Accordingly, the fact that USFWS has not adopted specific guidance for the potential loss of golden eagle foraging habitat near an active nest (see Comment 18-9) does not affect the analysis of potential impacts to golden eagles related to the potential loss of such habitat.

12-19 The PA/EIS analyzes impacts and identifies mitigation measures for the golden eagle under NEPA. As indicated in Response 11-73 and Response 11-74, any duties or obligations that may stem from the Bald Eagle and Golden Eagle Protection Act are independent of FLPMA, NEPA, and the PA/EIS. The BLM acknowledges that the Project, if the requested ROW grant and CDCA Plan Amendment are approved, cannot proceed until all necessary permits and approvals are obtained.

12-20 The occurrence of mineralized soil crusts and biological soil crusts, and the contribution of these crusts in controlling fugitive dust generated by wind erosion are discussed in Section 3.2, *Air Resources*, and 3.7, *Geology and Soils Resources*. The effects of ground disturbance on air quality, including presence of fugitive dust, is addressed in Section 4.2, *Air Resources*. The PA/EIS acknowledges that biological soil crusts would be damaged by Project activities (p. 4.3-7). The components of this common desert soil community

includes cyanobacteria, green algae, microfungi, mosses, liverworts and lichens. Through APMs AIR-1 and AIR-2, the Applicant has proposed to avoid disturbance of the desert pavement during construction and operation. The restoration of biological soil crusts is not required, though Mitigation Measure AQ-1 requires the use of non-toxic soil stabilizer in areas where desert pavement has been disturbed during construction.

12-21 See PA/FEIS Section 5.5.4.4, Common Response 4.

12-22 The comment's statement of support for the No Project Alternative is noted.

Letter 13 – Responses to Comments from Colorado River Indian Tribes (CRIT)

13-1 The comment regarding CRIT's traditional ties to the Project area is noted.

13-2 Regarding buried resources, as discussed on page 3.5-30, a geoarchaeological study was performed in order to assess the potential for buried resources to exist within the Project area. The study's findings confirmed that Holocene and Pleistocene-aged sediments within the Project area do have a potential to contain buried resources. Mitigation Measure CUL-1 requires the execution of an MOA that will detail the process for activities to proceed in areas where historic properties are not now known to exist, that will contain procedures for treatment of inadvertent discoveries. The comment regarding the spiritual harm that disturbance of buried cultural resources would cause to CRIT's members is noted.

13-3 The comment regarding the spiritual harm that disturbance of buried human remains would cause to CRIT's members is noted.

13-4 The BLM welcomes any information CRIT would be comfortable sharing about the cultural and spiritual practices of tribal members and would seek to accommodate those practices where mitigation can avoid, minimize or mitigate adverse effects to them.

13-5 See PA/FEIS Section 5.5.4.1, Common Response 1.

13-6 This introductory comment summarizing the commenter's opinion that the PA/EIS is insufficient with regard to NEPA and the NHPA is noted. The discussion of effects to cultural resources in the PA/EIS satisfies the requirements of NEPA, and the execution of an MOA, which is being prepared through consultation with SHPO, Indian tribes, and other interested consulting parties, and which will be executed prior to the ROD, will signify the completion of the BLM's requirements under Section 106 of the NHPA. Regarding mitigation, please see Response 13-31, below.

13-7 The term "cultural resource" is not defined in the National Environmental Policy Act (NEPA) or any other Federal law. The discussion on page 3.5-1 is consistent with the definition of cultural resources provided in the BLM 8100 Manual. Cultural resources on

the public lands managed by the BLM are concrete, material places and things. In compliance with several laws including NEPA and the NHPA, the BLM considers the values ascribed to these places and things, and the ways in which these places and things are used, when making decisions on actions that might affect them. The public participation processes followed by the BLM in complying with NEPA and the NHPA afford opportunities for the general public and Indian tribes to identify cultural resources of all kinds, and values relating to them, that they wish BLM to consider in its decision making.

Under the NHPA and its implementing regulations, significant cultural resources are called historic properties. Historic properties are districts, sites, buildings, structures and objects that are listed on, or eligible for listing on, the National Register of Historic Places. This definition is the only technical, operational meaning of the word "significant" as it applies to cultural resources within the context of Section 106. This does not mean that places or things not meeting this definition are unimportant. The BLM recognizes that values ascribed to places or things by social or cultural groups, including Indian tribes, may make them important and worthy of consideration even if those places or things do not meet the NRHP definition of significance. During the preparation of this PA/EIS, the general public and Indian tribes were afforded opportunities to identify cultural resources of importance to them regardless of whether those resources met the NRHP definition of significance. The cultural resources analyzed in the PA/EIS were the only cultural resources identified by the archival and field inventories, public participation opportunities, and tribal consultation efforts.

An Ethnographic Assessment currently is underway. Results are not yet available. See Section 5.2.2.

The BLM will continue consulting with Indian tribes throughout the Section 106 compliance process. BLM's tribal consultation efforts are discussed in Section 3.5.1.6 and in Appendix D. Tribes have been invited to identify resources and places of traditional cultural and religious importance that might be affected by the project. Tribes have also been invited to participate in consultations to develop a Memorandum of Agreement for the Project that will seek to resolve adverse effects, including visual, audible and atmospheric effects, on any NRHP-eligible traditional cultural properties that may be identified.

The analysis of impacts in Section 4.5 is not restricted to NRHP-listed or eligible cultural resources. All cultural resources identified within the Area of Potential Effects are included in the analysis, regardless of whether they meet the NRHP definition of significance.

Regarding the 6th paragraph on page 3.5-1, this statement has been corrected to reflect the fact that NEPA does not categorize cultural resources as buildings, sites, structures, objects, and districts.

13-8 See Response 13-7.

13-9 Please see Response 13-7. The BLM has assessed the values of the archaeological sites that would be affected by the Project. Based on that assessment, the BLM has concluded that only the seven sites that have been determined eligible for the NRHP warrant the implementation of measures to avoid, minimize or mitigate impacts. The sites determined ineligible for the NRHP were professionally recorded during the field inventories conducted for the Project. The BLM has determined that these ineligible sites lack further information potential relevant to history or prehistory that would justify mitigation. Other values that may be ascribed to these sites, including traditional cultural values, have not been identified by the public, by the consulting parties, or during the tribal consultation conducted for the Project. If such values relating to the NRHP-ineligible sites are identified by CRIT during the remainder of the NEPA and Section 106 processes, they will be considered by the BLM prior to approval of the ROD.

13-10 The BLM recognizes that values ascribed to places or things by social or cultural groups, including Indian tribes, may make them important and worthy of consideration even if those places or things do not meet the NRHP definition of significance. During the preparation of this PA/FEIS, Indian tribes were afforded opportunities to identify cultural resources of importance to them regardless of whether those resources met the NRHP definition of significance. The cultural resources analyzed in the PA/EIS and the values ascribed to them were the only cultural resources and values identified by the archival and field inventories, public participation opportunities, and tribal consultation efforts. An Ethnographic Assessment to identify sites to which Tribes may attach cultural or religious significance to, and that would be affected by the Project, currently is underway. The results of that study are not yet available. See Section 5.2.2.

13-11 As noted above, an Ethnographic Assessment currently is underway. The results of that study are not yet available. See Section 5.2.2. The Project has not yet been approved by the BLM, and the BLM will take information from the ethnographic analysis, along with other information concerning impacts to cultural resources into consideration prior to its decision to approve or deny the Project.

13-12 As noted above, an Ethnographic Assessment currently is underway. Results are not yet available. See Section 5.2.2.

13-13 Regarding buried resources, see Response 13-2. As discussed on page 3.5-30, a geoarchaeological study was conducted that identified and mapped areas with a high sensitivity for buried resources. Based on this study, there is a high potential for buried deposits in the Quaternary alluvium in the modern washes (Qw), the Quaternary Aeolian sands (Qs), and some alluvial fan and alluvial valley deposits (Qa6). Alluvial deposits of Palo Verde Mesa and McCoy Wash (Qa3, Qpv, and QTmw) have a moderate potential, while Cretaceous and Jurassic bedrock deposits (Kml, KJa, and Jv) have or little to no potential for buried deposits. BLM considers the identification of areas of sensitivity for buried resources to be sufficient to allow the identification of impacts and potential

mitigation measures in the event that the proposed Project or an alternative is approved. Your concern will be considered by the Lead Agency decision-makers.

13-14 See Response 13-13.

13-15 See Response 13-13. The comment regarding the spiritual harm that disturbance of buried cultural resources would cause to CRIT's members is noted. The BLM welcomes any information CRIT would be comfortable sharing about the cultural and spiritual practices of tribal members and would seek to accommodate those practices where mitigation can avoid, minimize, or mitigate adverse effects to them.

13-16 The comment that CRIT does not endorse invasive techniques to determine location of buried resources is noted.

13-17 Disturbance of cultural resources as a result of flash flood events would constitute an indirect Project effect. Paragraph 5 on page 4.5-4 has been modified to include damage from flash flooding as a potential indirect effect.

13-18 The Draft PA/EIS has been revised to eliminate discussion of draft cultural landscapes because there can be no adverse effect upon a delineated cultural landscape until the delineation process is complete. Studies are currently underway, independent of this Project, to examine prehistoric trails and associated sites in the Colorado Desert to determine, among other things, what sites might be included within such a network, the cultural behavior they may represent, and the importance they hold for Native Americans today. Until these landscape-level studies have been completed, it would be premature to speculate about NRHP eligibility criteria for the sites that may be included within such a network, whether the interrelated sites might qualify for nomination to the NRHP as a district, or precisely what mitigation strategies might be employed to address impacts to individual sites within the context of a larger complex of interrelated resources.

13-19 CRIT representatives have been on site visits where the redesign has been discussed; maps indicating the location of these resources and the redesigned footprint have been made available and will be forwarded to CRIT, if requested.

13-20 The list of projects considered in the cumulative scenario was established as of the date of the NOI (August 29, 2011), which predates the BLM's Final Solar PEIS and the White House press release mentioned in this comment. Because conditions as of August 29, 2011, establish the analytical baseline and therefore the foundation of the environmental analysis provided throughout in the PA/EIS, the cumulative projects list has not been updated to include later-identified projects. Numerous past, present, and reasonably foreseeable renewable energy and other projects are identified in PA/FEIS Section 4.1. For example, the analysis of cumulative effects on cultural resources considers the incremental contributory effects of all of the projects identified as BLM Renewable Energy Projects within the cumulative analysis impact area (PA/FEIS Table 4.1-1). These projects include the 1,000 MW BSPP (identified as project "N" in Table 4.1-4), 500 MW

Palen Solar Power Project (identified in that table as project "H"), 300 MW enXco McCoy project (identified as project "I"), and other projects ranging in between 100 MW and 250 MW. See also, PA/FEIS Table 4.1-2, which identifies all of the renewable energy projects that were known within the California Desert District as of the date of the NOI.

The analysis of cumulative effects to cultural resources acknowledges that adverse effects to cultural resources would occur. As explained in Sections 4.5.10 and 4.5.11, the implementation of Mitigation Measure CUL-1, which would require the execution of an MOA in accordance with the requirements of NHPA §106, would reduce but may not fully avoid Project-related impacts on cultural resources, including Native American resources.

13-21 See Response 13-20, which discusses the rationale for the geographic scope of the cumulative effects analysis for Cultural Resources. To the extent that the projects located in Arizona and summarized in Table 4.1-4 on page 4.1-13 are relevant to the geographic scope of cumulative effects for any resource area discussed in Chapter 4, the potential contributions to cumulative impacts of these projects are considered in combination with the Project's contributions. Including further detail about individual projects in Arizona would not change the analysis of cumulative effects for those resources. No revisions have been made.

13-22 The Visual Resources analysis for the Project correctly analyzed impacts on visual resources to the public, including all users of BLM facilities. To the extent that tribal members use the Project vicinity as members of the public, impacts to these users related to visual resources are considered in Section 4.19. As described on page 3.5-2, in addition to the Cultural Resources Survey Report, the BLM has initiated consultation with Indian tribes to identify places of traditional religious and cultural importance that may otherwise be left unidentified by these studies. Also, as discussed on page 4.5-3, BLM's analysis of adverse effects to cultural resources took into consideration types of effect other than direct physical impact, and included consideration of auditory, visual, and atmospheric effects. See also PA/FEIS Section 5.2.2, describing Section 106 and government-to-government consultation. Consultation is ongoing, and participants have ongoing opportunities to ensure that their concerns are addressed through this process.

13-23 The criteria for selecting KOPs is not to depict all of the visual impact scenarios, but to choose locations that are representative of views experienced by the public. The rationale for the selection of KOPs is fully detailed on page 4.19-3, and the locations of KOPs selected are shown in Figure 3.19-2. The KOPs represent an appropriate range of viewer types, view distances, and view angles. The BLM is coordinating its review of impacts to the human environment, including cultural resources, with its efforts to consult and coordinate with tribes. See PA/FEIS Section 5.2.2, describing Section 106 and government-to-government consultation. Section 106 consultation is ongoing, and

participants have ongoing opportunities to ensure that their concerns are addressed through those processes.

13-24 The BLM has not ignored tribal use of the affected area in this analysis. To the contrary, the BLM has considered such use and Project impacts to it in the preparation of the PA/EIS and is continuing to consider it as part of the ongoing NHPA Section 106 and government-to-government consultation processes (see PA/FEIS Section 5.2.2). The existing VRM classifications are part of the baseline condition. Unless and until those classifications are revised, the MSEP is required to conform to the VRM Class III objective, with a limited segment of the gen-tie line required to conform to the VRM Class II objective, as discussed in Section 3.19.1.7, *Interim Visual Resource Management Class Recommendations*.

13-25 The BLM would be pleased to meet with tribal members for the purpose of identifying specific places within the Project area that contain plants used for traditional purposes by tribal members. Such uses would be considered in the decision making for the Project as part of the NEPA process. The BLM would seek to accommodate the continued use of such plants by tribal members elsewhere on the public lands.

13-26 See Response 13-25.

13-27 The BLM has and continues to engage in government-to-government consultation with Indian Tribes in a good faith effort to identify and meaningfully address resources of tribal concern. The BLM would be pleased to meet with tribal council for the purpose of identifying potential effects to resources of importance to the tribe. Please see Table 5-1 in Section 5.2.2 that details the tribal outreach and communications to date for the McCoy Project.

13-28 See PA/FEIS Section 5.2.2.

13-29 As described on page 4.6-3, the analysis of environmental justice effects was limited to potential health or environmental effects; by comparison, effects related to cultural resources and the communities affected by impacts to such resources are discussed in Section 4.5, *Cultural Resources*. See Response 8-25 regarding the composition of the minority populations considered in the PA/FEIS. As explained in that response, Table 3.6-1 correctly reported the percentage of non-Hispanic American Indian and Alaska Native population in each of the geographic areas as reported by the 2010 U.S. Census. The purpose of Table 3.6-1 is to show how the total percentage of minority population is arrived at: it consists of racial or ethnic groups other than non-Hispanic White (p. 3.6-2). The BLM acknowledges that the total American Indian and Alaska Native population, alone or in combination with one or more races (which includes those also reporting Hispanic origin) is higher, as follows:

Riverside County, CA	Census Tract 469	Census Tract 9810	Blythe CDD	City of Blythe	La Paz County, AZ	Colorado River Indian Reservation

2.0%	2.3%	0.9%	2.3%	1.8%	15.2%	32.3%

SOURCE: U.S. Census Bureau, 2010b

As explained on pages 4.6-1 and 2, a minority population is identified when the percentage of minority population is greater than 50 percent and/or meaningfully greater than that of the general population. None of the areas studied for environmental justice effects has an American Indian and Alaska Native population greater than 50 percent, and only the Colorado River Indian Reservation has a population meaningfully greater than either Riverside or La Paz County. Therefore, using American Indian and Alaska Native population alone, the selection of the affected areas with respect to environmental justice would be the same as that of the Draft PA/EIS. The same is true for each other ethnic and racial group reported in the U.S. Census. Therefore, the approach taken in Section 4.6 is appropriately conservative in selecting affected areas with respect to environmental justice.

The geographic scope of the analysis in Section 4.6 consists of areas within which potential effects on the local populations could occur. The primary are includes a 6-mile radius, consistent with the range of the Project's air quality impacts, and the secondary area includes a 2-hour travel radius for commute-related effects.

13-30 Section 3.6 identifies whether minority and/or low-income populations meet or exceed the numeric threshold (50 percent) used for the analysis based on CEQ guidance, as explained on page 3.6-2. Both minority and low-income populations "meaningfully greater" than the general population are identified in the description of the methodology for the analysis in Section 4.6. Specifically, CT 469 and the Colorado River Indian Reservation are identified as having low-income populations meaningfully greater than the general population on page 4.6-3. No revisions have been made.

13-31 The discussion of effects to cultural resources in the PA/EIS satisfies the requirements of NEPA, and the execution of an MOA, which is being prepared through consultation with SHPO, Indian tribes, and other interested consulting parties, and which will be executed prior to the ROD, will signify the completion of the BLM's requirements under Section 106 of the NHPA.

The regulations implementing the National Historic Preservation Act (NHPA), found at 36 CFR Part 800, provide for the use of a Memorandum of Agreement (MOA) to describe measures designed to resolve adverse effects on historic properties. MOAs are commonly used to comply with Section 106 of the NHPA on projects like the MSEP. Development of the MOA for the Project will provide an opportunity for determining mitigation consistent with the values of the historic properties involved, prior to construction or other activities that could affect them.

Neither NEPA nor the NHPA require complete avoidance of all Project-related impacts on cultural resources. However, implementation of the HPTP required by Mitigation Measure CUL-1 will ensure that affected historic properties are treated consistent with the values that make them significant. In addition to addressing known historic properties, the HPTP will include provisions for monitoring construction activities and identifying, evaluating and treating buried cultural resources that may be discovered during construction.

The MOA will be completed and signed prior to approval of the ROD. Consulting parties and stakeholders, including the State Historic Preservation Officer and Indian tribes, will have an opportunity to participate in consultations on the terms and provisions of the MOA before the Project is approved. Final measures to avoid, minimize, and mitigate impacts to cultural resources will be developed as a result of that consultation.

If cultural resources that are not historic properties are identified prior to approval of the ROD, measures to avoid, minimize or mitigate impacts on them will be developed in consultation with the people to whom they are culturally important.

13-32 BLM considers the identification of cultural resources to be sufficient to allow the identification of impacts and potential mitigation measures in the event that the proposed Project or an alternative is approved. Your concern will be considered by the Lead Agency decision-makers.

13-33 The requested clarification, if made, would have no effect on the adequacy or accuracy of the BLM's review processes under NEPA, the NHPA, or other laws and policies governing tribal consultation, and so has not been made. See also, BLM Instruction Memorandum No. 2012-108 (April 27, 2012), *Coordinating National Historic Preservation Act and National Environmental Policy Act Compliance*, Attachment 1, p. 2 ("Resolve potential adverse effects to resources of concern; invite tribes to be a party to the Memoranda of Agreement (MOA) or Programmatic Agreement (PA) that will conclude the NHPA 106 process.") and Attachment 3, pp. 5-6 ("…the BLM executes the MOA and, when signed by all required Signatory Parties the Section 106 process is complete.").

13-34 See PA/FEIS Section 5.5.4.1, Common Response 1.

13-35 See PA/FEIS Section 5.5.4.1, Common Response 1.

13-36 See PA/FEIS Section 5.2.2, describing the development of the MOA. The commenter's conceptual disagreement with the MOA's ability to resolve cultural resource-related effects is noted. Section 106 consultation is ongoing, and participants have ongoing opportunities to ensure that their concerns are addressed through this process. The comment does not provide specific examples as a basis for the allegation that the MOA will not resolve cultural resource-related effects. Accordingly, the BLM is unable to provide a more detailed response at this time.

13-37 See Response 13-32. Your concern will be considered by the Lead Agency decision-makers.

Letter 14 – Responses to Comments from Laborers International Union of North America (LIUNA), Local Union No. 1184

14-1 The comment is noted.

14-2 See PA/FEIS Section 5.5.4.4, Common Response 4.

14-3 The comment is noted.

14-4 The comment does not specify what, if any, mitigation measures would or could be required that have not been considered in the PA/EIS. Without further detail, the BLM cannot provide more specific responses at this time.

14-5 The mitigation measures proposed in the PA/EIS provide performance standards and specific types of actions to be taken, and contain sufficient information to inform a decision on the Project's impacts and mitigation. The contents of certain of these plans are dictated by law; in these cases the Applicant is required to comply with the law, including implementing all statutory and regulatory requirements. In all cases, plans would be required to be submitted to and approved by BLM and any other agency with regulatory oversight, as detailed in the mitigation measure, before Project construction could begin. See the Environmental and Construction Compliance Monitoring Plan (Appendix L to this PA/FEIS) for detailed information about approval and monitoring of the plans required in the mitigation measures proposed in Chapter 4.

14-6 The first referenced exhibit (Sinha et al., 2012) found modeled exposure point concentrations of cadmium in groundwater based on worst-case releases from PV modules to be 0.783 µg/L (Table 2, p. 1673), and found modeled worst-case rooftop runoff cadmium concentrations to be 4 to 6 µg/L (p. 1673). Note that these were modeled, not observed data. The second referenced exhibit (Salton Sea Restoration, Final Preferred Project Report) does not contain discussion of cadmium concentrations in water, potential cadmium releases from solar PV panels, or environmental screening levels, and so is not discussed further.

As explained by Sinha, et al., these results represent a worst-case scenario that assumes "that a broken module would remain undetected and in the field over the exposure duration. This is a screening level assumption that would likely not occur given routine inspections of modules or power output" (p. 1673). As described on page 2-55, the on-site SCADA system would offer near real-time readings of the monitored devices, which would alert operators to reduced power output of modules in the event of broken panels. Additionally, seasonal panel washing and other maintenance activities would allow for visual inspection to identify broken panels, if breakage occurred.

The comment's assertion that the "California Regional Water Quality Control Board" has established an environmental screening level (ESL) of 0.25 µg/L for cadmium in groundwater and surface water is assumed by BLM to have derived from the San Francisco Bay Regional Water Quality Control Board's (SFRWQCB) "Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater" document (2008), as neither the State Water Resources Control Board nor the Colorado River RWQCB have established such ESLs. The SFRWQCB's ESLs are applicable to the San Francisco Bay region, not the Colorado River region, and are "not intended to establish policy or regulation" or "to serve as: 1) a stand-alone decision making tool, 2) guidance for the preparation of baseline environmental assessments, 3) a rule to determine if a waste is hazardous under the state or federal regulations, or 4) a rule to determine when the release of hazardous chemicals must be reported to the overseeing regulatory agency" (p. 3). The Colorado River RWQCB (Basin Plan) sets a Maximum Contaminant Level for cadmium in waters designated for use as domestic or municipal supply at 10 µg/L (2006, p. 3-4). The findings in Sinha et al. do not suggest that CdTe leachate from PV panels could result in such concentrations under any conditions.

Sinha et al. find that "Overall, a worst case leaching scenario with screening level fate and transport modeling yields impacts to soil, air, and groundwater that are one to five orders of magnitude below human health screening levels in a California…exposure scenario" (pp. 1674-1675). This new information does not change the conclusions of the hazardous materials impact analysis; however, in response to this and other comments concerning the potential for CdTe leaching from damaged panels, Mitigation Measure HAZ-2, which requires the Applicant to prepare and implement a Broken PV Module Detection and Handling Plan if the Applicant chooses to use CdTe PV panels, has been added to Section 4.9. Implementation of this measure would minimize the potential for CdTe leaching from damaged panels.

14-7 As described on pages 2-56, 2-57, and 4.18-4, because it is expected that the proposed PV panels would continue to have useful electricity-producing capacity after the Project authorizations expire, the Applicant anticipates reusing and then recycling them at the end of their useful life. Many panel manufacturers now offer no-cost recycling, and it is expected that after the end of the panels' useful life, adequate opportunities and incentive would exist to recycle the panels, rather than dispose of them in landfills.

14-8 PA/FEIS Section 2.3.1.3.1 identifies silicon as one of the materials commonly used for PV solar cells. As explained therein, "materials commonly used include monocrystalline silicon, polycrystalline silicon, amorphous silicon, cadmium telluride, and copper indium selenide/sulfide." Also stated in that section, the "Applicant is considering the installation of both polycrystalline and cadmium telluride solar cells." Accordingly, the PA/EIS did consider the use of silicon-based PV panels, in addition to considering the use of CdTe-based panels. If the Proposed Action is approved, the Applicant could determine what panel material would be used on-site closer to the start of construction.

14-9 The Draft PA/EIS addressed the prevalence and risk of Coccidioidomycosis (Valley Fever) in Section 3.9 (p. 3.9-5). Although the incidence of Valley Fever in Riverside County is low compared to other counties, this fungus is known to occur in desert soils. Further discussion of the potential risk to public health associated with Valley Fever has been added to Section 4.9.3.1 (p. 4.9-7).

14-10 PM2.5 emissions from the combustion of diesel fuel are commonly used as a surrogate for DPM emissions. Table 4.2-3 shows that the total PM2.5 exhaust emissions that would be associated with the Project would be up to 6 pounds per day. The location of DPM emissions from construction equipment would vary across the approximately 4,496-acre Project site over the 46-month construction period, and thus would not be in a fixed location for long periods of time. Therefore, DPM emissions would not be concentrated either spatially or temporally during the construction period, and the associated impact would be negligible.

14-11 See Response 14-10.

14-12 Pursuant to 40 CFR Part 98, *Mandatory Reporting of Greenhouse Gases Rule*, USEPA requires mandatory reporting of GHG emissions for facilities that emit more than 25,000 metric tons of CO_2e emissions per year. For the purposes of a conservative NEPA analysis, estimated GHG emissions for the Project were compared to the USEPA mandatory emissions reporting threshold to determine whether the GHG emissions would contribute substantially to global climate change.

14-13 See Response 14-12. Although the Project would emit approximately 8,313 metric tons of annual amortized CO_2e emissions, the Project could displace an estimated 639,061 metric tons of CO_2e annually, resulting in a net reduction of 630,748 metric tons of CO_2e per year. The commenter correctly notes that the MDAQMD does not have GHG thresholds. The County of San Diego threshold is noted, but does not apply to the NEPA review of the Project.

14-14 See Response 14-13. In addition, the PA/EIS includes APMs and mitigation measures that require a number of the measures suggested by the comment, such as APM TRANS-1 (encourages carpooling), Mitigation Measure TRN-1 (traffic control plan, provide sufficient staging for trucks), and Mitigation Measure TRN-2 (coordination of individual traffic control plans for Project and nearby projects).

14-15 The CDCA Plan is a comprehensive, long-range plan that was adopted in 1980; it since has been amended many times. The Plan anticipated that renewable power generation facilities would be proposed in the California Desert. Accordingly, it made allowances for the review of such applications, including a provision that all proposed applications "associated with power generation or transmission not identified in the [CDCA] Plan will be considered through the Plan Amendment process." The intention of this provision was to ensure that the BLM would take a planning view of all of the renewable energy applications proposed and that such projects would require an amendment to the CDCA

Plan to maintain consistency throughout the plan. Thus, the Plan Amendment process is an intentional aspect of the Plan designed to allow for both flexibility and consistency in the use and protection of public lands and resources.

Further alternative sites on other BLM-administered lands were not considered for the reasons explained in Section 2.1.1.1.1.

14-16 The Multiple Use Class (MUC) Guidelines in Table 1 of the CDCA Plan state that solar electrical generation facilities may be allowed in an MUC Limited (L) area after NEPA requirements are met and the CDCA Plan is properly amended. The Proposed Action, if approved, would amend the CDCA Plan following the process anticipated in the CDCA Plan to identify the site as suitable for the proposed solar energy use. Accordingly, the proposed CDCA Plan amendment and the overall amendment process would be consistent with the CDCA Plan. Furthermore, the Riverside East SEZ includes some Class L lands, indicating that the development of such lands for solar development is an anticipated use.

The decision criteria presented on page 93 of the CDCA plan are not requirements for CDCA Plan conformance; rather, they are the criteria the BLM will consider when making a decision about the Proposed Action and alternatives.

The extent to which the Project has been located and designed to avoid sensitive resources is addressed throughout the PA/EIS. The BLM and other federal regulations that restrict the placement of proposed facilities, such as the presence of designated Wilderness Areas or Desert Wildlife Management Areas, were considered in the original siting process used by the Applicant to identify potential sites for the Project.

As described on page 3.16-2 and shown on Figure 3.14-1, the nearest ACEC to the Project site is the Mule Mountains ACEC, approximately 9 miles to the south. The Project site is not within an ACEC, nor is it governed by the management prescriptions for any ACEC. Similarly, as described on page 4.16-1, the Proposed Action would have no effect on existing special designations because none occur within the Project site; therefore, no special designation-specific plans or management prescriptions apply to the site.

The comment does not specify any other local plan to which the Project would fail to conform. Local land use plans such as the Riverside County General Plan and Palo Verde Valley Area Plan pertain only to the portion of the Project site that is under Riverside County jurisdiction and do not control federal actions on federal land. This portion would be reviewed by the county separately from the BLM's NEPA process. Accordingly, analyzing consistency of the Proposed Action and alternatives with local land use plans is beyond the scope of analysis for the BLM.

As described on page 3.16-2, the consideration of wilderness characteristics in the land use planning process may result in several outcomes, including emphasizing other multiple uses as a priority over protecting wilderness characteristics.

The consideration of these and other decision criteria in the CDCA plan during decision-making process will be reflected in the ROD.

14-17 See PA/FEIS Section 5.2.1, which describes Federal Endangered Species Act Section 7 consultation with the USFWS. Section 7 does not require the BLM, as the consulting Federal Agency, to submit the BO for public review and comment under NEPA, as suggested by the comment. Rather, the code section cited by the comment (50 C.F.R. §401.12(g)(5)) states, "If requested, the Service shall make available to the Federal agency the draft biological opinion for the purpose of analyzing the reasonable and prudent alternatives. … The applicant may request a copy of the draft opinion from the Federal agency. All comments on the draft biological opinion must be submitted to the Service through the Federal agency, although the applicant may send a copy of its comments directly to the Service. …" Furthermore, 40 C.F.R. §1502.25 requires a federal lead agency to prepare draft EISs concurrently with and integrated with analyses, surveys, and studies required by the Federal Endangered Species Act to the fullest extent possible. The BO has been prepared by USFWS after review of the BA, concurrently with the BLM's preparation of the Draft PA/EIS and PA/FEIS, and in consultation with the BLM as described in Section 5.2.1.

14-18 As explained in PA/FEIS Section 5.5.4.4, Common Response 4, revisions to the Draft PA/EIS do not trigger recirculation.

14-19 Comment noted. The comment letter and all attachments are available in the administrative record for the PA/FEIS, and may be obtained along with all other Project-related public records from the BLM by contacting Jeff Childers, Project Manager, California Desert District. Contact information is provided in PA/FEIS Section 5.4.

Letter 15 – Responses to Comments from Metropolitan Water District of Southern California (MWD)

15-1 MWD requests that the final EIR provide analysis of potential effects to its facilities, but does not describe what specific potential impacts should be analyzed. As described in Section 3.10.1.3, "Within the immediate and surrounding areas of the Project, there are no communications sites, land use permits, leases or easements of record, nor are any land tenure issues identified in close proximity to or that would be affected by the Project." Furthermore, as described in Section 4.10, *Lands and Realty*, no impacts to lands and realty were identified south of I-10 or west of the Palen Mountains, where MWD's facilities are located as indicated on the map provided in the comment letter. No other MWD facilities, including fee-owned rights-of-way, were identified closer to the Project site where impacts related to lands and realty could occur.

The Draft PA/EIS contains sufficient information to evaluate the potential lands and realty effects that would result from development of the Project.

15-2 See PA/FEIS Section 5.5.4.3, Common Response 3. For the reasons explained in Common Response 4, Project-related groundwater pumping would have no impact on PVID return flows to the Colorado River; therefore, it would cause no reduction in MWD's Colorado River water supply.

15-3 See PA/FEIS Section 5.5.4.3, Common Response 3.

15-4 See PA/FEIS Section 5.5.4.3, Common Response 3. As explained therein, Project-related groundwater pumping would have no impact on MWD's Colorado River-sourced supplies. Accordingly, MWD will not be copied on the requested reports but nonetheless may obtain them and all other Project-related public records from the BLM by contacting Jeff Childers, Project Manager, California Desert District. Contact information is provided in PA/FEIS Section 5.4.

15-5 In Table 3.20-10, site number 4 was confirmed to be correctly listed. However, the latitudes and longitudes for site numbers 5, 6, and 7 (USGS Location Numbers 09533300, 09534550, and 09534500) were found to have been erroneously reported as being closer to the Project site. Because these sites are further than 15 miles from the Project site, they have been removed from the table.

Letter 16 – Responses to Comments from Renewable Resources Group, Inc.

16-1 The name and ownership of cumulative project "X" in Table 4.1-4, on page 4.1-12, have been revised "Palo Verde Mesa Solar Project" and "Renewable Resources Group, Inc.," respectively, to reflect the input of the commenter. References to "CUP03677" have been revised to "Palo Verde Mesa Solar Project" in Sections 4.7, 4.9, and 4.20.

16-2 The acreage and description of cumulative project "X" have been revised to reflect the input of the commenter and additional material published by the Riverside County Planning Department since publication of the Draft PA/EIS. Although the precise acreage of the Palo Verde Mesa Solar Project site was not known at the time of publication of the Draft PA/EIS, the analysis assumed that the entire project site would be developed as a solar plant, a larger area than is actually planned for development according to the commenter. Therefore, the analysis presented in the Draft PA/EIS was appropriately conservative, and no new or more severe impacts would result from the newly incorporated details about this cumulative project. No revisions have been made to cumulative impact conclusions.

Letter 17 – Responses to Comments from U.S. Environmental Protection Agency (USEPA), Region IX

17-1 Scoping comments received from USEPA Region IX are provided in full and summarized in Appendix B, *Scoping Report*, and were considered during the preparation of the Draft PA/EIS.

17-2 Comment noted. The detailed discussion of groundwater and surface water modeling is provided in Section 4.20, *Water Resources*.

17-3 See PA/FEIS Section 2.8 regarding the Agency Preferred Alternative.

17-4 In the PA/EIS, disturbance associated with the Project is treated generally, based on the footprint area of the Project site and the anticipated construction methods that would be used. Grading effects on water quality is considered in Section 4.20, page 4.20-2 (although the term "disc-and-roll" is not explicitly mentioned in Section 4.20). The effects of the Project on hydrology, including effects of all anticipated grading activities and facilities installation, is discussed on pages 4.20-4 through 4.20-9, as related to stormwater drainage and flooding, and largely based upon surface water models developed for the Project. The effectiveness of the proposed mitigation to account for stormwater drainage impacts during operation is discussed on pages 4.20-8 and 4.20-9. Additionally, evaluation of potential stormwater/flooding related impacts during the construction period has been added to the PA/EIS, in response to recent flooding events at other solar project sites. For a discussion of this analysis, please refer to Response 6-18. For a discussion of potential impacts associated with engineered channels, see Response 17-11.

17-5 See PA/FEIS Section 5.5.4.3, Common Response 3. As explained therein, there is no subsurface connectivity between the Colorado River and mesa groundwater.

17-6 See Responses 17-16, 17-17, 17-18, and 17-20, below, for individual responses to each of the commenter's suggestions for additional mitigation measures.

17-7 As indicated in PA/FEIS Section 5.2.2, tribal consultation processes for this Project remain in progress, although they will be concluded before the Project is considered for approval. Accordingly, it would be premature in the PA/FEIS to describe the outcome of consultation before the processes are complete.

17-8 The DRECP is intended to advance federal and state conservation goals in the California desert region while facilitating the timely permitting of renewable energy projects under applicable federal and state laws. However, because the DRECP process remains underway, it does not govern the BLM's decision-making efforts for the Project.

The Final Solar PEIS was issued in July 2012, after publication of the Draft PA/EIS. Because the MSEP ROW application meets the definition of Pending Application in the Solar PEIS ROD, it is not subject to that decision or the Plan Amendments it made. Consequently, the Solar PEIS and the decisions the BLM has made based on its analysis do not govern BLM's decision-making efforts for this Project.

17-9 See PA/FEIS Section 2.8 regarding the Agency Preferred Alternative.

17-10 Comment noted.

17-11 As discussed in Chapter 2 and Section 4.20, existing natural channels, as well as overland flow, would provide the primary means of drainage on site, as opposed to engineered channels. Limited engineered drainages within the site would be used to convey stormwater, but note that these do not refer to major flood conveyance channels as have been proposed and implemented for the Genesis Solar Energy Project and other solar projects. The commenter suggests various additional measures. Several of these have, however, already been implemented. For example, with respect to the placement of PV panels and other facilities in existing washes, the existing site designs account for the locations of existing washes and seek to avoid placement of PV panels and other facilities in those areas whenever possible.

With respect to quantifying the anticipated disc-and-roll acreage, the acreage of disc-and-roll that would occur on site will not be known until construction is underway, and will depend on area-specific considerations. However, the stormwater model and analysis provided on pages 4.20-4 through 4.20-9 accounts for grading and installation of facilities as applicable across the Project site. Mitigation is provided for associated impacts. Engineered channels would be utilized sparingly to convey on-site runoff. Modeled impacts associated with stormwater flows are already summarized and mitigated on pages 4.20-4 through 4.20-9.

In order to ensure that potential impacts associated with drainage and flooding are minimized in accordance with applicable suggestions by USEPA, Mitigation Measure WATER-3 on pages 4.20-18 and 4.20-19 has been revised to include the following:

> <u>Additionally, the number of road crossings over washes shall be minimized and necessary crossings shall be designed to provide adequate flow-through capacity during storm events, up to the 100-year event. In order to minimize disturbance to existing floodplains and natural channels, final facility designs shall be employed which minimize, to the extent practicable, the footprints of roads, parking lots, and other proposed facilities.</u>

17-12 Completion of a finalized drainage plan was not possible prior to circulation of this document. However, a 60 percent design drainage plan document has been completed. For a discussion of flooding related issues raised by the recent flooding event at the Genesis Solar Energy Project, and a review of updated analysis, please refer to Response 6-18.

17-13 See PA/FEIS Section 5.5.4.3, Common Response 3, and Response 17-5. No entitlement to Colorado River water would be needed to construct, operate, maintain, or decommission the Project.

17-14 The cumulative and climate change analyses presented in the PA/EIS are meant to address potential for climate change effects such as drought or reduced groundwater recharge to affect water resources, as well as potential for impacts from other anticipated future projects to result in cumulative impacts to groundwater levels (as well as other

resource areas). Thus the cumulative scenario anticipates future projects and other activities that could result in a net increase in demand on available groundwater resources. Potential effects of climate change on water supply available to the Project are discussed in Section 4.8. As discussed on page 4.8-10, climate change could result in some degree of reduction of precipitation at the Project site and vicinity. This could reduce groundwater recharge from rainfall. However, such an effect would occur slowly over time, and the Project would only draw about 30 AFY (page 4.20-3) during its operation period. This volume is anticipated to be available even if climate change affects groundwater recharge to some degree; thus Project operation would not be affected and no mitigation is required. With respect to water rights, the Project lies in an unadjudicated groundwater basin, and, as discussed in PA/FEIS Section 5.5.4.3, Common Response 3, would not draw water from the Colorado River or another surface water source. Therefore water rights would not be affected.

Cumulative impacts to groundwater are discussed on page 4.20-15, with cumulative scenario impacts illustrated on Figure 4.20-8, based on groundwater modeling results. As shown and as discussed in Section 4.20, anticipated changes, even under the cumulative scenario, would be minimal. Therefore, no additional mitigation is required.

17-15 The Draft PA/EIS referred to a Figure 4.20-9 on page 4.20-15. This was an editorial error and should have referred to Figure 4.20-8, *Cumulative Impacts Assessment – Predicted Drawdown 2043*. There is no Figure 4.20-9, and this reference has been revised in the PA/FEIS.

17-16 The commenter provides two suggestions for mitigation to reduce impacts to desert pavement. The intent of the first suggestion is covered by measure 6 indentified in APM AIR-1, which requires the disruption of desert pavement be minimized to the extent feasible. From an air quality perspective, the intent of the second suggestion is covered by PA/FEIS Mitigation Measure AQ-1 (formerly referred to as Mitigation Measure AQ-2 in the Draft PA/EIS), which requires that all areas where desert pavement has been disturbed during construction of the Project be applied with a non-toxic soil stabilizer prior to Project operation (see page 4.2-19). Therefore, implementation of the suggested measures is not necessary. Potential project effects on desert pavement related to biological and cultural resources are considered in Sections 4.3, 4.4., and 4.5.

17-17 The comment does not indicate that the measures in APMs AIR-1 and AIR-2 would be ineffective or otherwise inadequate at reducing fugitive dust emissions; however, the comment indicates that there are additional SCAQMD Rule 403 dust control measures that should be incorporated as mitigation for the Project, but makes no mention of which specific measures should be incorporated. SCAQMD Rule 403 measures are generic and relative to a variety of activities and sources such as construction sites, bulk material hauling, rock crushing, and disturbed soil in open areas and vacant lots. Many of the Rule 403 measures would not be directly applicable to the Project. As stated in Section 4.2.2, the Applicant has committed to implementing APMs AIR-1 and AIR-2 to minimize

impacts that would be associated with Project-related fugitive dust. These APMs include 20 individual dust control measures, many of which are unique for the Project. In lieu of any specific recommendations, the BLM believe that APMs AIR-1 and AIR-2 include comprehensive measures that would reduce construction-related fugitive dust emissions to the reasonable extent feasible, and that additional mitigation measures are not warranted.

As the NEPA lead agency for the project, the BLM would be required by law to ensure that the Mitigation Measure AQ-1 if adopted by the MSEP ROD is implemented as written, prior to the commencement of Project operations.

For a list of all the proposed mitigation measures applicable to the Project, as well as a description of how the measures would be made an enforceable part of the project implementation schedule, refer to PA/FEIS Appendix M.

17-18 The commenter recommends that a mitigation measure be added to the PA/EIS that requires the presence of an air quality construction mitigation manager to ensure the efficacy of the proposed measures. As discussed in Section 4.1.6, the BLM would compile an Environmental and Construction Compliance Monitoring Plan (ECCMP) if the Project is approved to ensure the effective implementation of the mitigation measures that have been identified to address Project impacts. The comment does not state that the monitoring and enforcement mechanisms anticipated in the PA/EIS would be insufficient to serve this function, and, without more, does not persuade the BLM that the requested resource-specific monitor should be added to the team.

It should be noted that the Draft PA/EIS has been revised to remove Mitigation Measure AQ-1 because: 1) the established mass emission indicator and threshold for the identification of adverse emissions of NO_x, as defined in Draft PA/EIS Section 4.2.1.4, would not be exceeded; and 2) the majority of the PM10 that would be generated during construction would be in the form of fugitive dust, and the reductions in PM10 exhaust that would be achieved under Mitigation Measure AQ-1 would be negligible (i.e., less than one percent of total PM10 emissions) and unwarranted. The BLM believes that APMs AIR-1 and AIR-2 include comprehensive measures that would reduce construction-related fugitive dust emissions to the reasonable extent feasible, and that additional mitigation measures are not warranted.

17-19 The 25 mph speed limit described in APM BIO-2e is considered appropriate to minimize project effects to Mojave fringe-toed lizards from vehicle collision hazards. If the requested ROW grant is approved, compliance and enforcement monitoring would be implemented as a requirement of the ROD. Consequently, further restricting speed limits for the purpose of protecting wildlife from vehicle collision hazards is not warranted. Additionally, the 25 mph speed limit for stabilized unpaved roads with no visible dust emissions described in APM AIR-1 is considered appropriate to minimize fugitive dust under such circumstances. In the event that APM BIO-2e and APM AIR-1 apply to the same unpaved road segment, the more restrictive speed limit would apply. Compliance

with applicable speed limits will be monitored and enforced during implementation of the Environmental and Construction Compliance Monitoring Plan (ECCMP), which will be appended to the ROD if and when the Project is approved (see PA/EIS Section 4.1.6, which describes the ECCMP.

17-20 As described in Section 4.2.9, cumulative impacts would occur from short-term Project-related construction PM10 emissions when combined with the emissions associated the cumulative projects, to the extent such projects would be constructed concurrently with the Project. The cumulative effects analysis includes reasonably foreseeable future actions, including those for which there are existing decisions, funding, formal proposals, or which are highly probable, based on known opportunities or trends. Given the moderate to high level of uncertainties associated with the cumulative projects identified in Table 4.1-1, it would not be possible to accurately estimate the cumulative emissions from the Project combined with the cumulative projects. Thus, this EIS provides a qualitative approach to assessing cumulative impacts (see Section 4.2.9) and PA/FEIS Mitigation Measure AQ-1 would be implemented to reduce the Project's long-term contribution to cumulative fugitive dust impacts associated with the potential disruption of desert pavement.

17-21 See PA/FEIS Section 5.2.1, which provides an update on the Federal Endangered Species Act Section 7 consultation with the USFWS.

17-22 Implementation of the Mitigation Measures set forth in PA/FEIS Section 4.4.10 (including WIL-6, Avian and Bat Protection Plan, and WIL-12, Measures to Minimize Impacts to Golden Eagles) would reduce impacts to eagles by reducing the potential electrocution and collision hazards, and by addressing hazards specific to the construction and decommissioning phases of the project. For example, utility lines (both transmission and distribution) can result in electrocution of birds that have a wing-span large enough for the bird simultaneously to contact two conductors or a conductor and grounded hardware. Therefore, any structures that would allow this to occur pose an electrocution risk. To protect eagles from possible electrocution, APLIC recommends a horizontal separation of 60 inches and a vertical separation of 40 inches between phase conductors or between a phase conductor and grounded hardware. The design and maintenance of separations in accordance with APLIC guidelines would render unlikely the potential for the MSEP electrocution impacts to eagles.

NEPA does not require an EIS to explain how Project approval would comply with other laws; instead, an EIS documents the agency's consideration of the environmental consequences of a proposed action before making a decision on that action. Compliance with the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act imposes separate obligations, independent of the NEPA process.

The BLM has reviewed the Service's February 18, 2011, Notice of Availability of the Draft Eagle Conservation Plan Guidance (76 FR 9529-01), the draft guidance itself (USFWS, 2011c), the related Fact Sheet (USFWS, 2011d). As explained in the summary

of the NOA, "The Guidance provides recommendations for agency staff and developers to use an iterative process to avoid and minimize negative effects on eagles and their habitats resulting from the construction, operation and maintenance of *land-based, wind energy facilities* in the United States" (76 FR 9529-01, emphasis added). Peer review of the draft guidance had not yet occurred when the NOA was issued in February, and agency and public comments were being invited but had not yet been considered or integrated as appropriate. At least these things must occur before the draft guidance can be finalized. The MSEP is not a wind project, and the draft guidance has not yet been adopted. For these reasons, the BLM has not applied the draft guidance, including the proposed no-net-loss standard, to this Project.

17-23 Consultation between the BLM and USFWS is ongoing regarding adjustments to the westernmost edge of Unit 2 as it relates to wildlife movement. The results of these discussions will be reflected in the Record of Decision.

The research study identified by the commenter (Barrows, 2011) was reviewed in support of the analysis and does not change the conclusions of the PA/EIS with regard to potential impacts to wildlife movement west of the Project area.

17-24 In support of the analysis, available wildlife habitat in the regional Project area was calculated for desert tortoise, Mojave fringe-toed lizard, burrowing owl, Nelson's bighorn sheep, and other species. The assessment provided in Table 4.4-3 is a species-by-species assessment of available habitat and habitat impacts from foreseeable future projects. The resulting figures show that these projects would cumulatively affect about 3.3 percent of habitat for desert tortoise (86,523 acres out of 2.6 million total acres in the Eastern Colorado Recovery Unit). The Project would affect about 0.2 percent of available desert tortoise habitat in the recovery unit; and 0.3 percent of Mojave fringe-toed lizard habitat (38 out of 12,911 acres available locally in Palo Verde Valley). Without specifically identifying any lands that may serve as worthy mitigation areas, given the large amount of available privately held lands in the regional Project area relative to the scale of the impact, the amount of mitigation habitat is not considered a limiting factor. The required Project mitigation for impacts to special-status plants in the Project area will be considerable (on the order of several thousand acres); however, it is expected that such compensatory mitigation for impacts to plants can be provided concurrently with desert tortoise mitigation. This is also the case for burrowing owl, which often co-occurs on lands that are occupied by desert tortoise.

As identified in Response 9-69, the time table to provide compensatory mitigation has been clarified in the PA/FEIS and requires the Applicant to acquire compensatory lands in fee or easement no more than 18 months after the start of Project ground-disturbing activities.

17-25 See Response 17-8. As the comment notes, the DRECP is not scheduled to be completed until 2013. Because the DRECP process remains underway, it does not govern the BLM's decision-making efforts for the Project.

The BLM has a responsibility to perform a timely environmental review in response to individual applications. For this reason, the BLM will consider the Project pursuant to FLPMA, NEPA, and applicable planning documents, in accordance with the BLM's existing Solar Energy Development Policy. Recognized as a pending application in the Solar PEIS ROD, neither the ROD nor the plan amendments made in that decision apply to the Project.

17-26 As indicated in PA/FEIS Section 5.2.2.1, the BLM has identified 114 archaeological resource sites, of which nine have been determined eligible for inclusion on the National Register; seven of the nine would be adversely affected by the alternatives under consideration. Although the tribal consultation processes remain in progress for this project, these processes will be concluded before the Project may be approved. Therefore, while it is premature to describe the outcome of consultation before the processes are complete, a draft MOA is provided in PA/FEIS Appendix L and issues raised by the tribes (as well as efforts taken to address them) are summarized in PA/FEIS Section 5.2.2. The NHPA Section 106 process (including eligibility determinations) is described and discussed in Section 5.2.2.1 and the government-to-government consultation process is described and discussed in Section 5.2.2.2.

17-27 As described in Section 4.9, if solar PV modules were damaged at the Project site, CdTe would not be likely to mobilize to the environment (Fthenakis, 2003, 2008). New information submitted by commenters (See Responses 11-113, 11-116, 14-6, and 14-7) that was published in July 2012 was not available to the authors of the analysis at the time it was completed (Sinha et al., 2012). This information has been reviewed and Section 4.9 revised to reflect this new information. Sinha et al. find that "Overall, a worst case leaching scenario with screening level fate and transport modeling yields impacts to soil, air, and groundwater that are one to five orders of magnitude below human health screening levels in a California…exposure scenario" (pp. 1674-1675).

Additionally, the comment cites a response from the Fraunhofer Institute (2010) to a number of studies on CdTe and safety concerns. One of these is Fthenakis et al. (2005), which studied the risk of CdTe release from fires in rooftop solar arrays. The Fraunhofer Institute statement notes that "Based on the results Fthenakis concludes that released Cd emissions of typical residential fires (~750°C-900°C) are negligible. This study has been criticized by stating that the tests did not reflect the conditions of real fire cases, in particular in terms of changing temperature distributions during fires, different orientations of modules and temperatures higher than 900°C. However, the test have carried out according to standards and evaluated as correct by the EU." Furthermore, a paper by the National Renewable Energy Laboratory (NREL), a laboratory of the U.S. Department of Energy, states that "The melting point of CdTe is 1041°C, and evaporation starts at 1050°C. Sublimation occurs at lower temperatures, but the vapor pressure of CdTe at 800°C is only 2.5 torr (0.003 atm). … Preliminary studies at Brookhaven and at the GSF Institute of Chemical Ecology in Germany showed that CdTe releases are unlikely to occur during residential fires or during accidental breakage. The thin layers of

CdTe and CdS are sandwiched between glass plates; at typical flame temperatures (800°–1000°C), these compounds would be encapsulated inside the molten glass so that any Cd vapor emissions would be unlikely. In any case, the fire itself and other sources of emissions within the burning structure are expected to pose an incomparably greater hazard than any potential Cd emissions from PV systems" (NREL, 2003, p.4). These studies represent the best currently available research on CdTe solar panel hazards.

Although the above-referenced studies examine solar panels in residential or small rooftop commercial applications, it can be expected that maintenance and inspection of panels for breakage or other damage would be greater at a utility-scale scenario like the Project than a smaller installation because, as described on page 2-55, the on-site SCADA system would offer near real-time readings of the monitored devices, which would alert operators to reduced power output of modules in the event of broken panels. Additionally, seasonal panel washing and other maintenance activities would allow for visual inspection to identify broken panels, if breakage occurred.

Because the Applicant has not yet determined the model of PV module that would be used for the Project, the exact amount of CdTe present in the panels cannot yet be determined. However, NREL (2003) estimates an average of 7 grams CdTe per square meter of solar panels. As shown in Table 2-2, Chapter 2, a 0.72-square-meter panel has an 85 W capacity. Therefore, a 750 MW solar plant may contain approximately 44.5 kilograms, or 98 pounds of CdTe.[3] Approximately 49 percent of the mass of CdTe is cadmium, so the total amount of cadmium would be approximately 48 pounds. In response to comments regarding the potential for CdTe leaching from panels, Mitigation Measure HAZ-2, which requires the Applicant to prepare and implement a Broken PV Module Detection and Handling Plan if the Applicant chooses to use CdTe PV panels, has been added to Section 4.9. Implementation of this measure would minimize the potential for CdTe leaching from damaged panels.

17-28 The mitigation measures proposed in the PA/EIS that require plans and studies provide performance standards and specific types of actions to be taken, and contain sufficient information to inform a decision on the Project's impacts and mitigation without needing to analyze the completed plans. Some plans cannot be completed until closer to construction in order to reflect current site conditions and to be representative of final Project plans, which also must be prepared closer to construction for the same reasons. The contents of certain of the studies and plans required by mitigation measures are dictated by law; in these cases the Applicant is required to comply with the law, including implementing all statutory and regulatory requirements. In all cases, plans would be required to be submitted to and approved by BLM and any other agency with regulatory oversight, as detailed in the mitigation measure, before Project construction could begin. See the Summary of BLM Mitigation and Monitoring (Appendix M to this PA/FEIS) for more detailed information about approval and monitoring of the plans required in the mitigation measures proposed in Chapter 4.

3 $(0.72\ m^2/85\ W) * 750{,}000\ W * (7g\ CdTe/m^2) = 44{,}470\ g\ CdTe$

Letter 18 – Responses to Comments from U.S. Fish and Wildlife Service (USFWS)

18-1 Comment noted. See PA/FEIS Section 5.2.1, which provides an update on the Federal Endangered Species Act Section 7 consultation with the USFWS.

18-2 Comment noted.

18-3 Comment noted. Also see PA/FEIS Section 2.8 regarding the Agency Preferred Alternative.

18-4 Comment noted.

18-5 The BLM has had ongoing discussions with the USFWS regarding adjustments to the westernmost edge of Unit 2, including site visits on August 14, 2012 and October 9, 2012 when this issue was discussed. A final decision regarding the location of western boundary of the proposed action will be reflected in the Record of Decision.

18-6 Discussions regarding the possibility of an alternative fence alignment along the western boundary of Unit 2 that could reduce potential wildlife-related edge effects of the project as proposed have continued since the agency/Applicant meeting of August 14, 2012, including at a site visit held on October 9, 2012. A decision on this issue will be reflected in the Record of Decision.

18-7 The BLM supports the protection of the desert tortoise movement corridor located on upper alluvial fans at the base of the McCoy Mountains. However, the permanent protection of these areas cannot be included in the current agency action. The BLM is not currently entertaining any proposal for the development of the areas identified in the comment and these areas are not part of the right-of-way corridor that is currently under consideration.

18-8 Consistent with NEPA, the analytical baseline for purposes of the PA/EIS was established as of the date the NOI was published in the Federal Register, i.e., August 29, 2011. Project-specific survey data relied upon in the analysis of environmental impacts to golden eagles were generated in accordance with USFWS's Interim Golden Eagle Inventory and Monitoring Protocols (Pagel et al., 2010) and in coordination with USFWS (USFWS, 2011a; USFWS, 2011b; Karl, 2011). For example, in 2010, Phase 1 helicopter surveys were conducted on March 25-26 and April 2-3 and a Phase 2 helicopter survey was conducted on May 14, each in accordance with the Service's Interim Golden Eagle Inventory and Monitoring Protocols. The Applicant provided Project-specific survey methods, including aerial golden eagle survey methods, to the USFWS for review and approval on February 11, 2011 (USFWS, 2011b), and received initial comments from USFWS on February 22, 2011 (USFWS, 2011a). The Applicant met on site with USFWS on February 23, 2011 to discuss survey methods, including golden eagle survey methods, and, on March 16, 2011, participated in a conference call with USFWS Ecological

Services and Division of Migratory Birds staff members specifically to discuss methods for golden eagle surveys. On March 17, 2011, USFWS provided final comments on the survey methods (USFWS, 2011b; Karl, 2011); no comments were regarding the dates of the helicopter surveys. In accordance with input provided by USFWS, Phase 1 surveys were conducted on March 23-24, 2011, and Phase 2 surveys were conducted on May 5-7, 2011. No more recent biological information about golden eagles has been provided in the context of the BLM's environmental analysis of the Proposed Action.

18-9 Two golden eagles were incidentally observed south of the solar plant site on March 28, 2011; no golden eagles were observed during raptor point count surveys or helicopter surveys and no successful breeding by golden eagles was detected within or beyond the 10 mile search radius during the helicopter surveys (TetraTech and Karl, 2011). Further, surveys conducted over multiple years have identified only one active golden eagle nest within 10 miles of the MSEP site that is occupied by golden eagles: it is located 9.2 miles northeast, in the Big Maria Mountains. The absence is noted of USFWS guidance regarding the mitigation of potential loss of golden eagle foraging habitat near an active nest.

The Applicant provided a Project-specific Golden Eagle Risk Assessment in August 2011 (Tetra Tech, 2011) that the BLM and its NEPA contractor independently reviewed. This Assessment evaluated potential direct, indirect, and cumulative impacts to golden eagles from development of the MSEP, including impacts related to the potential loss of golden eagle foraging habitat. Although it currently is unknown whether golden eagles that might nest in the McCoy, Little Maria, and Big Maria Mountains in the future would utilize the Project Area for foraging, avian point counts that have been conducted for the Project suggest that golden eagles do not use the area for foraging. Nonetheless, if it is assumed that they would forage in the Project Area, impacts related to the potential Project-related loss of such foraging habitat are likely to be minimal. This is because the area with the requested ROW represents 3 percent of the area within a 10-mile radius of the nearest eagle nest in the McCoy Mountains, which is an inactive nest located 1.7 miles to the west of the Project Area; 3 percent of the area of the next closest nest, which is an inactive nest located 3 miles to the southwest; and 1.5 percent of the area roughly central to the next closest nests, which are located 5.6 miles west-northwest and 8.4 miles northwest, respectively. Additionally, the requested ROW represents 0.4 percent of the area within a 10-mile radius of the active eagle nest in the Big Maria Mountains that was identified during spring 2010 surveys and determined in spring 2011 surveys to be occupied by red-tailed hawks. Furthermore, the habitat that would be disturbed or removed by development of the Project is neither unique nor limiting on the landscape, and does not represent a known prey concentration. Comparable or better foraging opportunities are expected to be available within the surrounding areas. For these reasons, development and operation of the Project is not expected to disturb the foraging of any eagle pairs within 10 miles of the Project site. Accordingly, the fact that USFWS has not adopted specific guidance for the potential loss of golden eagle foraging habitat near an

active nest does not affect the analysis of potential impacts to golden eagles related to the potential loss of such habitat.

18-10 The analysis of cumulative effects to golden eagles has been revised in PA/FEIS Section 4.4.9 to reflect the recommended 140-mile geographic area of cumulative consideration for this species. Within this larger cumulative study area (the Draft PA/EIS evaluated cumulative effects within a 10-mile radius of the site), development of the MSEP is not expected to contribute significantly to adverse cumulative effects on golden eagles in the area.

18-11 Consultation between the BLM and USFWS is ongoing regarding adjustments to the westernmost edge of Unit 2 as it relates to wildlife movement. The results of these discussions will be reflected in the Record of Decision.

Letter 19 – Responses to Comments from Colorado River Board of California

19-1 See PA/FEIS Section 5.5.4.3, Common Response 3.

19-2 See PA/FEIS Section 5.5.4.3, Common Response 3. In response to PVID Comment 4-5, the estimated annual underflow from the Colorado River that was presented in Draft PA/EIS Section 3.20 has been removed.

19-3 See PA/FEIS Section 5.5.4.3, Common Response 3. No entitlement to Colorado River water would be needed to construct, operate, maintain, or decommission the Project.

19-4 See PA/FEIS Section 5.5.4.3, Common Response 3.

Letter 20 – Responses to Comments from U.S. Bureau of Reclamation

20-1 See PA/FEIS Section 5.5.4.3, Common Response 3.

20-2 See PA/FEIS Section 5.5.4.3, Common Response 3. As explained therein, no entitlement is required.

20-3 See PA/FEIS Section 5.5.4.3, Common Response 3. As explained therein, construction, operation, maintenance, and decommissioning of the Project would have no impact on the Colorado River.

Letter 21 – Responses to Comments from La Cuna de Aztlan Sacred Sites Protection Circle

21-1 Opposition to the Project is noted.

21-2 Written comments included in this letter are noted, and responses are provided. It was made clear at the public meetings held June 27 and June 28, 2012, that, although meeting attendees were welcome to speak, responses would be provided in the PA/FEIS only to comments that had been submitted in writing. Comment cards were made available at the meeting for that purpose, and the presentation materials included the Project-specific email address as well as a physical address where comments could be sent. Nonetheless, oral input provided during those public meetings was summarized and the summary included in the formal Administrative Record for the Project.

21-3 The commenter did not provide a copy of the MOU referred to in the comment; however, the BLM understand the reference to be to Amendment No. 1 to the Memorandum of Understanding between the United States Department of the Interior Bureau of Land Management and the Southern Low Desert Resources and Conservation and Development Council (BLM & SLDRCDC, 2008). Alfredo Figueroa signed this document on behalf of La Cuna on February 15, 2008; Jim Shiplay signed it on behalf of the Blythe Area Chamber of Commerce and Tourist Information Center on February 29, 2009; Thomas Burgin, President of the Southern Low Desert Resources and Conservation and Development Council, signed it on March 6, 2008, and James T. Shoaff, Field Manager of the BLM's Yuma Field Office, signed it on March 14, 2008. By its terms, this document relates to the protection of cultural resources in the BLM Yuma Field Office planning area (BLM & SLDRCDC, 2008). It does not apply to cultural resources in the BLM Palm Springs-South Coast Field Office planning area, where the MSEP has been proposed.

21-4 Ethnographic resources represent the heritage of a particular ethnic or cultural group, such as Native Americans or African, European, Latino, or Asian immigrants. They may include traditional resource-collecting areas, ceremonial sites, value-imbued landscape features, cemeteries, shrines, or ethnic neighborhoods and structures.

21-5 Section 3.5 discusses the methods and results of the studies undertaken to identify cultural resources within the Project area. Section 4.5 analyzes the potential effects of the proposed Project on cultural resources, and provides a mitigation measure to reduce, avoid, or mitigate these effects.

21-6 The comment on the cultural importance of cultural resources is noted.

21-7 Section 4.5 analyzes the potential effects of the proposed Project on cultural resources, and provides a mitigation measure to reduce, avoid, or mitigate these effects. Section 4.5.11 acknowledges that although the proposed Mitigation Measure CUL-1 would serve to minimize or mitigate most of the proposed Project's effects on cultural resources, these effects cannot be fully mitigated and some residual effects would remain even after mitigation.

21-8 The comment summarizes the importance of the Mule Mountains to the commenter and is noted. This comment does not directly address the adequacy of the PA/EIS.

21-9 This comment refers to a project other than the one considered in the PA/EIS, but the comment regarding the Mule Mountains is noted.

21-10 The Project is neither connected to the Blythe Solar Power Project nor related to any natural gas-fired power plant. See Section 5.5.3.2. The comment does not address the adequacy or accuracy of the environmental analysis and does not identify any other significant environmental issue requiring a response.

21-11 This comment refers to a project other than the one considered in the PA/EIS. This comment does not directly address the adequacy of the PA/EIS.

21-12 The comment, which regards a different solar project, is noted.

21-13 This comment regarding the location of the project within the McCoy Valley is noted. This comment does not directly address the adequacy of the PA/EIS.

21-14 This comment regarding the location of the project within the McCoy Valley is noted. This comment does not directly address the adequacy of the PA/EIS.

21-15 No geoglyphs, monuments, or mazes have been identified within the McCoy Solar project area. The geoglyph referenced by the commenter is not located within the project area.

21-16 This comment summarizes the geoglyphs located in vicinity of project area. This comment does not directly address the adequacy of the PA/EIS, but is noted for the record.

21-17 Impacts to biological resources and wildlife are addressed in Section 4.4. The BLM would be pleased to meet with tribal members for the purpose of identifying specific places within the Project area that contain plants used for traditional purposes by tribal members. Such uses would be considered in the decision making for the Project as part of the NEPA process. The BLM would seek to accommodate the continued use of such plants by tribal members elsewhere on the public lands.

21-18 The comment does not address the adequacy or accuracy of the environmental analysis and does not identify any other significant environmental issue requiring a response. The status of solar panel manufacturers and security of long-distance high-voltage transmission lines is outside of the scope of this PA/EIS.

21-19 This comment refers to a statement made by the CEC with regards to the cumulative impacts of the Genesis Solar Energy Project. This comment does not directly address the adequacy of the PA/EIS.

21-20 The comment's statement of opposition to the Project is noted. The comment suggests that the Project is in violation of a number of laws; however, it provides no specific

examples as a basis for the allegation. Accordingly, the BLM is unable to provide a more detailed response at this time.

21-21 See PA/FEIS Section 5.5.4.1, Common Response 1.

21-22 The enclosed aerial photographs of geoglyphs will be included in the administrative record for the Project.

Letter 22 – Responses to Comments from Defenders of Wildlife, Natural Resources Defense Council, Sierra Club, The Wilderness Society, and Audubon California

22-1 Discussion and analysis of climate change in the context of the Proposed Action are provided in PA/FEIS Section 3.8 (Affected Environment) and Section 4.8 (Environmental Consequences). Discussion and analysis of socioeconomics in the context of the Proposed Action are provided in PA/FEIS Section 3.15 (Affected Environment) and Section 4.15 (Environmental Consequences). As explained in PA/FEIS Section 2.9.1, the BLM worked closely with the Applicant during the application phase to identify appropriate areas for the Project. BLM discouraged the Applicant from including in its application alternate BLM locations with significant environmental concerns, such as critical habitat, ACECs, DWMAs, designated OHV areas, wilderness study areas, and designated wilderness areas. BLM encouraged the Applicant to locate its project on public land with few potential conflicts. Regarding a potential "disturbed lands" alternative, see PA/FEIS Section 5.5.4.1, Common Response 1.

22-2 The BLM has undertaken two recent program-level planning efforts for solar development on lands within the CDCA: the California Desert Renewable Energy Conservation Plan (DRECP) and the Solar PEIS.

The DRECP is intended to advance federal and state conservation goals in the California desert region while facilitating the timely permitting of renewable energy projects under applicable federal and state laws. The Renewable Energy Action Team (REAT) has not yet released a formal public draft of the DRECP and associated environmental impact analysis: the process is not yet final. Accordingly, the DRECP does not govern the BLM's decision-making efforts for the Project.

The Final Solar PEIS was not completed until July 2012, after publication of the Draft PA/EIS for this Project. The MSEP is recognized as a "pending application" in the Solar PEIS ROD, and so neither the ROD nor the plan amendments made in that decision apply to the Project. Accordingly, if the BLM decides to grant a ROW for the MSEP, the CDCA Plan would be amended as required. Additional discussion of the Solar PEIS is provided on pages 2-29 (guidance for treatment of vegetation under panels); 3.10-7 through 3.10-9 (withdrawal and study of lands as solar energy study areas), 4.4-26 (portions of MSEP site have low potential for substantial resource conflicts relative to other locations

considered in the PEIS); and 4.19-17 and 4.19-18 (PEIS evaluated cumulative scenario for visual resource impacts).

The BLM has a responsibility to perform a timely environmental review in response to individual applications. For this reason, the BLM will consider the Project pursuant to FLPMA, NEPA, and applicable planning documents, in accordance with the BLM's existing Solar Energy Development Policy.

22-3 The Project was designed to minimize and avoid sensitive riparian habitat that occurs to the west of the Project area, including desert dry wash woodland (DDWW) habitat. Botanical surveys identified only 1.5 acres of DDWW on the Project site and an additional 2.7 acres on Project linears (see Table 3.3-1 and Figure 3.3-1). As shown in Figure 3.3-1, the identified DDWW habitat is located in a central portion of the solar plant site and avoidance may not be technically possible due to drainage concerns. However, it is likely that most impacts to DDWW habitat on linears can be avoided or minimized through the implementation of protective measures during construction (see APM HYDRO-1 and Mitigation Measures VEG-7, VEG-8, VEG-10, and VEG-11). Given that the large size of the Project, the anticipated impact to DDWW habitat is considered small.

22-4 The comment is noted.

22-5 The comment letter provides more specific comments regarding lands with wilderness characteristics at comments 22-7 and 22-8. See Responses 22-7 and 22-8, below, for detailed responses to these comments.

22-6 The PA/EIS is intended to satisfy the requirements of NEPA, but is not intended to satisfy the requirements of the California Environmental Quality Act (CEQA). As described on page 1-5, "Riverside County would be responsible for complying with the California Environmental Quality Act (CEQA) before the County may approve the portion of the MSEP under its land use jurisdiction." As described in the Executive Summary, the County was involved in the preparation of a joint NEPA/CEQA document with BLM, but as of March 2012, was no longer participating in that process. The PA/EIS states that the County "may rely on this Draft PA/EIS in accordance with CEQA to document the analysis of potential environmental impacts that could result from its approval of permits for the Project" (page ES-14). However, this is not intended to suggest that the BLM has prepared this document to satisfy CEQA requirement, but that the County may rely on the information and analysis contained in the PA/EIS to the extent that CEQA allows. The County, and not the BLM, would be responsible for compliance with CEQA requirements and would determine whether and to what extent to rely on the PA/EIS in meeting these requirements. Issues related to CEQA requirements are not within the scope of the PA/EIS.

22-7 As described on page 3.16-2, the consideration of wilderness characteristics in the land use planning process may result in several outcomes, including emphasizing other

multiple uses as a priority over protecting wilderness characteristics. Additionally, as described on page 3.16-4, the CDPA §103(d) states, "The Congress does not intend for the designation of wilderness areas in §102 of this title to lead to the creation of protective perimeters or buffer zones around any such wilderness area." The impacts of the Project on vegetation communities and wildlife are described in Sections 4.3 and 4.4.

22-8 See Response 22-7. As described in Section 4.16, the Proposed Action would have a direct impact on the 1,089 acres within Unit 2 of the Project which have been identified as lands with wilderness characteristics. Construction, operation, maintenance, and decommissioning of the Project would prevent this acreage from future consideration as wilderness by Congress. This is primarily because the 1,089 acres occupied by the Project would no longer meet the criteria of being in a "natural condition." No statute or regulation requires offsets, compensation, or funding for wilderness restoration to mitigate impacts to lands with wilderness characteristics. However, Mitigation Measure LWC-1 has been proposed to mitigate impacts to lands with wilderness characteristics off-site through restoration in the Big Maria Mountains and/or Palen-McCoy Wilderness Areas. Alternative 2 would have no impact on lands with wilderness characteristics because they would not be present within Unit 1. As described on page 3.16-2, the consideration of wilderness characteristics in the land use planning process may result in several outcomes, including emphasizing other multiple uses as a priority over protecting wilderness characteristics.

22-9 See Response 22-3.

22-10 The distribution of woodland habitat was mapped in the Project area and the resulting biological technical reports were provided in Appendix C of the PA/EIS. As identified in these reports, the Proposed Action does not overlap with McCoy Wash or desert dry wash woodland habitat associated with this drainage.

22-11 The BLM supports the protection of the desert tortoise movement corridor located on upper alluvial fans at the base of the McCoy Mountains. However, the permanent protection of these areas cannot be included in the current agency action. The BLM is not currently entertaining any proposal for the development of the areas identified in the comment and these areas are not part of the right-of-way corridor that is currently under consideration.

22-12 The comment is noted. The location of the Project site within the Colorado Desert Recovery Unit is discussed on page 3.4-6.

22-13 The comment is noted.

22-14 The comment that certain lands should be excluded from the Project is equivalent to stating that Alternative 2 would have greater adverse effects to desert tortoise than Alternative 1. The comment is noted.

22-15 See PA/FEIS Section 5.5.4.2, Common Response 2.

22-16 Support for Alternative 2 is noted.

22-17 Support for Alternative 2 is noted. Regarding consistency of the Proposed Action with the CDCA Plan's MUC classification of the project site, see PA/FEIS Section 1.5.1, Relationship of the Proposed Action to BLM Policies, Plans, and Programs; Section 3.10 (including Table 3.10-2) regarding the CDCA Plan's MUC land use and resource management guidelines; and Section 4.10 regarding impacts the land use plans.

22-18 Support for Alternative 2 is noted.

22-19 Figure 4.1-1 and Table 4.1-4 of the PA/FEIS describe portions of the cumulative scenario, which assumes for purposes of the analysis that the development of or operations on these sites would cause impacts that could interact with those of the Project to cause or contribute to cumulative effects. Therefore, while the BLM did consider a disturbed lands alternative, this potential alternative was eliminated from detailed analysis (see PA/FEIS Section 2.9.2.1.3). Nonetheless, the BLM did consider alternative locations for the Project: see Section 5.5.4.1, Common Response 1; and Section 2.9.2.1, Site Alternatives.

22-20 As indicated in PA/FEIS Section 5.5.4.1, Common Response 1, the BLM did consider a disturbed lands alternative; however, this potential alternative was eliminated from detailed analysis as described in Response 22-19.

22-21 PA/FEIS Section 5.5.4.1, Common Response 1; see also Response 22-19, explaining why the locations proposed by the commenter as a separate "disturbed lands alternative" were not considered in detail in the PA/FEIS.

22-22 Regarding coordinated environmental review, see PA/FEIS Section 5.5.4.2, Common Response 2. Regarding the range of alternatives considered in the PA/FEIS, see Section 5.5.4.1, Common Response 1. Because the MSEP and BSPP are separate, distinct projects under NEPA, the BLM declines to consider them together in a "combined projects" alternative as suggested by this comment. As explained in PA/FEIS Section 5.5.4.4, Common Response 4, the Draft PA/EIS for the MSEP is not being recirculated for public review and comment.

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APPENDIX L

Draft Memorandum of Agreement

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MEMORANDUM OF AGREEMENT
AMONG THE
BUREAU OF LAND MANAGEMENT-CALIFORNIA,
MCCOY SOLAR, LLC,
THE CALIFORNIA STATE HISTORIC PRESERVATION OFFICER,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING
THE MCCOY SOLAR ENERGY PROJECT
RIVERSIDE COUNTY, CALIFORNIA

WHEREAS, McCoy Solar, LLC (Applicant) has applied for a right-of-way (ROW) grant on public lands managed by the Bureau of Land Management (BLM) and has submitted a plan of development (POD) to construct, operate and maintain a photovoltaic solar electric generation facility and a 230 kilovolt (kV) generation tie line (gen-tie) on public lands managed by the BLM, including construction of access and maintenance roads, laydown and staging areas, and support facilities and infrastructure (hereinafter, the "undertaking"); and

WHEREAS, the BLM has determined that the issuance of a ROW (proposed federal action) to the Applicant in accordance with the Federal Land Policy and Management Act (FLPMA) 43 U.S.C. § 1701, et seq., and authorization of the Project is an undertaking subject to Section 106 of the National Historic Preservation Act (NHPA), 16 U.S.C. § 470(f), and its implementing regulations at 36 C.F.R. § 800 (2004); and

WHEREAS, the BLM has consulted with the California State Historic Preservation Officer (SHPO) pursuant to 36 CFR Part 800 and has determined to comply with the NHPA Section 106 by means of a federal agency program alternative, as authorized by 36 C.F.R. § 800.14 and as summarized in this Agreement; and

WHEREAS, in accordance with the regulations at 36 C.F.R. § 800.6(a)(1), BLM has notified the Advisory Council on Historic Preservation (ACHP) regarding the effects of alternatives of the undertaking on historic properties and has invited the ACHP to participate in consultation to resolve the potential effects on historic properties, and as per their letter dated March 2, 2012, the ACHP is participating; and

WHEREAS, Riverside County is the lead State agency for compliance with the California Environmental Quality Act (CEQA) and has certain responsibilities under State laws and regulations to take into account and mitigate the impacts on historical resources eligible for or included in the California Register of Historical Resources (CRHR), Cal. Pub. Res. Code, Sec. 5024.1, and has participated in consultation and is invited to participate in this Agreement as a Concurring Party; and

WHEREAS, the Applicant has participated in this consultation per 36 C.F.R. § 800.2(c)(4), will be the entity to whom the BLM may grant a ROW, and has the responsibility for carrying out the specific terms of this Agreement under the oversight of the BLM, and is an Invited Signatory to this Agreement; and

WHEREAS, the BLM has authorized the Applicant to conduct specific identification efforts for this undertaking including a review of the existing literature and records, cultural resource surveys, ethnographic studies, and geomorphological studies to identify historic properties that might be located within the Area of Potential Effect (APE) as defined at 36 C.F.R. § 800.16(d); and

WHEREAS, the reports entitled *Cultural Resources Class III Survey Report for the Proposed McCoy Solar Energy Project, Riverside County, California*, prepared by AECOM, November 2011, and; *Results of Archaeological Testing and Evaluation of Site CA-RIV-9696 at the McCoy Solar Energy Project*, letter report prepared by AECOM, January, 2012, and; *Literature Review for the Native American Ethnographic Assessment for the McCoy Solar Energy Project, Riverside County, California*, prepared by AECOM, June 2012, and; <*insert final ethnographic assessment report here*>, prepared by AECOM, September 2012, present the results of identification and evaluation efforts; and

WHEREAS, the BLM has identified 114 archaeological sites within the APE which are described in Appendix A to this Agreement, and has determined, in consultation with SHPO, that the archaeological sites designated CA-RIV-2486, CA-RIV-3419, CA-RIV-10194, CA-RIV-10225, CA-RIV-10240, CA-RIV-10242, CA-RIV-10245, CA-RIV-10246, and CA-RIV-10222 are eligible for inclusion on the National Register of Historic Places (NRHP); and

WHEREAS, the BLM has determined, in consultation with SHPO, that alternatives are under consideration that would have an adverse effect on seven archaeological sites designated CA-RIV-10194, CA-RIV-10225, CA-RIV-10240, CA-RIV-10242, CA-RIV-10245, CA-RIV-10246, and CA-RIV-10222, and the Desert Training Center/California-Arizona Maneuver Area which are eligible for inclusion on the NRHP; and

WHEREAS, the BLM will manage all unevaluated archaeological sites within the APE as eligible for inclusion on the NRHP under 36 C.F.R. § 60.4(d) (hereinafter "Criterion D") for project management purposes, and through the imposition of monitoring and avoidance measures, the BLM has found that the significant information values retained by these resources would not be affected by the undertaking; and

WHEREAS, pursuant to 36 C.F.R. § 800.2(c)(2)(ii) and Executive Order 13175, the BLM is responsible for government-to-government consultation with federally recognized Indian tribes and is the lead federal agency for all tribal consultation and coordination; and

WHEREAS, the BLM has formally notified and invited federally recognized tribes including the Agua Caliente Band of Cahuilla Indians, Augustine Band of Cahuilla Indians, Cabazon Band of Mission Indians, Cahuilla Band of Mission Indians, Chemehuevi Indian Tribe, Cocopah Indian Tribe, Colorado River Indian Tribes, Fort Mojave Indian Tribe, Fort Yuma Quechan Tribe, Morongo Band of Mission Indians, Ramona Band of Mission Indians, San Manuel Band of Mission Indians, Soboba Band of Luiseno Indians, Torres-Martinez Desert Cahuilla Indians and Twenty-nine Palms Band of Mission Indians (Tribes) to consult on the undertaking and participate in this Agreement as Concurring Parties; and

WHEREAS, the BLM recognizes its government-to-government obligation to consult with Indian tribes that may attach religious and cultural significance to historic properties that may be affected by the proposed undertaking and will continue to consult with the affected tribes regarding their concerns under Section 106; in addition, the BLM will comply with the American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act (NAGPRA), and Executive Orders 13007 and 13175;

WHEREAS, the California Unions for Reliable Energy, as an organizations, and Mamie Harper, Priscilla Eswonia, Stacia Baillie, Michael Tsosie, and David Harper, as individuals, have been invited to consult on this undertaking and this Agreement, have been afforded consulting party status pursuant to 36 C.F.R. 800.3(f)(4), and have been invited to be Concurring Parties to this Agreement. The BLM will continue to consult with any consulting party that request such consultation regardless of their decision to concur by signature in this Agreement. BLM shall continue to consult throughout the implementation of this Agreement, however only consulting parties that have concurred in this Agreement by signature shall have rights with regard to implementation of the terms of this Agreement; and

NOW, THEREFORE, the BLM, SHPO, and ACHP (hereinafter "Signatories"), and the Applicant (hereinafter "Invited Signatory"), agree that the undertaking shall be implemented in accordance with the following stipulations in order to take into account the adverse effect of the undertaking on historic properties, resolve such adverse effects through the process set forth in this Agreement, and provide the ACHP with a reasonable opportunity to comment in compliance with Section 106.

STIPULATIONS

The BLM shall ensure that the following measures are implemented:

I. DEFINITIONS

The definitions found at 36 C.F.R. § 800.16 and in Appendix B shall apply throughout this Agreement. If there is a conflict between the definitions in the implementing regulations and Appendix B, the regulations shall govern.

II. AREA OF POTENTIAL EFFECTS

The APE is depicted in Appendix C to this Agreement. The APE, as currently defined, encompasses an area sufficient to accommodate all of the proposed and alternative Project components under consideration as of the date of execution of this Agreement. If BLM selects a Project alternative for implementation, the APE shall be defined by operation of this Agreement to exclusively encompass the area of that selected alternative. If it is determined in the future that the undertaking may directly or indirectly affect historic properties located outside the defined APE, then the BLM, in consultation with SHPO and pursuant to 36 C.F.R. § 800.4(a)(1), shall determine and document modifications to the APE using the following process:

a) Consulting Parties to this Agreement may propose that the APE established herein be modified. If the Signatories and Invited Signatory decide that such modification is warranted, the BLM shall modify the APE as agreed. Modifications of the APE (Appendix C) made as a result of continuing consultation among the Consulting Parties do not require the Agreement to be amended.

b) If the Signatories and Invited Signatory agree to the proposal, then the BLM will prepare a description and a map of the modification to which the Signatories and Invited Signatory agree. The BLM will keep copies of the description and the map on file for its administrative record and distribute copies of each to the other Consulting Parties within 30 days of the day upon which agreement was reached.

c) Where modification to the APE adds a new geographic area, the BLM shall take the steps necessary to identify, evaluate and take into account the effects of the undertaking on historic properties in the new geographic area in accordance with this Agreement.

d) If the Signatories and Invited Signatory cannot agree to a proposal for the modification of the APE, then they will resolve the dispute in accordance with Stipulation XI of this Agreement.

III. AVOIDANCE, PROTECTION, AND MITIGATION MEASURES

a) Avoidance and Protection Measures

Where archaeological resources can be avoided, the BLM will implement the management or protective measures identified in Table 1 of Appendix A and the following:

i. Archaeological sites that can be protected from direct impacts, but are within 100 feet, including buffer areas, of proposed construction activities will be identified and labeled as Environmentally Sensitive Areas (ESAs). This includes archaeological sites determined eligible for inclusion in the NRHP and sites that have not been formally evaluated, but are being treated as eligible and avoided for project management purposes.

ii. The ESAs will be designated by marking the boundaries of sites with appropriate buffer zones (generally a buffer of 50 feet beyond the outer limits of the site extent, as demonstrated by surface and/or subsurface indications) using temporary fencing or other easily recognizable boundary defining materials.

(1) These areas will be shown on the engineering plans for the undertaking as off-limits to construction activities.

(2) Once established, an ESA will define areas where construction activities cannot occur, in order to prevent effects to historic properties within the designated ESA.

iii. ESAs will be identified and established prior to initiation of ground disturbing activities in the vicinity of the site and will be maintained and monitored for the duration of the work effort in the ESA vicinity.

iv. Violations of permits, stipulations or other requirements will be investigated by the BLM and subject to requirements and/or penalties under the Act for the Preservation of American Antiquities of 1906 (Antiquities Act), Archaeological Resources Protection Act of 1979 (ARPA), Federal Land Policy and Management Act of 1976, the rights-of-way regulations at 43 C.F.R. § 2805.12 and/or other relevant laws and regulations.

b) Mitigation of Adverse Effects

Should BLM approve an alternative that adversely affects archaeological site CA-RIV-10194, CA-RIV-10225, CA-RIV-10240, CA-RIV-10242, CA-RIV-10245, CA-RIV-10246, CA-RIV-10222, and the Desert Training Center/California-Arizona Maneuver Area (DTC/C-AMA) the BLM will resolve the adverse effects as follows:

i. The BLM shall ensure that the adverse effect of the undertaking on archaeological site CA-RIV-10222 is resolved through sampling, scientific study and the capping of the remainder of the site. Due to the property's scientific or information values as defined in Criterion D of 36 C.F.R. §60.4, the qualifying criteria for inclusion on the NRHP, sampling, scientific study, and capping is the appropriate treatment for the archaeological values at the site. A historic properties treatment plan (HPTP) will be prepared and included as Appendix E to this Agreement. Amendment of the HPTP will not require amendment of this Agreement.

ii. The adverse direct effects of the undertaking on the Criterion D values of [illegible]gical sites CA-RIV-10194, CA-RIV-10225, CA-RIV-10240, CA-RIV-[illegible]0242, CA[illegible]V-10245, CA-RIV-10246, as defined in 36 C.F.R. § 60.4, will be resolved throu[illegible] extensive and detailed mapping of all features at each site.

iii. H[illegible]oric Properties [illegible] Religious or Cultural Significance/Traditional Cultural Prop[illegible]ies (TO BE D[illegible]VELOPED IN CONSULTATION)

iv. The adver[illegible]cumula[illegible] effects of the undertaking on the Criterion A-C values of the DTC/C-AM[illegible]s [illegible]ned in 36 C.F.R. §60.4, will be resolved through the development o[illegible] minute documentary film to be made available to the public. The BLM will ensure that the Applicnat will conduct interviews of WWII veterans who trained at the DTC/C-AMA. These interviews should be conducted using high-definition video recording techniques. A historian familiar with the DTC/C-AMA should be present at all interviews. The interviews should be used to create the 30 minute documentary film about the DTC/C-AMA.

c) Within 45 days of the issuance of the notice to proceed for this Project, the Applicant will identify to the BLM the consultant(s) who, under contract to the Applicant, will be

responsible for developing and completing the mitigation products described in items III(b)(i) – (iv) above.

i. Prior to carrying out any activities related to any mitigation measure, the consultant(s) shall meet with the BLM and the Applicant to discuss the goals of the Project and work plan requirements, including lines of communication, deliverables, schedules, and any terms and conditions.

ii. Within 45 days of meeting with the BLM and the Applicant, and prior to initiation of any work, the consultant(s) will provide the BLM with draft Work Plans for completing work required in the mitigation measures.

(1) Each work plan shall document lines of communication, key personnel, and provide appropriate natural and cultural context to support the research design and methods proposed for completion of the mitigation measure. The work plans shall also include a schedule of milestones and timeline for completion of the work.

(2) The BLM will provide copies of the draft work plans to the Consulting Parties in accordance with the communication and reporting procedures in Section VII of the Agreement.

i. Upon approval of each work plan by the BLM, the BLM will authorize the Applicant and the consultant(s) to initiate work on the mitigation measure.

d) General Mitigation Stipulations

i. Any products or studies described in the mitigation measures required by this Agreement will be developed in a manner to allow other proposed undertakings that may occur in the region to augment or expand the scope of the products or studies, provided that such augmentation or expansion proposed by other undertakings are the result of consultation under Section 106 or is an appropriate mitigation measure developed through the National Environmental Policy Act (NEPA) or CEQA process, cost sharing is provided as appropriate and developed in consultation with the Applicant and the BLM, and that no additional burden (e.g., cost or schedule) be placed on the Applicant.

ii. Should the undertaking be approved by the BLM, mitigation measures will be implemented after the ROW is granted and prior to the issuance of a Notice to Proceed for construction in those portions of the undertaking addressed by the subject mitigation measures.

iii. Within thirty (30) days after the BLM has determined that all work required by a work plan has been completed, the BLM shall notify and submit a summary report to the Consulting Parties. Within twelve (12) months after BLM has determined that all work required by a work plan has been completed, or pursuant to an alternative

schedule required by any work plan implementing the terms of this Agreement, the Applicant will submit a written draft technical report to the BLM that documents the results of implementing the work plan. The BLM will provide draft technical reports for each work plan to the Consulting Parties for review as provided in Stipulation VII(a).

iv. Copies of the final technical reports documenting the results of implementing each work plan will be distributed by BLM to the Consulting Parties and to the appropriate California Historical Resources Information Survey (CHRIS) Regional Information Center.

IV. MONITORING

a) Archaeological Monitoring

i. The Applicant, in consultation with the other Consulting Parties to this Agreement, may develop a comprehensive archaeological monitoring plan that will be in effect during construction of the Project. A comprehensive archaeological monitoring plan that has been approved by the BLM shall take precedence over those stipulations regarding monitoring provided below. A draft comprehensive archaeological monitoring plan may be incorporated into the plan for post-review discoveries and unanticipated effects and attached as Appendix E to this Agreement. In the absence of a comprehensive archaeological monitoring plan, Paragraphs (1) through (4) of Stipulation IV shall apply.

(1) The Applicant shall ensure that archaeological monitors will be on site during construction to observe grading, trenching or other ground disturbing activities for any facilities, roads or other Project components related to the undertaking near ESAs and in other areas designated for full-time monitoring, as detailed in Stipulation III, Appendix A, and/or Appendix E.

(2) The Applicant shall ensure that archaeological monitors will meet the standards specified in Stipulation VIII(a), will be approved and permitted by the BLM, will be familiar with the types of historic and prehistoric archaeological resources that may occur in the APE, and will be directly supervised by a principal archaeologist (PA).

(3) The Applicant shall ensure that the PA will submit bi-weekly documentation of archaeological monitoring activities to the BLM by email. Documentation will include the location of archaeological monitoring activities for the reporting time period, as well as a description of any archaeological resources identified and any actions taken. The PA will prepare a monthly field monitoring verification report with the compiled monitoring observations, results, and actions taken for submission and approval to the BLM. The BLM will provide copies of bi-weekly and monthly archaeological monitoring reports to the Consulting Parties, unless otherwise directed by a Consulting Party.

(4) Upon completion of all archaeological monitoring tasks and requirements related to Project construction and implemented pursuant to this Agreement, the Applicant shall ensure that the PA will submit within three months of completion of Project construction a final monitoring report to the BLM for review and approval. The final monitoring report will describe the monitoring program and its findings and results, and present a detailed professional description, analysis, and evaluation of any cultural resources that were encountered and evaluated during construction. The BLM will provide a copy of the monitoring report to the Consulting Parties.

ii. Long Term Management Plan for Sites within the APE

(1) The Applicant, in consultation with the other Consulting Parties to this Agreement, will establish and fund a Long Term Management Plan (LTMP) for the post-construction archaeological monitoring, and condition assessment of sites in the APE of the selected alternative which could be affected by on-going operation and maintenance activities. The Applicant shall submit a draft LTMP to the BLM within nine (9) months from the date of the issuance of the Notice to Proceed for the undertaking. The BLM will submit the LTMP to the Consulting Parties for review following the provisions of Stipulation VII(a). The LTMP will be made Appendix F to this Agreement.

V. POST-REVIEW DISCOVERIES AND UNANTICIPATED EFFECTS

a) The Applicant, in consultation with the other Consulting Parties to this Agreement, shall develop a comprehensive plan to manage post-review discoveries and unanticipated effects which shall be attached as Appendix E to this Agreement.

b) If human remains and/or associated funerary objects compose all or part of the discovery, then the BLM shall follow the process described in Stipulation VI.

c) The BLM, at its discretion, but in consultation with SHPO, can assume eligibility of the discovered archaeological property under Criterion D pursuant to 36 C.F.R. § 800.13 (2)(c), and notify all Consulting Parties to the Agreement within 48 hours of the discovery. The adverse effects to the historic property will be resolved through implementation of the archaeological data recovery plan included in Appendix E to this Agreement. A report of the completed actions will be provided to all Consulting Parties.

VI. TREATMENT OF HUMAN REMAINS OF NATIVE AMERICAN ORIGIN

a) The BLM shall ensure that any Native American human remains, funerary objects, sacred objects, and/or objects of cultural patrimony discovered on BLM administered lands during implementation of the terms of the Agreement will be treated in accordance with the requirements of the Native American Graves Protection and Repatriation Act (NAGPRA) (Pub. L. 101-601) and 43 C.F.R. § 10.

b) In consultation with the Tribes, the BLM shall seek to develop a written plan of action pursuant to 43 C.F.R. 10.5(e) to manage the inadvertent discovery or intentional excavation of human remains, funerary objects, sacred objects, or objects of cultural patrimony. The finalized plan of action shall be included as Appendix G to this Agreement.

c) The BLM shall ensure that Native American human remains, funerary objects, sacred objects, and/or objects of cultural patrimony on non-federal lands are treated in accordance with the California Public Resources Code at Sections 5097.98 and 5097.991, and of the California Health and Human Safety Code at Section 7050.5(c).

VII. COMMUNICATION AND REPORTING

a) The BLM shall submit all documents relating to the Agreement to the Consulting Parties in complete but draft form for review. Consulting Parties will be afforded 30 days following receipt of a draft document to submit written comments to BLM unless otherwise mutually agreed to by the Consulting Parties. The BLM will provide Consulting Parties with written documentation indicating whether and how the document will be modified in response to comments. Unless Consulting Parties object to the revisions in writing to the BLM within 30 days following receipt of the revised document, BLM may finalize the document.

   i. If a Consulting Party objects to the revisions during the comment period, the BLM will consult with the objecting party for no more than 30 days to resolve the objection. If the objection is resolved, the BLM will notify Consulting Parties of the resolution and may revise and finalize the document. If the objection cannot be resolved, the BLM shall follow the procedures in Stipulation XI(c).

   ii. The BLM will provide a copy of the final document to the Consulting Parties.

b) The BLM shall prepare a letter report on a biennial schedule summarizing the fulfillment of the stipulations contained within this Agreement. The report will be submitted to all Consulting Parties to this Agreement by December 31, 2013, for the initial reporting period and every two years thereafter for the duration of this Agreement.

   i. The implementation and operation of this Agreement shall be evaluated on a biennial basis by the parties. This evaluation, to be conducted after the receipt of the BLM letter report, may include in-person meetings or conference calls among these parties, and may provide suggestions for modifications or amendments.

   ii. During the construction phase of the undertaking, the Consulting Parties will meet annually between January and March to discuss the fulfillment of the stipulations contained within this Agreement.

VIII. ADMINISTRATIVE STANDARDS

a) PROFESSIONAL QUALIFICATION STANDARDS. All actions prescribed by this Agreement that involve the identification, evaluation, analysis, recordation, treatment, monitoring, and disposition of historic properties and that involve the reporting and documentation of such actions in the form of reports, forms or other records, shall be carried out by or under the direct supervision of a person or persons meeting, at a minimum, the Secretary of the Interior's Professional Qualifications Standards (PQS), as appropriate (48 Fed. Reg. 44738-44739 dated September 29, 1983). However, nothing in this Stipulation may be interpreted to preclude any party qualified under the terms of this paragraph from using the services of persons who do not meet the PQS, so long as the work of such persons is directly supervised by someone who meets the PQS.

b) DOCUMENTATION STANDARDS. Reporting on and documenting the actions cited in this Agreement shall conform to every reasonable extent with the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation (48 Fed Reg. 44716-40 dated September 29, 1983), as well as, the BLM 8100 Manual, the California Office of Historic Preservation's Preservation Planning Bulletin Number 4(a) (December 1989), Archaeological Resource Management Reports (ARMR): Recommended Contents and Format (ARMR Guidelines) for the Preparation and Review of Archaeological Reports, and any specific and applicable county or local requirements or report formats.

c) CURATION STANDARDS. On BLM-administered land, all records and materials resulting from the actions required by this Agreement shall be curated in accordance with 36 C.F.R. § 79, and the provisions of the NAGPRA regulations, 43 C.F.R. § 10, as applicable. To the extent permitted under Sections 5097.98 and 5097.991 of the California Public Resources Code and by private property owners, the materials and records resulting from the actions required by this Agreement for private lands shall be curated in accordance with 36 C.F.R. § 79. The BLM will seek to have the materials retrieved from private lands donated through a written donation agreement.

IX. IMPLEMENTATION OF THE UNDERTAKING

a) The BLM may authorize construction activities, including but not limited to those listed below, to proceed in specific geographic areas where there are no historic properties; where there will be no adverse effect to historic properties; where an archaeological monitoring and post-review discovery process or plan is in place per Stipulation IV and V, or in areas where a mitigation plan has been approved and initiated, and field work completed. Such construction activities may include:

i. Demarcation, set up, and use of staging areas for construction of the undertaking;
ii. Conduct of geotechnical boring investigations or other geophysical and engineering activities;
iii. Grading and construction of buildings and support facilities;
iv. Construction of transmission lines.

b) Initiation of any construction activities on federal lands shall not occur until after the BLM issues the Record of Decision, ROW grant, and Notice(s) to Proceed.

X. AMENDMENTS TO THE AGREEMENT

This Agreement may be amended only upon written agreement of the Signatories and Invited Signatory.

a) Upon receipt of a request to amend this Agreement, the BLM will immediately notify the other Consulting Parties and initiate a 30 day period to consult on the proposed amendment, whereupon all Consulting Parties shall consult to consider such amendments.

b) If agreement to a proposed amendment cannot be reached within the 30 day period, resolution of the issue may proceed by following the dispute resolution process set forth in Stipulation XI.

c) Amendments to this Agreement shall take effect on the dates that they are fully executed by the Signatories and Invited Signatories.

d) Modifications, additions, or deletions to the appendices made as a result of continuing consultation among the Consulting Parties do not require the Agreement to be amended.

e) The terms of this Agreement are a condition of any ROD and the ROW grant that the BLM may issue and are binding on the Applicant. For purposes of this Agreement, changes in the corporate name of the Applicant or reassignment of the ROW to a subsidiary company or other entity may be authorized by the BLM and does not require the Agreement to be amended.

XI. DISPUTE RESOLUTION

a) Should the Signatories or Invited Signatory object at any time to the manner in which the terms of this Agreement are implemented, the BLM will immediately notify the other Signatories and Invited Signatory and consult for no more than 30 days to resolve the objection.

b) If the objection can be resolved within the consultation period, the BLM may authorize the disputed action to proceed in accordance with the terms of such resolution.

c) If the objection cannot be resolved through such consultation, the BLM will forward all documentation relevant to the objection to the ACHP with copies to the Consulting Parties to the Agreement. Any comments provided by the ACHP within 30 days after its receipt of all relevant documentation will be taken into account by the BLM in reaching a final decision regarding the objection. The BLM will notify Consulting Parties in writing of its final decision within 14 days after it is rendered.

d) The BLM's responsibility to carry out all other actions under this Agreement that are not the subject of the objection will remain unchanged.

e) At any time during implementation of the terms of this Agreement, should an objection pertaining to the Agreement be raised by a Concurring Party or a member of the interested public, the BLM shall immediately notify the Consulting Parties, consult with the SHPO about the objection, and take the objection into account. The other Consulting Parties may comment on the objection to the BLM. The BLM shall consult with the objecting party for no more than 30 days. Within 14 days following closure of consultation, the BLM will render a final decision regarding the objection and proceed accordingly after notifying all parties of its decision in writing. In reaching its final decision, the BLM will take into account all comments from the parties regarding the objection.

XII. TERMINATION

a) If any Signatory or Invited Signatory to this Agreement determines that its terms will not or cannot be carried out, that party shall immediately consult with the other Signatories and Invited Signatory to amend this Agreement in accordance with Stipulation X above. If resolution regarding an amendment has not been reached within sixty (60) days, a Signatory or Invited Signatory may terminate the Agreement upon 10 days' written notification to the other Signatories and Invited Signatory. Following written notification, the terminating Signatory or Invited Signatory will inform the Concurring Parties.

b) If the Agreement is terminated, and prior to work continuing on the undertaking, the BLM shall either (a) execute a new Agreement pursuant to 36 C.F.R. § 800.6 or (b) request, take into account, and respond to the comments of the ACHP under 36 C.F.R. § 800.7. Each party shall notify the other Signatories and Invited Signatory to the Agreement as to the course of action that it will pursue.

XIII. ADDITION/WITHDRAWAL OF PARTIES TO/FROM THE AGREEMENT

a) Should conditions of the undertaking change such that other federal agencies, state agencies, Indian tribes, tribal organizations or other organizations or individuals not already party to this Agreement request in writing to participate, the BLM will notify the Consulting Parties and consider the request to participate in the Agreement. Should the BLM agree to the request to participate, the Agreement shall be amended following the procedures in Stipulation X.

b) In the event that the Applicant applies for additional federal funding or other federal approvals, such funding or approving agency may comply with Section 106 and 36 C.F.R. § 800.2 (a)(2) by agreeing in writing to the terms of this Agreement and notifying and consulting with SHPO and ACHP. Any necessary modifications will be considered in accordance with Stipulation X to this Agreement.

c) Should a Concurring Party determine that its participation in this Agreement is no longer warranted, the Concurring Party may withdraw from participation by informing the BLM. The BLM shall inform the Consulting Parties of the withdrawal. Withdrawal of a Concurring Party to the Agreement does not require an amendment of the Agreement.

XIV. DURATION OF THIS AGREEMENT

a) This Agreement will expire if construction has not been initiated and the BLM ROW grant expires or is withdrawn, or the stipulations of this Agreement have not been initiated, within five (5) years from the date of execution. Prior to such time, the BLM may consult with the other Signatories and Invited Signatory to reconsider the terms of the Agreement and amend it in accordance with Stipulation X above.

b) Unless the Agreement is terminated pursuant to Stipulation XII, another agreement executed for the undertaking supersedes it, or the undertaking itself has been terminated, this Agreement will remain in full force and effect for the 30 year term of the ROW grant or until BLM, in consultation with the other Signatories and Invited Signatory, determines that implementation of all aspects of the undertaking has been completed and that all terms of this Agreement have been fulfilled in a satisfactory manner. The effective period of this Agreement may be extended as provided in Stipulation X. Upon a determination by BLM that implementation of all aspects of the undertaking have been completed and that all terms of this Agreement have been fulfilled in a satisfactory manner, BLM will notify the Consulting Parties in writing of the agency's determination. This Agreement will terminate and have no further force or effect 30 days after BLM so notifies the Consulting Parties to this Agreement, unless BLM retracts its determination before the end of that period.

XV. EFFECTIVE DATE

a) This Agreement and any amendments shall take effect on the date that it has been fully executed by the Signatories.

b) Execution and implementation of this Agreement is evidence that the BLM has taken into account the effect of the undertaking on historic properties, afforded the ACHP a reasonable opportunity to comment, and that the BLM has satisfied their responsibilities under Section 106. The BLM shall be responsible for managing historic properties within the APE for this undertaking pursuant to the NHPA. The Signatories and Invited Signatory to this Agreement represent that they have the authority to sign for and bind the entities on behalf of whom they sign.

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SIGNATORY PARTIES

U.S. BUREAU OF LAND MANAGEMENT

BY: _____ DATE: _____

John Kalish
Manager, Palm Springs – South Coast Field Office

CALIFORNIA STATE HISTORIC PRESERVATION OFFICER

BY: _____ DATE: _____

Carol Roland-Nawi
State Historic Preservation Officer

ADVISORY COUNCIL ON HISTORIC PRESERVATION

BY: _____ DATE: _____

John M. Fowler
Executive Director

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INVITED SIGNATORY PARTIES

McCoy Solar, LLC

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Invited Signatory

MCCOY SOLAR, LLC

BY: _____ DATE: _____

TITLE: _____

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PARTIES INVITED TO CONCUR IN THE AGREEMENT

RIVERSIDE COUNTY
AGUA CALIENTE BAND OF CAHUILLA INDIANS
AUGUSTINE BAND OF CAHUILLA INDIANS
CABAZON BAND OF MISSION INDIANS
CAHUILLA BAND OF MISSION INDIANS
CHEMEHUEVI INDIAN TRIBE
COCOPAH INDIAN TRIBE
COLORADO RIVER INDIAN TRIBES
FORT MOJAVE INDIAN TRIBE
FORT YUMA QUECHAN TRIBE
MORONGO BAND OF MISSION INDIANS
RAMONA BAND OF MISSION INDIANS
SAN MANUEL BAND OF MISSION INDIANS
SOBOBA BAND OF LUISENO INDIANS
TORRES-MARTINEZ DESERT CAHUILLA INDIANS
TWENTY-NINE PALMS BAND OF MISSION INDIANS
MAMIE HARPER
PRISCILLA ESWONIA
STACIA BAILLIE
MICHAEL TSOSIE
DAVID HARPER

DRAFT

Concurring Party

RIVERSIDE COUNTY

BY: _____ DATE: _____

TITLE: _____

DRAFT

Concurring Party

AGUA CALIENTE BAND OF CAHUILLA INDIANS

BY: _____ DATE: _____

TITLE: _____

DRAFT

Concurring Party

AUGUSTINE BAND OF CAHUILLA INDIANS

BY: _____ DATE: _____

TITLE: _____

DRAFT

Concurring Party

CABAZON BAND OF MISSION INDIANS

BY: _____ DATE: _____

TITLE: _____

DRAFT

Concurring Party

CAHUILLA BAND OF MISSION INDIANS

BY: _____ DATE: _____

TITLE: _____

DRAFT

Concurring Party

CHEMEHUEVI INDIAN TRIBE

BY: _____ DATE: _____

TITLE: _____

DRAFT

Concurring Party

COCOPAH INDIAN TRIBE

BY: _____ DATE: _____

TITLE: _____

DRAFT

Concurring Party

COLORADO RIVER INDIAN TRIBES

BY: _____ DATE: _____

TITLE: _____

DRAFT

Concurring Party

FORT MOJAVE INDIAN TRIBE

BY: _____ DATE: _____

TITLE: _____

DRAFT

Concurring Party

FORT YUMA QUECHAN TRIBE

BY: _____ DATE: _____

TITLE: _____

DRAFT

Concurring Party

MORONGO BAND OF MISSION INDIANS

BY: _____ DATE: _____

TITLE: _____

DRAFT

Concurring Party

RAMONA BAND OF MISSION INDIANS

BY: _____ DATE: _____

TITLE: _____

DRAFT

Concurring Party

SAN MANUEL BAND OF MISSION INDIANS

BY: _____ DATE: _____

TITLE: _____

DRAFT

Concurring Party

SOBOBA BAND OF LUISENO INDIANS

BY: _____ DATE: _____

TITLE: _____

DRAFT

Concurring Party

TORRES-MARTINEZ DESERT CAHUILLA INDIANS

BY: _____ DATE: _____

TITLE: _____

DRAFT

Concurring Party

TWENTY-NINE PALMS BAND OF MISSION INDIANS

BY: _____ DATE: _____

TITLE: _____

DRAFT

Concurring Party

MAMIE HARPER

BY: _____ DATE: _____

TITLE: _____

DRAFT

Concurring Party

PRISCILLA ESWONIA

BY: _____ DATE: _____

TITLE: _____

DRAFT

Concurring Party

STACIA BAILLIE

BY: _____ DATE: _____

TITLE: _____

DRAFT

Concurring Party

MICHAEL TSOSIE

BY: _____ DATE: _____

TITLE: _____

DRAFT

Concurring Party

DAVID HARPER

BY: _____ DATE: _____

TITLE: _____

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APPENDIX A: CULTURAL RESOURCES WITHIN THE APE AND PROPOSED TREATMENT/MANAGEMENT STRATEGY

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Table 1: Cultural Resources within the APE and Proposed Treatment/Management Strategy

Site Designation	Site Description	Eligibility Recommendation / Criteria or Values	Associated Project Component	Effects / Management
CA-RIV-2846	Sparse, extensive flaked stone scatters and other features across Pleistocene pebble terrace	Eligible under D, Not eligible under A-C	Linear Feature Corridor	Avoided; No effect; Implement ESA Monitoring and Management Prescriptions
CA-RIV-3419	Sparse, extensive flaked stone scatters and other features across Pleistocene pebble terrace	Eligible under D, Not eligible under A-C	Linear Feature Corridor	Avoided; No effect; Implement ESA Monitoring and Management Prescriptions
CA-RIV-7175	Lithic scatter	Eligible under D, Not eligible under A-C	Linear Feature Corridor	None - Avoided (No longer in APE)
CA-RIV-9510	Historical debris scatter	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-9513	Historical debris scatter and cairns	Unevaluated A-D	Solar Facility Footprint	None - Avoided (No longer in APE)
CA-RIV-9633	Historical debris scatter	Not eligible A-D	Linear Feature Corridor	None - Not Eligible (No longer in APE)
CA-RIV-9634	Historical debris scatter	Not eligible A-D	Linear Feature Corridor	None - Not Eligible (No longer in APE)
CA-RIV-9635	Historical debris scatter	Not eligible A-D	Linear Feature Corridor	None - Not Eligible (No longer in APE)
CA-RIV-9636	Historical debris scatter	Not eligible A-D	Linear Feature Corridor	None - Not Eligible (No longer in APE)
CA-RIV-9637	Historical debris scatter	Not eligible A-D	Linear Feature Corridor	None - Not Eligible
CA-RIV-9639	Historical debris scatter	Not eligible A-D	Linear Feature Corridor	None - Not Eligible (No longer in APE)
CA-RIV-9641	Historical debris scatter	Not eligible A-D	Linear Feature Corridor	None - Not Eligible
CA-RIV-9642	Historical debris scatter	Not eligible A-D	Linear Feature Corridor	None - Not Eligible
CA-RIV-9643	Historical debris scatter	Not eligible A-D	Linear Feature Corridor	None - Not Eligible
CA-RIV-9680	Historical debris scatter	Not eligible A-D	Linear Feature Corridor	None - Not Eligible (No longer in APE)
CA-RIV-9681	Historical structure foundations	Not eligible A-D	GenTie & Distribution Line	None - Not Eligible
CA-RIV-9688	Historical debris scatter and hearth	Not eligible A-D	Linear Feature Corridor	None - Not Eligible
CA-RIV-9691	Historical debris scatter	Not eligible A-D	Linear Feature Corridor	None - Not Eligible (No longer in APE)
CA-RIV-9696	Historical debris scatter with structural ruins	Not eligible A-D	Linear Feature Corridor	None - Not Eligible
CA-RIV-9713	Historical debris scatter	Not eligible A-D	Linear Feature Corridor	None - Not Eligible

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Site Designation	Site Description	Eligibility Recommendation / Criteria or Values	Associated Project Component	Effects / Management
CA-RIV-9714	Historical debris scatter	Not eligible A-D	Linear Feature Corridor	None - Not Eligible
CA-RIV-9724	Historical debris scatter	Not eligible A-D	Linear Feature Corridor	None - Not Eligible (No longer in APE)
CA-RIV-9727	Historical debris scatter	Not eligible A-D	Linear Feature Corridor	None - Not Eligible
CA-RIV-9729	Historical debris scatter	Not eligible A-D	Linear Feature Corridor	None - Not Eligible
CA-RIV-9730	Historical debris scatter with emplacements	Not eligible A-D	Linear Feature Corridor	None - Not Eligible
CA-RIV-9752	Historical debris scatter	Not eligible A-D	Linear Feature Corridor	None - Not Eligible (No longer in APE)
CA-RIV-9754	Lithic and ceramic isolates with historical debris scatter	Not eligible A-D	Linear Feature Corridor	None - Not Eligible
CA-RIV-9755	Historical debris scatter	Not eligible A-D	Linear Feature Corridor	None - Not Eligible
CA-RIV-9756	Historical debris scatter	Not eligible A-D	Linear Feature Corridor	None - Not Eligible
CA-RIV-9760	Blythe/Eagle Mountain Utility Line	Not eligible A-D	Linear Feature Corridor	None - Not Eligible
CA-RIV-9762	Historical debris scatter	Not eligible A-D	Linear Feature Corridor	None - Not Eligible
CA-RIV-9763	Historical debris scatter	Not eligible A-D	Linear Feature Corridor	None - Not Eligible
CA-RIV-9768	Historical debris scatter	Not eligible A-D	Linear Feature Corridor	None - Not Eligible
CA-RIV-9770	Lithic and ceramic isolates with historical debris scatter	Not eligible A-D	Linear Feature Corridor	None - Not Eligible
CA-RIV-9778	Lithic scatter with historical debris	Not eligible A-D	Linear Feature Corridor	None - Not Eligible
CA-RIV-9780	Lithic scatter with emplacements	Not eligible A-D	Linear Feature Corridor	None - Not Eligible
CA-RIV-9797	Lithic scatter with historical-period debris scatter and possible privy	Not eligible A-D	Linear Feature Corridor	None - Not Eligible
CA-RIV-9798	Lithic scatter with fortified positions	Not eligible A-D	Linear Feature Corridor	None - Not Eligible
CA-RIV-9801	Ceramic scatter with historical debris scatter	Not eligible A-D	Solar Facility Footprint	None - Avoided (No longer in APE)
CA-RIV-9813	Thermal cobble features	Not eligible under A-C, Unevaluated under D	Linear Feature Corridor	Avoided; No effect; Implement ESA Monitoring and Management Prescriptions
CA-RIV-9817	Thermal cobble feature	Not eligible under A-C, Unevaluated under D	GenTie & Distribution Line	Avoided; No effect; Implement ESA Monitoring and Management Prescriptions

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Site Designation	Site Description	Eligibility Recommendation / Criteria or Values	Associated Project Component	Effects / Management
CA-RIV-9818	Thermal cobble features	Not eligible under A-C, Unevaluated under D	Linear Feature Corridor	Avoided; No effect; Implement ESA Monitoring and Management Prescriptions
CA-RIV-9819	Lithic scatter and thermal cobble feature	Not eligible A-D	Distribution Line	None - Not Eligible
CA-RIV-9820	Thermal cobble feature	Not eligible under A-C, Unevaluated under D	Linear Feature Corridor	Avoided; No effect; Implement ESA Monitoring and Management Prescriptions
CA-RIV-9821	Thermal cobble feature and ceramic scatter	Not eligible under A-C, Unevaluated under D	Linear Feature Corridor	Avoided; No effect; Implement ESA Monitoring and Management Prescriptions
CA-RIV-9981	Historic Road	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-9982	Historic Road	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-9983	Historic Road	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-10077	Historical debris scatter	Not eligible A-D	Linear Feature Corridor	None - Not Eligible
CA-RIV-10180	Historical debris scatter	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-10181	Historical debris scatter, emplacement	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-10182	Hearth	Unevaluated A-D	Solar Facility Footprint	None - Avoided (No longer in APE)
CA-RIV-10183	Rock feature	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-10184	Rock feature	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-10185	Temporary camp site	Unevaluated A-D	Solar Facility Footprint	None - Avoided (No longer in APE)
CA-RIV-10186	Rock feature	Unevaluated A-D	Solar Facility Footprint	None - Avoided (No longer in APE)
CA-RIV-10187	Ceramic scatter	Unevaluated A-D	Solar Facility Footprint	None - Avoided (No longer in APE)
CA-RIV-10188	Trail	Unevaluated A-D	Solar Facility Footprint	None - Avoided (No longer in APE)
CA-RIV-10189	Glass scatter	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-10190	Historical debris scatter, flake	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-10191	Historical debris scatter, emplacement	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-10192	Historical debris scatter	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-10193	Historical debris scatter	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-10194	Military encampment, associated debris	Eligible under A and D, Not eligible under B and C	Solar Facility Footprint	Yes/Project-specific data recovery program

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Site Designation	Site Description	Eligibility Recommendation / Criteria or Values	Associated Project Component	Effects / Management
CA-RIV-10195	Military encampment, associated debris	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-10196	Military emplacements	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-10197	Cairn	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-10198	Habitation debris, concrete pad	Unevaluated A-D	Solar Facility Footprint	None - Avoided (No longer in APE)
CA-RIV-10199	Lithic scatter, rock ring	Unevaluated A-D	Solar Facility Footprint	None - Avoided (No longer in APE)
CA-RIV-10200	Historical debris scatter, feature	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-10201	Mining prospect	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-10202	Historical debris scatter	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-10203	Historical debris scatter	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-10204	Historical debris scatter	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-10205	Historical debris scatter	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-10206	Historical debris scatter	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-10207	Historical debris scatter	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-10208	Historical debris scatter	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-10209	Historical debris scatter	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-10210	Historical debris scatter	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-10211	Historical debris scatter	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-10212	Historical debris scatter	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-10213	Historical debris scatter	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-10214	Lithic scatter	Unevaluated A-D	Solar Facility Footprint	None - Avoided (No longer in APE)
CA-RIV-10215	Rock feature, 2 tools	Unevaluated A-D	Solar Facility Footprint	None - Avoided (No longer in APE)
CA-RIV-10216	Cairn	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-10217	Cairn	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-10218	Lithic scatter	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-10219	Hearth, milled wood	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-10220	Hearth, milled wood	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-10221	Military emplacements	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-10222	Ceramic scatter	Eligible under D, Not eligible A-C	Solar Facility Footprint	Yes/Project-specific data recovery program
CA-RIV-10223	Can dump	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-10224	Household debris deposit	Not eligible A-D	Solar Facility Footprint	None - Not Eligible

Site Designation	Site Description	Eligibility Recommendation / Criteria or Values	Associated Project Component	Effects / Management
CA-RIV-10225	Historic debris/desert training	Eligible under A and D, Not eligible under B and C	Solar Facility Footprint	Yes/Project-specific data recovery program
CA-RIV-10226	Mining	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-10227	Temporary camp site	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-10239	Ceramic scatter	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-10240	Historic deposit, military debris, tracks	Eligible under A and D, Not eligible under B and C	Solar Facility Footprint	Yes/Project-specific data recovery program
CA-RIV-10241	Tank tracks	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-10242	Military debris, tank tracks	Eligible under A and D, Not eligible under B and C	Solar Facility Footprint	Yes/Project-specific data recovery program
CA-RIV-10243	Military debris scatter	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
CA-RIV-10244	Single lithic reduction area	Unevaluated A-D	Solar Facility Footprint	None - Avoided (No longer in APE)
CA-RIV-10245	WWII training area	Eligible under A and D, Not eligible under B and C	Solar Facility Footprint	Yes/Project-specific data recovery program
CA-RIV-10246	Military activity	Eligible under A and D, Not eligible under B and C	Solar Facility Footprint	Yes/Project-specific data recovery program
P-33-009670	Historical debris scatter	Not eligible A-D	Linear Feature Corridor	None - Not Eligible (No longer in APE)
P-33-020053	Rock feature	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
P-33-020055	Cairn	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
P-33-020058	Cairn	Unevaluated A-D	Solar Facility Footprint	None - Avoided (No longer in APE)
P-33-020071	Cairn	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
P-33-020093	Cairn	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
P-33-020222	Rock pile	Unevaluated A-D	Solar Facility Footprint	None - Avoided (No longer in APE)
P-33-020223	Cairn/rock ring	Not eligible A-D	Solar Facility Footprint	None - Not Eligible
P-33-020224	Rock pile	Not eligible A-D	Solar Facility Footprint	None - Not Eligible

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APPENDIX B - DEFINITIONS

a) ***Applicant***. Refers to McCoy Solar, LLC, and to the same organization in the event of a change of the name of the company, provided the Signatories are notified in writing of the name change.
b) ***Area of Potential Effect.*** The APE is defined as the total geographic area or areas within which the undertaking may directly or indirectly cause alterations in the character or use of historic properties per 36 C.F.R. § 800.16(d). The APE is influenced by the scale and nature of an undertaking and includes those areas which could be affected by an undertaking prior to, during and after construction.
c) ***Concurring Parties***. Collectively refers to parties (not Signatories or Invited Signatory) with a demonstrated interest in the undertaking, who agree, through their signature, with the terms of this Agreement. Concurring Parties may propose amendments to this Agreement.
d) ***Cultural Resource.*** A cultural resource is an object or definite location of human activity, occupation, use, or significance identifiable through field inventory, historical documentation, or oral evidence. Cultural resources are prehistoric, historic, archaeological, or architectural sites, structures, buildings, places, or objects and locations of traditional cultural or religious importance to specified social and/or culture groups. Cultural resources include the entire spectrum of objects and places, from artifacts to cultural landscapes, without regard to eligibility for inclusion on the National Register of Historic Places (NRHP) or California Register of Historical Resources (CRHR).
e) ***Consulting Parties.*** Collectively refers to the Signatories, Invited Signatory and Concurring Parties who have signed this Agreement.
f) ***Historic Properties.*** Properties (cultural resources) that are included in, or eligible for inclusion in, the NRHP maintained by the Secretary of the Interior and per the NRHP eligibility criteria at 36 C.F.R. § 60.4 and may include any prehistoric or historic district, site, building, structure, traditional cultural property or object. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization that meet the NRHP criteria. The term "eligible for inclusion on the NRHP" refers both to properties formally determined as such in accordance with regulations of the Secretary of the Interior and all other properties that meet the NRHP criteria.
g) ***Historical Resources.*** Historical resources are cultural resources that meet the criteria for listing on the CRHR as provided at California Code of Regulations Title 14, Chapter 11.5, Section 4850 and may include, but are not limited to, any object, building, structure, site, area, place, record, or manuscript which is historically or archaeologically significant, or is significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California.
h) ***Invited Signatory.*** Invited Signatories are parties that have specific responsibilities as defined in this Agreement. The Invited Signatory who signs this Agreement has the same rights with regard to seeking amendment or termination of this Agreement as the Signatories, but whose signature is not required for execution of the Agreement. The Invited Signatory to this Agreement is the Applicant.

i) ***Lands Administered by the U.S. Department of Interior, Bureau of Land Management*** (BLM) means any federal lands under the administrative authority of the BLM.

j) ***Literature Review.*** A literature review is one component of a BLM class I inventory, as defined in BLM Manual Guidance 8100.21(A)(1), and is a professionally prepared study that includes a compilation and analysis of all reasonably available cultural resource data and literature, and a management-focused, interpretive, narrative overview, and synthesis of the data. The overview may also define regional research questions and treatment options.

k) ***Records Search.*** A records search is one component of a BLM class I inventory and an important element of a literature review. A records search is the process of obtaining existing cultural resource data from published and unpublished documents, BLM cultural resource inventory records, institutional site files, state and national registers, interviews, and other information sources.

l) ***Signatories.*** Signatories are parties that have the sole authority to execute, amend or terminate this Agreement. Signatories to this Agreement are the BLM,SHPO, and the ACHP.

m) ***Traditional Cultural Property.*** A traditional cultural property is defined generally as a property that is important to a living group or community because of its association with cultural practices or beliefs that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community. It is a place, such as a traditional gathering area, prayer site, or sacred/ceremonial location that may figure in important community traditions. These places may or may not contain features, artifacts, or physical evidence, and are usually identified through consultation. A traditional cultural property may be eligible for inclusion in the NRHP.

n) ***Tribes.*** The federally recognized Indian tribes that the BLM is consulting with on this undertaking.

o) ***Undertaking.*** Collectively refers to all projects, activities, or programs funded in whole or in part under the direct or indirect jurisdiction of the federal agencies (BLM) that are party to this Agreement, including those carried out by or on behalf of the federal agency; those carried out by federal financial assistance; and those requiring a federal permit, license, or approval.

p) ***Windshield Survey.*** A windshield survey is the driving or walking of surveyors along streets and roads of a community in order to observe and record the buildings, structures, and landscape characteristics seen from those vantage points. A windshield survey is a method commonly utilized in reconnaissance surveys to identify built-environment resources, such as buildings, objects, and structures.

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APPENDIX C-1: AREA OF POTENTIAL EFFECT

1. The BLM has defined the APE for the McCoy Solar Energy Project based on consideration of both direct and indirect impacts. The APE was established based on the consultation and identification procedures required in BLM's *Statewide Protocol Agreement* (Protocol) with the California and Nevada SHPO and consistent with 36 C.F.R. § 800.4.

2. An area (see Appendix C-2:Reference Maps for the Area of Potential Effect) within which historic properties could sustain direct effects as a result of the undertaking and the BLM will establish Environmentally Sensitive Areas (ESA) and implement the management or protective measures as described in Stipulation III(a) of the Agreement. These areas include:

   a) The area within which historic properties could sustain direct effects as a result of the undertaking is defined to include:

      i) The block area of installation of the proposed photovoltaic solar power generation facility, which includes approximately 4,315 acres of BLM-managed federal land and 477 acres of private land, and generally includes; portions of Sections 19, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, and 35 of Township 5S and Range 21E, portions of Sections 1, 5, 8, 9, 10, 13, 14, 15, 22, 23, 26, and 35 of Township 6S and Range 21E, portions of Section 6, 7, and 18 of Township 6S and Range 22E, and portions of Sections 2, 3, 4, 5, and 6 of Township 7S, Range 21E (all San Bernardino Base Meridian).

      ii) All linear elements of the undertaking including:

         (1) A ROW for construction of the 230 kV transmission line. The ROW is approximately 100-feet wide and 14.5 miles long and extends from the eastern side of the solar facility south and west to Southern California Edison's Colorado River Substation. The survey corridor for cultural resources for this linear element was established as a 50-foot wide buffer on either side of the center line (100-foot wide corridor).

         (2) An access road for the solar facility follows the existing Black Rock Road. The access road extends north from the frontage road north of Interstate 10 to the east side of the solar facility.

3. The area within which historic properties could sustain indirect effects, including visual, auditory, atmospheric, and contextual, as a result of the undertaking includes:

   i) Historic properties within a one-half mile of the Project footprint that are identified through a review of existing literature and records search, information or records on file with the BLM or at the Eastern Information Center, interviews or discussions with local professional or historical societies and local experts in history or archaeology.

(1) Historic properties identified through archaeological or other field investigations for this undertaking that, as a result of Project redesign to avoid direct effects to cultural resources, are no longer within the APE.

ii) Historic properties included in the Native American Heritage Commission Sacred Lands Files, identified through a literature review or records search, or identified by a Tribe, through consultation as having religious or cultural significance that may be affected by the undertaking.

iii) Historic properties that have been identified by a consulting party, organization, governmental entity, or individual through consultation or the public commenting processes as having significance or being a resource of concern that may be affected by the undertaking.

iv) Built-environment resources located within one-half mile of the Project footprint whose historic settings could be adversely affected.

(1) On private property, historic properties within one-half mile of the Project footprint that are identified through surveys.

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APPENDIX C-2: REFERENCE MAPS FOR THE AREA OF POTENTIAL EFFECT

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APPENDIX D: HISTORIC PROPERTIES TREATMENT PLAN

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APPENDIX E: PLAN FOR MONITORING, POST-REVIEW DISCOVERY AND UNANTICIPATED EFFECTS

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APPENDIX F: LONG TERM MANAGEMENT PLAN

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APPENDIX G: NAGPRA PLAN

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APPENDIX M

Summary of Bureau of Land Management Mitigation and Monitoring

Introduction

The table that follows presents a compilation of APMs and mitigation measures identified in the PA/EIS for the McCoy Solar Energy Project (Project). The purpose of the table is to provide a single comprehensive list of recommended mitigation measures, the timing for their implementation, and related monitoring and reporting requirements.

If and when the Project is approved, the BLM will compile an Environmental and Construction Compliance Monitoring Plan (ECCMP) that will include a summary of mitigation and monitoring requirements that includes approved measures and any revisions to them that the BLM may make in its Record of Decision.

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Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Air Resources						
APM AIR-1: To reduce construction-generated air quality impacts: 1. The main access roads through the facility to the unit substation areas shall be either paved or stabilized using soil binders, or equivalent methods, to provide a stabilized surface that is similar for the purposes of dust control to paving, that may or may not include a crushed rock (gravel or similar material with fines removed) top layer, prior to initiating construction in the unit substation areas. 2. All unpaved construction roads and unpaved operation and maintenance site roads, as they are being constructed, shall be stabilized with a non-toxic soil stabilizer or soil weighting agent that can be determined to be both as efficient or more efficient for fugitive dust control as ARB-approved soil stabilizers, and shall not increase any other environmental impacts including loss of vegetation to areas beyond where the soil stabilizers are being applied for dust control. All other disturbed areas in the project and linear construction sites shall be watered as frequently as necessary during grading; and after active construction activities shall be stabilized with a nontoxic soil stabilizer or soil weighting agent, or alternative approved soil stabilizing methods. The frequency of watering can be reduced or eliminated during periods of precipitation. 3. No vehicle shall exceed 10 miles per hour on unpaved areas within the site, with the exception that vehicles may travel up to 25 miles per hour on stabilized unpaved roads as long as such speeds do not create visible dust emissions. 4. Visible speed limit signs shall be posted at the site entrance(s). 5. All construction equipment vehicle tires shall be inspected and washed as necessary to be cleaned free of dirt prior to entering paved roadways. 6. Gravel ramps of at least 20 feet in length must be provided at the tire washing/cleaning station. 7. All unpaved exits from the construction site shall be graveled or treated to prevent track-out to public roadways. 8. All construction vehicles shall enter the construction site through the treated entrance roadways. 9. All paved roads within the construction site shall be swept daily or as needed (less during periods of precipitation) on days when construction activity occurs to prevent the accumulation of dirt and debris. 10. At least the first 500 feet of any paved public roadway exiting the construction site or exiting other unpaved roads en route from the construction site or construction staging areas shall be swept as needed (less during periods of precipitation) on days when construction activity occurs or on any other day when dirt or runoff resulting from the construction site activities is visible on the public paved roadways. 11. All soil storage piles and disturbed areas that remain inactive for longer than 10 days shall be covered, or shall be treated with appropriate dust suppressant compounds. 12. All vehicles that are used to transport solid bulk material on public roadways and that have potential to cause visible emissions shall be provided with a cover, or the materials shall be sufficiently wetted and loaded onto the trucks in a manner to provide at least one foot of freeboard. 13. Wind erosion control techniques (such as windbreaks, water, chemical dust suppressants, and/or vegetation) shall be used on all construction areas that may be disturbed. Any windbreaks installed to comply with this measure shall remain in place until the soil is stabilized or permanently covered with vegetation. 14. The disruption of desert pavement shall be minimized to the extent feasible.	Prior to and during construction	BLM	Implement construction related air quality impact reduction procedures			

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Air Resources (cont.)						
APM AIR-2: To reduce operation and maintenance-related air emissions: 1. The main access roads through the facility to the unit substation areas shall be either paved or stabilized using soil binders, or equivalent methods, to provide a stabilized surface that is similar for the purposes of dust control to paving, that may or may not include a crushed rock (gravel or similar material with fines removed) top layer, and delivery areas for operations materials (chemicals, replacement parts, etc.) shall be paved or treated prior to taking initial deliveries. 2. All unpaved operation and maintenance site roads shall be stabilized with a non-toxic soil stabilizer or soil weighting agent that can be determined to be both as efficient or more efficient for fugitive dust control as ARB approved soil stabilizers, and shall not increase any other environmental impacts including loss of vegetation to areas beyond where the soil stabilizers are being applied for dust control. After construction activities, all disturbed areas in the project and linear sites shall be stabilized with a nontoxic soil stabilizer or soil weighting agent, or alternative approved soil stabilizing methods. 3. No vehicle shall exceed 10 miles per hour on unpaved areas within the site, with the exception that vehicles may travel up to 25 miles per hour on stabilized unpaved roads as long as such speeds do not create visible dust emissions. 4. Visible speed limit signs shall be posted at the site entrance(s). 5. All vehicles that are used to transport solid bulk material on public roadways and that have potential to cause visible emissions shall be provided with a cover, or the materials shall be sufficiently wetted and loaded onto the trucks in a manner to provide at least one foot of freeboard. 6. The disruption of desert pavement shall be minimized to the extent feasible.	Prior to and during Operations and maintenance	BLM	Implement operation and maintenance-related air emissions reduction procedures			
MM AQ-1: The Applicant shall ensure that all areas where desert pavement has been disturbed during construction of the Project shall be applied with a non-toxic soil stabilizer prior to Project operation. The Applicant shall develop, for review and approval by the BLM, a plan that outlines the frequency of non-toxic soil stabilizer applications based on the specifications of the selected soil stabilizer.	After construction	BLM	Review and approve a soil stabilization application plan.			
Biological Resources – Vegetation						
APM BIO-2a. Biological Resources Mitigation and Monitoring Plan (BRMMP). The BRMMP will outline steps to implement the protection measures; document their implementation; and monitor their effectiveness. The BRMMP will identify the terms and conditions of any permits associated with the Project, including, but not limited to, the USFWS §7 Biological Opinion, CDFG §2081 Incidental Take Permit, and CDFG Streambed Alteration Agreement. The BRMMP will be submitted to the BLM and USFWS for approval prior to the start of ground disturbance.	Prior to construction	BLM, USFWS, CDFG	Develop and implement BRMMP			
APM BIO-2c. Worker Environmental Training. The Applicant will prepare and implement site-specific Worker Environmental Training to inform Project personnel about the biological constraints of the Project. The training will be included in the BRMMP and will be developed and presented by a qualified Project biologist prior to the commencement of construction activity. All Project personnel must attend the training. The training will include information regarding the sensitive biological resources, restrictions, protection measures, and individual responsibilities associated with the Project. Special emphasis will be placed on protection measures developed for the desert tortoise and the consequences of non-compliance. Written material will be provided to employees at orientation and participants will sign an attendance sheet documenting their participation.	Prior to construction	BLM	Develop and implement worker environmental training			

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Vegetation (cont.)						
APM BIO-2d. Construction-related Activities. Existing roads will be utilized wherever possible to avoid unnecessary impacts. New and existing roads that are planned for either construction or widening will not extend beyond the planned impact area and will minimize surface disturbance in native habitats, where practical. All vehicles passing or turning around will do so within the planned impact area or in previously disturbed areas. Along the linear facilities, the anticipated impact zones, including staging areas, equipment access, and disposal or temporary placement of spoils, will be delineated with stakes and/or flagging prior to construction to avoid natural resources, where possible. Outside the Project boundaries, personnel will utilize established roadways (paved or unpaved) for traveling to and from the Project Area, including for transmission line construction. No work in unfenced and uncleared habitat will occur except under the direct supervision of a BM. Cross-country vehicle and equipment use outside designated work areas will be prohibited. Best Management Practices will be employed to prevent loss of habitat due to erosion caused by Project-related impacts (i.e., grading or clearing for new roads). All detected erosion will be remedied within 2-days of discovery. Additionally, fueling of equipment will take place within existing paved roads and not within or adjacent to drainages or native desert habitats. Contractor equipment will be checked for leaks prior to operation and repaired as necessary. All vehicles and equipment will be in proper working condition to minimize the potential for fugitive emissions of motor oil, antifreeze, hydraulic fluid, grease, or other hazardous materials. The AB and BM will be informed of any hazardous spills within 24 hours. Hazardous spills will be immediately cleaned up and the contaminated soil will be properly disposed of at a licensed facility. Employees and contractors will look under vehicles and equipment for the presence of desert tortoises prior to movement. No equipment will be moved until the animal has left voluntarily or an AB removes it.	During construction	BLM	• Existing roads will be used when possible and road construction will not extended beyond the impact area • BMPs will be implemented to prevent loss of habitat • Fueling of equipment will take place on paved areas and vehicles will be checked for leaks • Hazardous spills will be reported to the AB and BM within 24 hours and immediately cleaned up • Workers will check for tortoises under vehicles			
APM BIO-2n. Weed Management Plan. The Applicant will prepare and implement a Weed Management Plan to prevent the spread of existing weeds and the introduction of new weeds to the Project Area.	Prior to Construction	BLM	Develop and implement a Weed Management Plan			
APM BIO-2o. Water Application for Dust Control. The Applicant will ensure water is applied to the construction area, dirt roads, trenches, spoil piles, and other areas where ground disturbance has taken place to minimize dust emissions and topsoil erosion. A BM will patrol these areas to ensure water does not pool for long periods of time and potentially attract desert tortoises, common ravens, and other wildlife.	During Construction	BLM	• Water will be applied for dust suppression • A BM will ensure that water does not pool for extended periods and attract wildlife			
APM BIO-2p. Cleanup and Restoration; Revegetation Plan. The Applicant will ensure that all unused material and equipment will be removed upon completion of construction activities or maintenance activities conducted outside the permanently fenced sites (this includes non-emergency and emergency repairs). Upon completion, all construction equipment and refuse, including, but not limited to wrapping material, cables, cords, wire, boxes, rope, broken equipment parts, twine, strapping, buckets, metal or plastic containers will be removed from the site and disposed of properly. Any unused or leftover hazardous products will be properly disposed of off-site. The Applicant will prepare and implement a Revegetation Plan to restore temporarily disturbed areas.	Prior to construction	BLM	Develop and implement Revegetation Plan			

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Vegetation (cont.)						
APM BIO-5. Protection Measures during Decommissioning/Closure. Project Decommissioning: The planned operating life of the Project is 30 years. In the event the Project permanently shuts down, and no other project will occupy the same industrial space, the Applicant will prepare and implement a Decommissioning Plan to ensure that the environment is protected during the decommissioning phase. Prior to decommissioning, a plan will be finalized and approved by the BLM. The Applicant shall retain an AB for the decommissioning phase of the Project to ensure that all environmental protection measures are implemented. The Applicant will submit the names and qualifications of all proposed biologists to the USFWS and BLM for review and approval at least 30 days prior to decommissioning activities and prior to initiation of any tortoise handling. Decommissioning activities will not begin until the ABs are approved by the aforementioned agencies.	Prior to construction	BLM	Develop and Implement a Decommissioning Plan			
VEG-1: Qualifications of Designated Biologist. The Applicant shall assign at least one Designated Biologist to the Project. The Applicant shall submit the resume of the proposed Designated Biologist(s), with at least three references and contact information, to the BLM AO for approval in consultation with CDFG and USFWS. The Designated Biologist must meet the following minimum qualifications: 1. Bachelor's degree in biological sciences, zoology, botany, ecology, or a closely related field; 2. Three years of experience in field biology or current certification of a nationally recognized biological society, such as The Ecological Society of America or The Wildlife Society; 3. Have at least one year of field experience with biological resources found in or near the Project area; 4. Meet the current USFWS Authorized Biologist qualifications criteria (www.fws.gov/ ventura/speciesinfo/protocols_guidelines), demonstrate familiarity with protocols and guidelines for the desert tortoise, and be approved by the USFWS; 5. Possess a CESA Memorandum of Understanding pursuant to §2081(a) for desert tortoise. In lieu of the above requirements, the resume shall demonstrate to the satisfaction of the BLM AO, in consultation with CDFG and USFWS, that the proposed Designated Biologist or alternate has the appropriate training and background to effectively implement the mitigation measures.	Prior to construction	BLM, CDFG, USFWS	Approve qualifications of designated biologist.			
VEG-2: Duties of the Designated Biologist. The Applicant shall ensure that the Designated Biologist performs the activities described below during any site mobilization activities, construction-related ground disturbance, grading, boring or trenching activities. The Designated Biologist may be assisted by the approved Biological Monitor(s) but remains the contact for the Applicant and the BLM AO. The Designated Biologist Duties shall include the following: 1. Advise the Applicant's construction and operation managers on the implementation of the biological resources mitigation measures; 2. Consult on the preparation of the Biological Resources Mitigation, Implementation, and Monitoring Plan (BRMIMP) to be submitted by the Applicant; 3. Be available to supervise, conduct and coordinate mitigation, monitoring, and other biological resources compliance efforts, particularly in areas requiring avoidance or containing sensitive biological resources, such as special-status species or their habitat; 4. Clearly mark sensitive biological resource areas and inspect these areas at appropriate intervals for compliance with regulatory terms and conditions;	During ground disturbing activities.	Applicant	Ensure that the designated biologist performs all required activities during any site disturbing activities. Ensure that any non-conformance is reported to the BLM AO.			

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Vegetation (cont.)						
5. Inspect active construction areas where animals may have become trapped prior to construction commencing each day. At the end of the day, inspect for the installation of structures that prevent entrapment or allow escape during periods of construction inactivity. Periodically inspect areas with high vehicle activity (e.g., parking lots) for animals in harm's way; 6. Notify the Applicant and the BLM AO of any non-compliance with any biological resources mitigation measure; 7. Respond directly to inquiries of the BLM AO regarding biological resource issues; 8. Maintain written records of the tasks specified above and those included in the BRMIMP. Summaries of these records shall be submitted in the Monthly Compliance Report and the Annual Compliance Report; 9. Train the Biological Monitors as appropriate, and ensure their familiarity with the BRMIMP, Worker Environmental Awareness Program (WEAP) training, and USFWS guidelines on desert tortoise surveys and handling procedures[1]; and 10. Maintain the ability to be in regular, direct communication with representatives of CDFG, USFWS, and the BLM AO, including notifying these agencies of dead or injured listed species and reporting special-status species observations to the California Natural Diversity Data Base.						
VEG-3: Identification of Biological Monitors. The Designated Biologist shall submit the resume, at least three references, and contact information of the proposed Biological Monitors to the BLM AO. The resume shall demonstrate, to the satisfaction of the BLM AO, the appropriate education and experience to accomplish the assigned biological resource tasks. The Biological Monitor is the equivalent of the USFWS-approved biologist (also "Service-approved biologist"). Biological Monitor(s) training by the Designated Biologist shall include familiarity with the mitigation measures, BRMIMP, WEAP, and USFWS guidelines on desert tortoise surveys and handling procedures.	Prior to construction.	BLM	Review and approve the proposed Biological Monitors.			
VEG-4: Duties of Biological Monitors. The Biological Monitors shall assist the Designated Biologist in conducting surveys and in monitoring of site mobilization activities, construction-related ground disturbance, grading, boring or trenching. The Designated Biologist shall remain the contact for the Applicant and the BLM AO.	During site disturbing activities.	Applicant, BLM	Ensure the Biological Monitors assist the Designated Biologist.			
VEG-5: Authority of the Designated Biologist And Biological Monitors. The Applicant's construction/operation manager shall act on the advice of the Designated Biologist and Biological Monitor(s) to ensure conformance with the biological resources mitigation measures. The Designated Biologist shall have the authority to immediately stop any activity that is not in compliance with these conditions and/or order any reasonable measure to avoid take of an individual of a listed species. If required by the Designated Biologist and Biological Monitor(s) the Applicant's construction/operation manager shall halt all site mobilization, ground disturbance, grading, boring, trenching and operation activities in areas specified by the Designated Biologist. The Designated Biologist shall: 1. Require a halt to all activities in any area when determined that there would be an unauthorized adverse impact to biological resources if the activities continued; 2. Inform the Applicant and the construction/operation manager when to resume activities; and 3. Notify the BLM AO and if there is a halt of any activities and advise them of any corrective actions that have been taken or would be instituted as a result of the work stoppage.	Prior to and during construction.	Applicant	Ensure conformance with the biological resources mitigation measures and advice of the Designated Biologist and Biological Monitors.			

[1] Available at: http://www.fws.gov/ventura/species_information/protocols_guidelines/

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Vegetation (cont.)						
If the Designated Biologist is unavailable for direct consultation, the Biological Monitor shall act on behalf of the Designated Biologist.						
VEG-6: Worker Environmental Awareness Program. The Applicant shall develop and implement a Project-specific Worker Environmental Awareness Program (WEAP) and shall secure approval for the WEAP from the AO. The WEAP shall be administered to all on-site personnel including surveyors, construction engineers, employees, contractors, contractor's employees, supervisors, inspectors, subcontractors, and delivery personnel. The WEAP shall be implemented during site preconstruction, construction, operation, and closure. The WEAP shall: 1. Be developed by or in consultation with the Designated Biologist and consist of an on-site or training center presentation in which supporting written material and electronic media, including photographs of protected species, is made available to all participants; 2. Discuss the locations and types of sensitive biological resources on the Project site and adjacent areas, and explain the reasons for protecting these resources; provide information to participants that no snakes, reptiles, or other wildlife shall be harmed; 3. Place special emphasis on desert tortoise, including information on physical characteristics, distribution, behavior, ecology, sensitivity to human activities, legal protection, penalties for violations, reporting requirements, and protection measures; 4. Include a discussion of fire prevention measures to be implemented by workers during Project activities; request workers dispose of cigarettes and cigars appropriately and not leave them on the ground or buried; 5. Describe the temporary and permanent habitat protection measures to be implemented at the Project site; 6. Identify whom to contact if there are further comments and questions about the material discussed in the program; and 7. Include a training acknowledgment form to be signed by each worker indicating that they received training and shall abide by the guidelines. The specific program can be administered by a competent individual(s) acceptable to the Designated Biologist and BLM AO.	Prior to construction.	BLM	Approve the WEAP.			
VEG-7: Biological Resources Mitigation Implementation and Monitoring Plan. The Applicant shall develop a BRMIMP, and shall submit two copies of the proposed BRMIMP to the BLM AO for review and approval. The Applicant shall implement the measures identified in the approved BRMIMP. The BRMIMP shall incorporate avoidance and minimization measures described in final versions of the Invasive Weed Management Plan (Mitigation Measure VEG-9), the Special-Status Plant Species Impact Avoidance and Mitigation Plan (Mitigation Measure VEG-10) and Decommissioning and Reclamation Plan (Mitigation Measure VEG-12), the Desert Tortoise Relocation Translocation Plan (Mitigation Measure WIL-2), the Raven Management Plan (Mitigation Measure WIL-5), the Burrowing Owl Mitigation and Monitoring Plan (Mitigation Measure WIL-9), and all other biological mitigation and/or monitoring plans associated with the Project. The BRMIMP shall be prepared in consultation with the Designated Biologist and shall include accurate and up-to-date maps depicting the location of sensitive biological resources that require temporary or permanent protection during construction and operation. The BRMIMP shall include complete and detailed descriptions of the following: 1. All biological resources mitigation, monitoring, and compliance measures proposed and agreed to by the Applicant;	Prior to construction	BLM	Review and approve the proposed BRMIMP.			

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Vegetation (cont.)						
2. All biological resources mitigation measures identified as necessary to avoid or mitigate impacts; 3. All biological resource mitigation, monitoring and compliance measures required in federal agency terms and conditions, such as those provided in the USFWS Biological Opinion; 4. All sensitive biological resources to be impacted, avoided, or mitigated by Project construction, operation, and closure; 5. All required mitigation measures for each sensitive biological resource; 6. All measures that shall be taken to avoid or mitigate temporary disturbances from construction activities; 7. Duration for each type of monitoring and a description of monitoring methodologies and frequency; 8. Performance standards to be used to help decide if/when proposed mitigation is or is not successful; 9. All performance standards and remedial measures to be implemented if performance standards are not met; 10. Biological resources-related facility closure measures including a description of funding mechanism(s); 11. A process for proposing plan modifications to the BLM AO and appropriate agencies for review and approval; and **12.** A requirement to submit any sightings of any special-status species that are observed on or in proximity to the Project site, or during Project surveys, to the CNDDB per CDFG requirements.						
VEG-8: The Applicant shall undertake the following measures to manage the construction site and related facilities in a manner to avoid or minimize impacts to biological resources: 1. ***Limit Area of Disturbance.*** The boundaries of all areas to be disturbed (including staging areas, access roads, and sites for temporary placement of spoils) shall be delineated with stakes and flagging prior to construction activities in consultation with the Designated Biologist. Spoils and topsoil shall be stockpiled in disturbed areas lacking native vegetation and which do not provide habitat for special-status species. Parking areas, staging and disposal site locations shall similarly be located in areas without native vegetation or special-status species habitat. All disturbances, Project vehicles and equipment shall be confined to the flagged areas. 2. ***Minimize Road Impacts.*** New and existing roads that are planned for construction, widening, or other improvements shall not extend beyond the flagged impact area as described above. All vehicles passing or turning around would do so within the planned impact area or in previously disturbed areas. Where new access is required outside of existing roads or the construction zone, the route shall be clearly marked (i.e., flagged and/or staked) prior to the onset of construction. 3. ***Minimize Traffic Impacts.*** Vehicular traffic during Project construction and operation shall be confined to existing routes of travel to and from the Project site, and cross country vehicle and equipment use outside designated work areas shall be prohibited. The speed limit shall not exceed 25 miles per hour within the Project area, on maintenance roads for linear facilities, or on access roads to the Project site, except on paved access roads where the speed limit shall not exceed 45 miles per hour. 4. ***Monitor During Construction.*** In areas that have not been fenced with desert tortoise exclusion fencing and cleared, the Designated Biologist shall be present at the construction site during all Project activities that have potential to disturb soil, vegetation, and wildlife. The Designated Biologist or Biological Monitor shall walk immediately ahead of equipment during brushing and grading activities.	Prior to and during construction.	BLM, CDFG, USFWS	Ensure compliance with MM VEG-8			

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Vegetation (cont.)						
5. ***Minimize Impacts of Transmission/Pipeline Alignments, Roads, Staging Areas.*** Staging areas for construction on the plant site shall be within the area that has been fenced with desert tortoise exclusion fencing and cleared. For construction activities outside of the plant site (transmission line, pipeline alignments) access roads, pulling sites, and storage and parking areas shall be designed, installed, and maintained with the goal of minimizing impacts to native plant communities and sensitive biological resources. Transmission lines and all electrical components shall be designed, installed, and maintained in accordance with the Avian Power Line Interaction Committee's (APLIC's) Suggested Practices for Avian Protection on Power Lines (APLIC, 2006) and Mitigating Bird Collisions with Power Lines (APLIC, 1994) to reduce the likelihood of large bird electrocutions and collisions. 6. ***Avoid Use of Toxic Substances.*** Soil bonding and weighting agents used on unpaved surfaces shall be non-toxic to wildlife and plants. 7. ***Minimize Lighting Impacts.*** Facility lighting shall be designed, installed, and maintained to prevent side casting of light towards wildlife habitat. 8. ***Minimize Noise Impacts.*** A continuous low-pressure technique shall be used for steam blows, to the extent possible, in order to reduce noise levels in sensitive habitat proximate to the Project. Loud construction activities (e.g., unsilenced high pressure steam blowing and pile driving, or other) shall be avoided from February 15 to April 15 when it would result in noise levels over 65 dBA in nesting habitat (excluding noise from passing vehicles). Loud construction activities may be permitted from February 15 to April 15 only if: a. the Designated Biologist provides documentation (e.g., nesting bird data collected using methods described in Mitigation Measure WIL-7 and maps depicting location of the nest survey area in relation to noisy construction) to the BLM AO indicating that no active nests would be subject to 65 dBA noise, or b. the Designated Biologist or Biological Monitor monitors active nests within the range of construction-related noise exceeding 65 dBA. The monitoring shall be conducted in accordance with Nesting Bird Monitoring and Management Plan approved by the BLM AO. The Plan shall include adaptive management measures to prevent disturbance to nesting birds from construction related noise. Triggers for adaptive management shall be evidence of Project-related disturbance to nesting birds such as: agitation behavior (displacement, avoidance, and defense); increased vigilance behavior at nest sites; changes in foraging and feeding behavior, or nest site abandonment. The Bird Monitoring and Management Plan shall include a description of adaptive management actions, which shall include, but not be limited to, cessation of construction activities that are deemed by the Designated Biologist to be the source of disturbance to the nesting bird. 9. ***Avoid Vehicle Impacts to Desert Tortoise.*** Parking and storage shall occur within the area enclosed by desert tortoise exclusion fencing to the extent feasible. No vehicles or construction equipment parked outside the fenced area shall be moved prior to an inspection of the ground beneath the vehicle for the presence of desert tortoise. If a desert tortoise is observed, it would be left to move on its own. If it does not move within 15 minutes, a Designated Biologist or Biological Monitor under the Designated Biologist's direct supervision may remove and relocate the animal to a safe location if temperatures are within the range described in the USFWS' 2009 Desert Tortoise Field Manual.[2]						

[2] Available at: http://www.fws.gov/ventura/species_information/protocols_guidelines/

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Vegetation (cont.)						
10. ***Avoid Wildlife Pitfalls*:** a. Backfill Trenches. At the end of each work day, the Designated Biologist shall ensure that all potential wildlife pitfalls (trenches, bores, and other excavations) outside the area fenced with desert tortoise exclusion fencing have been backfilled. If backfilling is not feasible, all trenches, bores, and other excavations shall be sloped at a 3:1 ratio at the ends to provide wildlife escape ramps, or covered completely to prevent wildlife access, or fully enclosed with desert tortoise-exclusion fencing. All trenches, bores, and other excavations outside the areas permanently fenced with desert tortoise exclusion fencing shall be inspected periodically throughout the day, at the end of each workday and at the beginning of each day by the Designated Biologist or a Biological Monitor. Should a tortoise or other wildlife become trapped, the Designated Biologist or Biological Monitor shall remove and relocate the individual as described in the Desert Tortoise Relocation/Translocation Plan. Any wildlife encountered during the course of construction shall be allowed to leave the construction area unharmed. b. Avoid Entrapment of Desert Tortoise. Any construction pipe, culvert, or similar structure with a diameter greater than 3 inches, stored less than 8 inches aboveground and within desert tortoise habitat (i.e., outside the permanently fenced area) for one or more nights, shall be inspected for tortoises before the material is moved, buried or capped. As an alternative, all such structures may be capped before being stored outside the fenced area, or placed on pipe racks. These materials would not need to be inspected or capped if they are stored within the permanently fenced area after the clearance surveys have been completed. 11. ***Minimize Standing Water*.** Water applied to dirt roads and construction areas (trenches or spoil piles) for dust abatement shall use the minimal amount needed to meet safety and air quality standards in an effort to prevent the formation of puddles, which could attract desert tortoises and common ravens to construction sites. A Biological Monitor shall patrol these areas to ensure water does not puddle and shall take appropriate action (e.g., coordinating with the contractor to reduce watering frequency) to reduce water application where necessary. 12. ***Dispose of Road-killed Animals*.** Road-killed animals or other carcasses detected on roads near the Project area shall be immediately reported to the Designated Biologist and picked up within 24 hours. The contractor and Designated Biologist shall be responsible for securing all required federal or State permits to handle and dispose of collected animals, including handling and disposal for scientific use. For special-status species roadkill, the Biological Monitor shall contact CDFG, and USFWS within 1 working day of receipt of the carcass for guidance on disposal or storage of the carcass. The Biological Monitor shall maintain and report special-status species records as described in Mitigation Measure WIL-3. 13. ***Minimize Spills of Hazardous Materials*.** All vehicles and equipment shall be maintained in proper working condition to minimize the potential for fugitive emissions of motor oil, antifreeze, hydraulic fluid, grease, or other hazardous materials. The Designated Biologist shall be informed of any hazardous spills immediately as directed in the Project Hazardous Materials Plan. Hazardous spills shall be immediately cleaned up and the contaminated soil properly disposed of at a licensed facility. Servicing of construction equipment shall take place only at a designated area. Service/maintenance vehicles shall carry a bucket and pads to absorb leaks or spills. 14. ***Worker Guidelines*.** During construction all trash and food-related waste shall be placed in self-closing containers and removed daily from the site. Workers shall not feed wildlife or bring pets to the Project site. Except for law enforcement personnel, no workers or visitors to the site shall bring firearms or weapons.						

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Vegetation (cont.)						
Vehicular traffic shall be confined to existing routes of travel to and from the Project site, and cross country vehicle and equipment use outside designated work areas shall be prohibited. The speed limit when traveling on dirt access routes within desert tortoise habitat shall not exceed 25 miles per hour. 15. ***Implement Erosion Control Measures.*** Standard erosion control measures shall be implemented for all phases of construction and operation where sediment run-off from exposed slopes threatens to enter "Waters of the State". Sediment and other flow-restricting materials shall be moved to a location where they shall not be washed back into the stream. All disturbed soils and roads within the Project site shall be stabilized to reduce erosion potential, both during and following construction. Areas of disturbed soils (access and staging areas) with slopes toward a drainage shall be stabilized to reduce erosion potential. 16. ***Monitor Ground Disturbing Activities Prior to Pre-Construction Site Mobilization.*** If pre-construction site mobilization requires ground-disturbing activities such as for geotechnical borings or hazardous waste evaluations, a Designated Biologist or Biological Monitor shall be present to monitor any actions that could disturb soil, vegetation, or wildlife. 17. ***Revegetation of Temporarily Disturbed Areas.*** The Applicant shall prepare and implement a Revegetation Plan to restore all areas subject to temporary disturbance to pre-Project grade and conditions. Temporarily disturbed areas within the Project area include, but are not limited to: all proposed locations for linear facilities, temporary access roads, berms, areas surrounding the drainage diffusers, construction work temporary lay-down areas not converted to part of the solar field, and construction equipment staging areas. The Revegetation Plan shall include a description of topsoil salvage and seeding techniques and a monitoring and reporting plan, and the following performance standards by the end of monitoring year 2: a. at least 80 percent of the species observed within the temporarily disturbed areas shall be native species that naturally occur in desert scrub habitats; and b. relative cover and density of plant species within the temporarily disturbed areas shall equal at least 60 percent.						
VEG-9: Weed Management Plan. Prior to beginning construction on the Project, the Applicant will prepare, circulate to the BLM for comment and approval, and then implement an Invasive Weed Management Plan (Appendix H) that meets the approval of BLM's AO to prevent the spread of existing weeds and the introduction of new weeds to the Project Area. The objective of the Weed Management Plan shall be to prevent the introduction of any new weeds and the spread of existing weeds as a result of Project construction, operation, and decommissioning. The Weed Management Plan shall include at a minimum the following information: specific weed management objectives and measures for each target non-native weed species; baseline conditions; a map of the Weed Management Areas; weed risk assessment and measures to prevent the introduction and spread of weeds; monitoring and surveying methods; and reporting requirements. The Plan shall be consistent with BLM's *Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States* (BLM, 2007) and the National Invasive Species Management Plan (National Invasive Species Council, 2008), and will be implemented by the Applicant to reduce the potential for the introduction of invasive species during construction, operation and maintenance, and decommissioning of the Project. The draft plan will be reviewed and approved by the BLM. The following measures are required in the Plan and will be implemented by the Applicant to monitor and control invasive species:	Prior to construction	BLM	Review and approve the Weed Management Plan and ensure implementation of the Invasive Weed Management Plan (Appendix H).			

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Vegetation (cont.)						
1. ***Preventative Measures During Construction.*** Equipment Cleaning: To prevent the spread of weeds into new habitats, and prior to entering the Project work areas, construction equipment will be cleaned of dirt and mud that could contain weed seeds, roots, or rhizomes. Equipment will be inspected to ensure they are free of any dirt or mud that could contain weed seeds and the tracks, feet, tires, and undercarriage will be carefully washed, with special attention being paid to axles, frame, cross members, motor mounts, underneath steps, running boards, and front bumper/brush guard assemblies. Other construction vehicles (e.g. pick-up trucks) that will be frequently entering and exiting the site will be inspected and washed on an as-needed basis. a. *Vehicle Washing*: All vehicles will be washed off-site when possible. Should off-site washing prove infeasible, an on-site cleaning station will be set up to clean equipment before it enters the work area. Either high-pressure water or air will be used to clean equipment and the cleaning site will be situated away from any sensitive biological resources. If possible, water used to wash vehicles and equipment will be collected and re-used. Ingress and egress will be limited to defined routes. b. *Site Soil Management*: Soil management will consist of limiting ground disturbance to the minimum necessary for construction activities and using dust suppressants to minimize the spread of seeds. Disturbed vegetation and topsoil will be re-deposited at or near the area from which they are removed to eliminate the transport of soil-borne invasive weed seeds, roots, or rhizomes. During reclamation of the temporarily cleared areas, the contractor will return topsoil and vegetative material to the areas from which they were stripped. BLM-approved dust suppressants (e.g. water and/or palliative) will be minimized on the site as much as possible, but will use during construction to minimize the spread of airborne weed seeds, especially during very windy days. As appropriate, temporary drift fences may be installed to help control sand movement during construction. c. *Weed-free Products*: Any use of hay or straw bales on the Project site will be limited to certified weed-free material. Other products such as gravel, mulch, and soil may also carry weeds and these products, too, will be certified weed-free. If needed, mulch will be made from the local, on-site native vegetation cleared from the Project area. d. *Personnel Training*: Weed management will be part of mandatory site training for all construction personnel and will be included in initial Worker Environmental Awareness Program training briefings. Training will include weed identification and the threat of impacts including impacts to local agriculture, vegetation communities, wildlife, and creating fire potential. Training will also cover the importance of preventing the spread of weeds. e. *Mechanical Weed Removal*: The Applicant primarily will use mechanical weed removal techniques with the use of herbicides restricted to BLM-approved usage in areas that are not accessible through mechanical means or where mechanical weed removal is impractical. f. *Herbicides*: The Applicant will use only BLM-approved pre- and/or post-emergent herbicides, as applicable. Pre-emergent herbicides will be applied to the soil before the weed seed germinates and is usually incorporated into the soil with irrigation or rainfall. Post-emergent herbicides will be applied directly to plants. Herbicides will be investigated in detail, made a part of the Invasive Weed Management Plan, and approved by BLM before use. g. *Pesticides*: Pesticide use will be limited to non-persistent, immobile pesticides applied only in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications. Any pesticide applications, if used, will be conducted within the framework of BLM and DOI policies, and will entail only the use of USEPA registered pesticides.						

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Vegetation (cont.)						
2. ***Containment and Control Measures.*** When Project monitoring (see below) indicates that invasive species are spreading, invasive species will be removed using mechanical and chemical methods. The Applicant will use mechanical weed removal methods as the preferred method, but herbicides may be used when conditions (such as wind, proximity of native vegetation) are such that the effect on native species is expected to be minimal. During suppression or eradication activities, care will be taken to have the least affect on native plant species. Herbicides used will be limited to those approved by the BLM. Herbicides will be applied before the invasive species flower and set seed. If monitoring indicates the spread of athel (*Tamarix* spp.), a woody invasive species, then athel will be controlled by cutting the trees and applying GarlonTM Ultra Herbicide to the stump immediately after cutting. GarlonTM is approved for use on athel by the BLM. All cut material generated during athel clearance will be removed from the site by truck. This material will be covered with a tarp or other material that will keep athel cuttings or seed from being spread by truck movement. The Applicant and its contractors will follow the BLM's Herbicide Use Standard Operating Procedures provided in Appendix B of the Record of Decision for the Final Vegetation Treatments Using Herbicides Programmatic Environmental Impact Statement (BLM, 2007). Personnel responsible for weed control will be trained in the proper and safe use of all equipment and chemicals used for weed control. 3. ***Monitoring.*** Baseline weed conditions will be assessed during the pre-construction phase of the Project, during pre-construction surveys and staking and flagging of construction areas. A stratified random sampling technique will be used to identify and count the extent of weeds on the site. Monitoring will take place each year during construction, and annually for three years following the completion of construction. The purpose of annual monitoring will be to determine if weed populations identified during baseline surveys have increased in density or are spreading as a result of the Project. Control methods will be implemented when measurable weed increases, as well as visually verified increases, are detected during monitoring. This will include small patches of unusually high density weeds (e.g., concentrations in swales) that are growing as a result of Project activities. During construction, daily monitoring records will be kept by biological monitors that will include information relevant to invasive weeds. During Project operations and maintenance, noxious and invasive weed list and provide monitoring and management appropriate to any new species in coordination with the BLM. After the three years of operations monitoring is complete, general management and monitoring of the Project area will be conducted by designated site personnel each year during both the germinating and early growing season (November through April) to eliminate new weed individuals prior to seed set. Throughout construction and long-term monitoring, personnel will be trained to identify weedy and native species and work with a trained vegetation monitor to determine where elimination is necessary. 4. ***Reporting.*** Results of monitoring and management efforts will be included in annual reports and a final monitoring report completed at the end of three years of post-construction monitoring. Copies of these reports will be kept on file at the site. Copies of each annual report as well as the final monitoring report will be sent to the BLM for review and comment. BLM will use the results of these reports to determine if any additional monitoring or control measures are necessary. 5. ***Success Criteria.*** Weed control will be ongoing on the Project site for the life of the Project, but plan success will be determined by BLM after the three years of operations monitoring through the reporting and review process. Success criteria will be defined as having no more than ten percent increase in a weed species or in overall weed cover in any part of the Project.						

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Vegetation (cont.)						
VEG-10: Special-Status Plant Species Impact Avoidance and Minimization, and Compensation. For this four-part measure, the Applicant shall: A) prepare and implement a Special-Status Plant Species Impact Avoidance and Mitigation Plan that meets the approval of BLM AO; B) ensure adequate special-status plant surveys and reporting; C) avoid, minimize and mitigate for impacts to special-status plants; and D) fund or support a compensatory mitigation program for special-status plants through land acquisition, restoration/enhancement, or a combination of acquisition and restoration/ enhancement. The Applicant shall implement measures **VEG-1** through **VEG-8**, and **VEG-10** to avoid, minimize, and compensate for impacts to special-status plant species. In this discussion the term "Project Disturbance Area" encompasses all areas to be temporarily and permanently disturbed by the Project, including the plant site, linear facilities, and areas disturbed by temporary access roads, fence installation, construction work lay-down and staging areas, parking, storage, or by any other activities resulting in disturbance to soil or vegetation. **A) Special-Status Plant Impact Avoidance and Minimization Measures** This measure contains the Best Management Practices and other measures designed to avoid accidental impacts to plants occurring outside of the Project Disturbance Area and within 100 feet of the Project Disturbance Area during construction, operation, and decommissioning. ***Special-Status Plant Impact Avoidance and Minimization Measures*.** The Applicant shall incorporate all measures for protecting special-status plants in close proximity to the site into the BRMIMP (Mitigation Measure VEG-7). These measures shall include the following elements: a) *Site Design Modifications*: Incorporate site design modifications to minimize impacts to special-status plants along the Project linears: limiting the width of the work area; adjusting the location of staging areas, lay downs, spur roads and poles or towers; driving and crushing vegetation as an alternative to blading temporary roads to preserve the seed bank, and minor adjustments to the alignment of the roads and pipelines within the constraints of the ROW. Design the engineered channel discharge points to maintain the natural surface drainage patterns between the engineered channel and the outlet of the natural washes that flow toward the south and east, downstream of the Project These modifications shall be clearly depicted on the grading and construction plans, and on report-sized maps in the BRMIMP. b) *Establish Environmentally Sensitive Areas (ESAs)*. Prior to the start of any ground- or vegetation-disturbing activities, a qualified Project biologist shall establish ESAs to protect avoided special-status plants that occur outside of the Project Disturbance Areas and within 100 feet of Project Disturbance Areas. This includes plant occurrences identified during the late season 2011 surveys. The locations of ESAs shall be clearly depicted on construction drawings, which shall also include all avoidance and minimization measures on the margins of the construction plans. The boundaries of the ESAs shall be placed a minimum of 20 feet from the uphill side of the occurrence and 10 feet from the downhill side. Where this is not possible due to construction constraints, other protection measures, such as silt-fencing and sediment controls, may be employed to protect the occurrences. Equipment and vehicle maintenance areas, and wash areas, shall be located 100 feet from the uphill side of any ESAs. ESAs shall be clearly delineated in the field with temporary construction fencing and signs prohibiting movement of the fencing or sediment controls under penalty of work stoppages and additional compensatory mitigation. ESAs shall also be clearly identified (with signage or by mapping on site plans) to ensure that avoided plants are not inadvertently harmed during construction, operation, or closure.	Prior to, during, and after construction.	BLM	Review and approve a Special-Status Plant Species Impact Avoidance and Mitigation Plan.			

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Vegetation (cont.)						
c) *Special-Status Plant Worker Environmental Awareness Program (WEAP)*. The WEAP (Mitigation Measure VEG-6) shall include training components specific to protection of special-status plants that may occur in the Study Area. d) *Herbicide and Soil Stabilizer Drift Control Measures*. Special-status plant occurrences within 100 feet of the Project Disturbance Area shall be protected from herbicide and soil stabilizer drift. The Invasive Weed Management Plan (Mitigation Measure VEG-9) shall include measures to avoid chemical drift or residual toxicity to special-status plants consistent with guidelines such as those provided by the Nature Conservancy's The Global Invasive Species Team (Hillmer and Liedtke, 2003), the USEPA, and the Pesticide Action Network Database.[3] e) *Erosion and Sediment Control Measures*. Erosion and sediment control measures shall not inadvertently impact special-status plants (e.g., by using invasive or non-native plants in seed mixes, introducing pest plants through contaminated seed or straw, etc.). These measures shall be incorporated in any required Drainage, Erosion, and Sedimentation Control Plans. f) *Avoid Special-Status Plant Occurrences*. Areas for spoils, equipment, vehicles, and materials storage areas; parking; equipment and vehicle maintenance areas, and wash areas shall be placed at least 100 feet from any ESAs. g) *Monitoring and Reporting Requirements*. The Designated Botanist shall conduct weekly monitoring of the ESAs that protect special-status plant occurrences during construction and decommissioning activities. **B) Ensure Adequate Special-Status Plant Surveys And Reporting (Applies to Alternative 3 Routes)** At least 30 days prior to construction, the Applicant shall ensure that botanical surveys have been fully performed and reported on the Alternative 3 Routes, as described below: 1. ***Survey Timing*.** Surveys shall be timed to detect: a) summer annuals triggered to germinate by the warm, tropical summer storms (which may occur any time between June and October). Fall-blooming perennials that respond to the cooler, later season storms (typically beginning in September or October) shall only be required if blooms and seeds are necessary for identification or the species are summer-deciduous and require leaves for identification. The surveys shall not be timed to coincide with the statistical peak bloom period of the target species but shall instead be based on plant phenology and the timing of a significant storm event (i.e., a 10mm or greater rain or multiple storm events of sufficient volume to trigger germination, as measured at or within 1 mile of the Project site). Surveys shall occur at the appropriate time to capture the characteristics necessary to identify the taxon. 2. ***Surveyor Qualifications and Training*.** Surveys shall be conducted by a qualified botanist knowledgeable in the complex biology of the local flora, and consistent with CDFG protocols (CDFG, 2009). Each surveyor shall be equipped with a GPS unit and record a complete tracklog; these data shall be compiled and submitted along with the Summer-Fall Survey Botanical Report (described below). Prior to the start of surveys, all crew members shall, at a minimum, visit reference sites (where available) and/or review herbarium specimens of all BLM Sensitive plants, CNPS List 1B or 2 (Nature Serve rank S1 and S2) or proposed List 1B or 2 taxa, and any new reported or documented taxa, to obtain a search image. Because the potential for range extensions is unknown, the list of potentially occurring special-status plants shall include all special-status taxa known to occur within the Sonoran Desert region and						

[3] Available at: http://www.pesticideinfo.org

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Vegetation (cont.)						
the eastern portion of the Mojave in California. The list shall also include taxa with bloom seasons that begin in fall and extend into the early spring as many of these are reported to be easier to detect in fall, following the start of the fall rains. 3. ***Survey Coverage*.** The survey coverage or intensity shall be in accordance with the most recent BLM Survey Protocols, which specify that intuitive controlled surveys shall only be accomplished by botanists familiar with the habitats and species that may reasonably be expected to occur in the project area (BLM, 2009). 4. ***Documenting Occurrences*.** If a special-status plant is detected, the full extent of the population on-site shall be recorded using GPS in accordance with BLM survey protocols. Additionally, the extent of the population within one mile of Project boundaries shall be assessed at least qualitatively to facilitate an accurate estimation of the proportion of the population affected by the Project. For populations that are very dense or very large, the population size may be estimated by simple sampling techniques. When populations are very extensive or locally abundant, the surveyor must provide some basis for this assertion and roughly map the extent on a topographic map. All but the smallest populations (e.g., a population occupying less than 100 square feet) shall be recorded as area polygons; the smallest populations may be recorded as point features. All GPS-recorded occurrences shall include: the number of plants, phenology, observed threats (e.g., OHV or invasive exotics), and habitat or community type. The map of occurrences submitted with the final botanical report shall be prepared to ensure consistency with definition of an occurrence by CNDDB, i.e., occurrences found within 0.25 miles of another occurrence of the same taxon, and not separated by significant habitat discontinuities, shall be combined into a single 'occurrence'. The Applicant shall also submit the raw GPS shape files and metadata, and completed CNDDB forms for each 'occurrence' (as defined by CNDDB). 5. ***Reporting*.** Raw GPS data, metadata, and CNDDB field forms shall be provided to the BLM AO within two weeks of the completion of each survey. If surveys are split into two or more periods (e.g., a late summer survey and a fall survey), then a summary letter shall be submitted following each survey period. 6. The Final Summer-Fall Botanical Survey Report shall be prepared consistent with CDFG guidelines (CDFG, 2009), and BLM 2009 guidelines and shall include all of the following components: a) the BLM designation, NatureServe Global and State Rank of each species or taxon found (or proposed rank, or CNPS List); b) the number or percent of the occurrence that will be directly affected, and indirectly affected by changes in drainage patterns or altered geomorphic processes; c) the habitat or plant community that supports the occurrence and the total acres of that habitat or community type that occurs in the Project Disturbance Area; d) an indication of whether the occurrence has any local or regional significance (e.g., if it exhibits any unusual morphology, occurs at the periphery of its range in California, represents a significant range extension or disjunct occurrence, or occurs in an atypical habitat or substrate); e) a completed CNDDB field form for every occurrence (occurrences of the same species within one-quarter mile or less of each other combined as one occurrence, consistent with CNDDB methodology), and f) two maps: one that depicts the raw GPS data (as collected in the field) on a topographic base map with Project features; and a second map that follows the CNDDB protocol for occurrence mapping.						

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Vegetation (cont.)						
C) Avoidance Requirements for Special-Status Plants The Applicant shall avoid impacts to special-status plant populations whenever possible, as described below. 1. Mitigation for CNDDB Rank 1, 2, and 3 Plants – Avoidance on Linear Corridors Required: If species with a CNDDB rank of 1, 2, or 3 are detected within the Project Disturbance Area, the Applicant shall prepare and implement a Special-Status Plant Mitigation Plan (Plan) that describes measures to avoid and minimize impacts to plant populations on the Project linear corridors and construction laydown areas, unless such avoidance would create greater environmental impacts in other resource areas (e.g. Cultural Resource Sites) or other restrictions (e.g., FAA or other restrictions for placement of transmission poles). The Applicant shall provide compensatory mitigation as described below in Mitigation Measure VEG-10.D for impacts to Rank 1, 2, and 3 plants that cannot be avoided. The content of the Plan and definitions shall be as described above in Mitigation Measure VEG-10.C (1). 2. Preservation of the Germplasm of Affected Special-Status Plants. For all significant impacts to special-status plants, regardless of whether compensatory mitigation is required, mitigation shall include seed collection from the affected special-status plants on-site prior to construction to conserve the germplasm and provide a seed source for restoration efforts. The seed shall be collected under the supervision or guidance of a reputable seed storage facility such as the Rancho Santa Ana Botanical Garden Seed Conservation Program, San Diego Natural History Museum, or the Missouri Botanical Garden. The costs associated with the long-term storage of the seed shall be the responsibility of the Applicant. Any efforts to propagate and reintroduce special-status plants from seeds in the wild shall be carried out under the direct supervision of specialists such as those listed above and as part of a Habitat Restoration/Enhancement Plan approved by the BLM AO.						
D) Off-Site Compensatory Mitigation for Special-Status Plants This section describes performance standards for mitigation for a range of options for compensatory mitigation. Where compensatory mitigation is required under the terms of Mitigation Measure VEG-10.C, above, the Applicant shall mitigate Project impacts to special-status plant occurrences with compensatory mitigation. Compensatory mitigation shall consist of acquisition of habitat supporting the target species, or restoration/enhancement of populations of the target species, and shall meet the performance standards for mitigation described below. Compensatory mitigation shall be at a ratio of 3:1 for Rank 1 plants, with 3 acres of habitat acquired or restored/enhanced for every acre of habitat occupied by the special-status plant that will be disturbed by the Project Disturbance Area (for example, if the area occupied by the special-status plant collectively measured is 0.25 acre, the compensatory mitigation will be 0.75 acre). The mitigation ratio for Rank 2 plants shall be 2:1. So, for the example above, the mitigation ratio would be 0.5 acre for the Rank 2 plants. The Applicant shall provide funding for the acquisition and/or restoration/ enhancement, initial improvement, and long-term maintenance and management of the acquired or restored lands. The actual costs to comply with this condition will vary depending on the Project Disturbance Area, the actual costs of acquiring compensation habitat, the actual costs of initially improving the habitat, the actual costs of long-term management as determined by a Property Analysis Record (PAR) report, and other transactional costs related to the use of compensatory mitigation. The Applicant shall comply with other related requirements of this measure, as follows:						

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Vegetation (cont.)						
I. ***Compensatory Mitigation by Acquisition*:** The requirements for the acquisition initial protection and habitat improvement, and long-term maintenance and management of special-status plant compensation lands include all of the following: 1. *Selection Criteria for Acquisition Lands*. The compensation lands selected for acquisition may include any of the following three categories: a. Occupied Habitat, No Habitat Threats: The compensation lands selected for acquisition shall be occupied by the target plant population and shall be characterized by site integrity and habitat quality that are required to support the target species, and shall be of equal or better habitat quality than that of the affected occurrence. The occurrence of the target special-status plant on the proposed acquisition lands should be viable, stable or increasing (in size and reproduction). b. Occupied Habitat, Habitat Threats. Occupied compensation lands characterized by habitat threats may also be acquired as long as the population could be reasonably expected to recover with habitat restoration efforts (e.g., OHV or grazing exclusion, or removal of invasive non-native plants) and is accompanied by a Habitat Enhancement/Restoration Plan as described in Mitigation Measure VEG-10.D.II, below. c. Unoccupied but Adjacent. The Applicant may also acquire habitat for which occupancy by the target species has not been documented, if the proposed acquisition lands are adjacent to occupied habitat. The Applicant shall provide evidence that acquisitions of such unoccupied lands would improve the defensibility and long-term sustainability of the occupied habitat by providing a protective buffer around the occurrence and by enhancing connectivity with undisturbed habitat. This acquisition may include habitat restoration efforts where appropriate, particularly when these restoration efforts will benefit adjacent habitat that is occupied by the target species. 2. *Review and Approval of Compensation Lands Prior to Acquisition*. The Applicant shall submit a formal acquisition proposal to the BLM AO describing the parcel(s) intended for purchase. This acquisition proposal shall discuss the suitability of the proposed parcel(s) as compensation lands for special-status plants in relation to the criteria listed above, and must be approved by the BLM AO. 3. *Management Plan*. The Applicant or approved third party shall prepare a management plan for the compensation lands in consultation with the entity that will be managing the lands. The goal of the management plan shall be to support and enhance the long-term viability of the target special-status plant occurrences. The Management Plan shall be submitted for review and approval to the BLM AO. 4. *Integrating Special-Status Plant Mitigation with Other Mitigation lands*. If all or any portion of the acquired Desert Tortoise, Waters of the State, or other required compensation lands meets the criteria above for special-status plant compensation lands, the portion of the other species' or habitat compensation lands that meets any of the criteria above may be used to fulfill that portion of the obligation for special-status plant mitigation. 5. *Compensation Lands Acquisition Requirements*. The Applicant shall comply with the following requirements relating to acquisition of the compensation lands after the BLM AO, has approved the proposed compensation lands:						

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Vegetation (cont.)						
a. Preliminary Report. The Applicant, or an approved third party, shall provide a recent preliminary title report, initial hazardous materials survey report, biological analysis, and other necessary or requested documents for the proposed compensation land to the BLM AO. All documents conveying or conserving compensation lands and all conditions of title are subject to review and approval by the BLM AO. For conveyances to the state, approval may also be required from the California Department of General Services, the Fish and Game Commission and the Wildlife Conservation Board. b. Title/Conveyance. The Applicant shall acquire and transfer fee title to the compensation lands, a conservation easement over the lands, or both fee title and conservation easement, as required by the BLM AO. Any transfer of a conservation easement or fee title must be to CDFG, a non-profit organization qualified to hold title to and manage compensation lands (pursuant to California Government Code §65965), or to BLM or other public agency approved by the BLM AO. If an approved non-profit organization holds fee title to the compensation lands, a conservation easement shall be recorded in favor of CDFG or another entity approved by the BLM AO. If an entity other than CDFG holds a conservation easement over the compensation lands, the BLM AO may require that CDFG or another entity approved by the BLM AO, in consultation with CDFG, be named a third party beneficiary of the conservation easement. The Applicant shall obtain approval of the BLM AO of the terms of any transfer of fee title or conservation easement to the compensation lands. c. Initial Protection and Habitat Improvement. The Applicant shall fund activities that the BLM AO requires for the initial protection and habitat improvement of the compensation lands. These activities will vary depending on the condition and location of the land acquired, but may include trash removal, construction and repair of fences, invasive plant removal, and similar measures to protect habitat and improve habitat quality on the compensation lands. The costs of these activities are estimated to be $330 per acre, using the estimated cost per acre for Desert Tortoise mitigation as a best available proxy, at the ratio of 3:1 for Rank 1 plants and 2:1 for Rank 2 plants, but actual costs will vary depending on the measures that are required for the compensation lands. A non-profit organization, CDFG or another public agency may hold and expend the habitat improvement funds if it is qualified to manage the compensation lands (pursuant to California Government Code §65965), if it meets the approval of the BLM AO in consultation with CDFG, and if it is authorized to participate in implementing the required activities on the compensation lands. If CDFG takes fee title to the compensation lands, the habitat improvement fund must be paid to CDFG or its designee. d. Property Analysis Record. Upon identification of the compensation lands, the Applicant shall conduct a PAR or PAR-like analysis to establish the appropriate amount of the long-term maintenance and management fund to pay the in-perpetuity management of the compensation lands. The PAR or PAR-like analysis must be approved by the BLM AO before it can be used to establish funding levels or management activities for the compensation lands. e. Long-term Maintenance and Management Funding. In accordance with Mitigation Measure VEG-13 (*Phasing*), the Applicant shall deposit in the National Fish and Wildlife Foundation's (NFWF) Renewable Energy Action Team (REAT) Account a non-wasting capital long-term maintenance and management fee in the amount determined through the PAR or PAR-like analysis conducted for the compensation lands.						

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Vegetation (cont.)						
f. The BLM AO, in consultation with CDFG, may designate another non-profit organization to hold the long-term maintenance and management fee if the organization is qualified to manage the compensation lands in perpetuity. If CDFG takes fee title to the compensation lands, CDFG shall determine whether it will hold the long-term management fee in the special deposit fund, leave the money in the REAT Account, or designate another entity to manage the long-term maintenance and management fee for CDFG and with CDFG supervision. g. Interest, Principal, and Pooling of Funds. The Applicant shall ensure that an agreement is in place with the long-term maintenance and management fund (endowment) holder/manager to ensure the following requirements are met: i. Interest. Interest generated from the initial capital long-term maintenance and management fund shall be available for reinvestment into the principal and for the long-term operation, management, and protection of the approved compensation lands, including reasonable administrative overhead, biological monitoring, improvements to carrying capacity, law enforcement measures, and any other action that is approved by the BLM AO and is designed to protect or improve the habitat values of the compensation lands. ii. Withdrawal of Principal. The long-term maintenance and management fund principal shall not be drawn upon unless such withdrawal is deemed necessary by the BLM AO or by the approved third-party long-term maintenance and management fund manager, to ensure the continued viability of the species on the compensation lands. iii. Pooling Long-Term Maintenance and Management Funds. An entity approved to hold long-term maintenance and management funds for the Project may pool those funds with similar non-wasting funds that it holds from other projects for long-term maintenance and management of compensation lands for special-status plants. However, for reporting purposes, the long-term maintenance and management funds for this Project must be tracked and reported individually to the BLM AO. h. Other Expenses. In addition to the costs listed above, the Applicant shall be responsible for all other costs related to acquisition of compensation lands and conservation easements, including but not limited to the title and document review costs incurred from other state agency reviews, overhead related to providing compensation lands to CDFG or an approved third party, escrow fees or costs, environmental contaminants clearance, and other site cleanup measures. i. Mitigation Security. The Applicant shall provide financial assurances in accordance with Mitigation Measure VEG-13 (*Phasing*) to the BLM AO to guarantee that an adequate level of funding is available to implement any of the mitigation measures required by this condition that are not completed prior to the start of ground-disturbing Project activities. Financial assurances shall be provided to the BLM AO in the form of an irrevocable letter of credit, a pledged savings account or another form of approved security (“Security”). The amount of the Security shall be $2,280 per acre, using the estimated cost per acre for Desert Tortoise mitigation as a best available proxy, at a ratio of 3:1 for Rank 1 plants and 2:1 for Rank 2 plants, for every acre of habitat supporting the target special-status plant species which is impacted by the project. The actual costs to comply with this condition will vary depending on						

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Vegetation (cont.)						
the actual costs of acquiring compensation habitat, the costs of initially improving the habitat, and the actual costs of long-term management as determined by a PAR report. Prior to submitting the Security to the BLM AO, the Applicant shall obtain the BLM AO's approval of the form of the Security. The BLM AO may draw on the Security if the BLM AO determines the Applicant has failed to comply with the requirements specified in this condition. The BLM AO may use money from the Security solely for implementation of the requirements of this condition. The BLM AO's use of the Security to implement measures in this condition may not fully satisfy the Applicant's obligations under this condition, and the Applicant remains responsible for satisfying the obligations under this condition if the Security is insufficient. The unused Security shall be returned to the Applicant in whole or in part upon successful completion of the associated requirements in this condition. j. The Applicant may elect to comply with the requirements in this condition for acquisition of compensation lands, initial protection and habitat improvement on the compensation lands, or long-term maintenance and management of the compensation lands by funding, or any combination of these three requirements, by providing funds to implement those measures into the REAT Account established with the NFWF. To use this option, the Applicant must make an initial deposit to the REAT Account in an amount equal to the estimated costs (as set forth in the Security section of this condition) of implementing the requirement. If the actual cost of the acquisition, initial protection and habitat improvements, or long-term funding is more than the estimated amount initially paid by the Applicant, the Applicant shall make an additional deposit into the REAT Account sufficient to cover the actual acquisition costs, the actual costs of initial protection and habitat improvement on the compensation lands, and the long-term funding requirements as established in an approved PAR or PAR-like analysis. If those actual costs or PAR projections are less than the amount initially transferred by the Applicant, the remaining balance shall be returned to the Applicant. The responsibility for acquisition of compensation lands may be delegated to a third party other than NFWF, such as a non-governmental organization supportive of desert habitat conservation, by written agreement of the Energy Commission. Such delegation shall be subject to approval by the BLM AO, in consultation with CDFG, BLM, and USFWS, prior to land acquisition, enhancement or management activities. Agreements to delegate land acquisition to an approved third party, or to manage compensation lands, shall be executed and implemented within 18 months of the BLM's certification of the Project. **II. *Compensatory Mitigation by Habitat Enhancement/Restoration*:** As an alternative or adjunct to land acquisition for compensatory mitigation the Applicant may undertake habitat enhancement or restoration for the target special-status plant species. Habitat enhancement or restoration activities must achieve protection at a 3:1 ratio for Rank 1 plants and 2:1 for Rank 2 plants, with improvements applied to 3 acres, or 2 acres, respectively, of habitat for every acre of special-status plant habitat directly or indirectly disturbed by the Project Disturbance Area (for example, if the area occupied by the special-status plant collectively measured is 0.25 acre, the improvements would be applied to an area equal to 0.75 acre at a 3:1 ratio, or 0.5 acre at a 2:1 ratio). Examples of suitable enhancement projects include but are not limited to the following: i) control unauthorized vehicle use into an occurrence (or pedestrian use if clearly damaging to the species); ii) control of invasive non-native plants that infest or pose an immediate threat to an occurrence; iii) exclude grazing by wild burros or livestock from an occurrence; or iv) restore lost or degraded hydrologic or geomorphic functions critical to the species by restoring previously diverted flows, removing obstructions to the wind sand transport corridor above an occurrence, or increasing groundwater availability for dependent species.						

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Vegetation (cont.)						
If the Applicant elects to undertake a habitat enhancement project for mitigation, the project must meet the following performance standards: The proposed enhancement project shall achieve rescue of an off-site occurrence that is currently assessed, based on the NatureServe threat ranking system (Master et al., 2009; see also Morse et al., 2004) with one of the following threat ranks: a) long-term decline >30 percent; b) an immediate threat that affects >30 percent of the population, or c) has an overall threat impact that is High to Very High. "Rescue" would be considered successful if it achieves an improvement in the occurrence trend to "stable" or "increasing" status, or downgrading of the overall threat rank to slight or low (from "High" to "Very High"). If the Applicant elects to undertake a habitat enhancement project for mitigation, they shall submit a Habitat Enhancement/Restoration Plan to the BLM AO for review and approval, and shall provide sufficient funding for implementation and monitoring of the Plan. The amount of the Security shall be $2,280 per acre, using the estimated cost per acre for Desert Tortoise mitigation as a best available proxy, at the ratio of 3:1 for Rank 1 plants and 2:1 for Rank 2 plants, for every acre of habitat supporting the target special-status plant species which is directly or indirectly impacted by the project. The amount of the security may be adjusted based on the actual costs of implementing the enhancement, restoration and monitoring. The implementation and monitoring of the enhancement/restoration may be undertaken by an appropriate third party such as NFWF, subject to approval by the BLM AO. The Habitat Enhancement/Restoration Plan shall include each of the following: 1. *Goals and Objectives*. Define the goals of the restoration or enhancement project and a measurable course of action developed to achieve those goals. The objective of the proposed habitat enhancement plan shall include restoration of a target special-status plant occurrence that is currently threatened with a long-term decline. The proposed enhancement plan shall achieve an improvement in the occurrence trend to "stable" or "increasing" status, or downgrading of the overall threat rank to slight or low (from "High" to "Very High"). 2. Historical Conditions. Provide a description of the pre-impact or historical conditions (before the site was degraded by weeds or grazing or ORV, etc.), and the desired conditions. 3. Site Characteristics. Describe other site characteristics relevant to the restoration or enhancement project (e.g., composition of native and pest plants, topography and drainage patterns, soil types, geomorphic and hydrologic processes important to the site or species. 4. Ecological Factors. Describe other important ecological factors of the species being protected, restored, or enhanced such as total population, reproduction, distribution, pollinators, etc. 5. Methods. Describe the restoration methods that will be used (e.g., invasive exotics control, site protection, seedling protection, propagation techniques, etc.) and the long-term maintenance required. The implementation phase of the enhancement must be completed within five years. 6. Budget. Provide a detailed budget and time-line, and develop clear, measurable, objective-driven annual success criteria. 7. Monitoring. Develop clear, measurable monitoring methods that can be used to evaluate the effectiveness of the restoration and the benefit to the affected species. The Plan shall include a minimum of five years of quarterly monitoring, and then annual monitoring for the remainder of the enhancement project, and until the performance standards for rescue of a threatened occurrence are met. At a minimum the progress reports shall include: quantitative measurements of the projects progress in meeting the enhancement project success criteria, detailed description of remedial actions taken or proposed, and contact information for the responsible parties.						

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Vegetation (cont.)						
8. Reporting Program. The Plan shall ensure accountability with a reporting program that includes progress toward goals and success criteria. Include names of responsible parties. 9. Contingency Plan. Describe the contingency plan for failure to meet annual goals. Long-term Protection. Include proof of long-term protection for the restoration site. For private lands this would include conservations easements or other deed restrictions; projects on public lands must be contained in a Desert Wildlife Management Area, Wildlife Habitat Management Area, or other land use protections that will protect the mitigation site and target species.						
VEG-11: Mitigation for Impacts to Sensitive Riparian Habitat and State Waters. The Applicant shall implement the following measures to avoid, minimize and mitigate for direct and indirect impacts to waters of the state and to satisfy requirements of California Fish and Game Code §§1600 and 1607. 1. ***Acquire Off-Site State Waters*:** The Applicant shall acquire, in fee or in easement, a parcel or parcels of land that includes at least 215.2 acres of state jurisdictional waters, or comparable area based on actual project impact to jurisdictional features that meets BLM and CDFG mitigation ratios, as identified in APM HYDRO-1 (Table 2-7, *Applicant Proposed Measures*). The parcel or parcels comprising the 215.2 acres of ephemeral washes shall include at least 6 acres of desert dry wash woodland. Under Alternative 2, the mitigation requirement for impacts to riparian habitat and state waters would be a minimum of 63.3 acres that included at least 1.5 acres of desert dry wash woodland. If Alternative 3 were constructed the mitigation requirements for impacts to riparian habitat and state waters would be incrementally greater than under Alternative 1; however, would need to be finalized to include the impacts of road facilities on riparian habitat located on Project linears south of the Project. The terms and conditions of this acquisition or easement shall be as described in Mitigation Measure WIL-4 (*Desert Tortoise Compensatory Mitigation*). Mitigation for impacts to state waters shall occur within the Palo Verde and surrounding watersheds, as close to the Project site as possible. If security is posted in accordance with Provision 2 below (Security for Implementation of Mitigation), the Applicant shall acquire, in fee or in easement, the land, no more than 18 months after the start of Project ground-disturbing activities. 2. ***Security for Implementation of Mitigation*:** The Applicant shall provide financial assurances to the BLM AO and CDFG to guarantee that an adequate level of funding is available to implement the acquisitions and enhancement of state waters as described in this condition. These funds shall be used solely for implementation of the measures associated with the project. Financial assurance can be provided to the BLM AO and CDFG in the form of an irrevocable letter of credit, a pledged savings account or Security prior to initiating ground-disturbing project activities. Prior to submittal to the BLM AO, the Security shall be approved by the BLM AO, in consultation with CDFG and the USFWS, to ensure funding. An estimate of $485,640 in required Security funds was developed for land costs or the estimated costs of enhancement and endowment (see WIL-4, Compensatory Mitigation for Desert Tortoise Habitat Losses, for a discussion of the assumptions used in calculating the Security) based on an estimate of $2,280 per acre (213.3 acres) to fund acquisition, enhancement and long-term management. For Alternative 2 the Security amounts is estimated to be $144,324. The estimate for Alternative 3 is $485,640, which does not include road impacts on portions of the Central Route or Western Route that deviates from the proposed Project gen-tie line. These this amounts may change based on land costs or the estimated costs of enhancement and endowment. The final amount due will be determined by the PAR analysis conducted pursuant to Mitigation Measure WIL-4 and approved by the BLM AO and CDFG. The final mitigation acreage is also subject to CDFG concurrence with project impacts to waters of the state that were developed by the Applicant.	Before Operation.	BLM, CDFG	Ensure provision of funding by the Applicant.			

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Vegetation (cont.)						
3. ***Preparation of Management Plan*:** The Applicant shall submit to the BLM AO and CDFG a draft Management Plan that reflects site-specific enhancement measures for the drainages on the acquired compensation lands. The objective of the Management Plan shall be to enhance the wildlife value of the drainages, and may include enhancement actions such as weed control, fencing to exclude livestock, or erosion control. 4. ***Code of Regulations*:** The Applicant shall provide a copy of the BRMMP and CDFG permits to all contractors, subcontractors, and the Applicant's Project supervisors. Copies shall be readily available at work sites at all times during periods of active work and must be presented to any CDFG personnel upon demand. The BLM AO reserves the right to issue a stop work order or allow CDFG to issue a stop work order after giving notice to the Applicant. If the BLM AO in consultation with CDFG, determines that the Applicant has breached any of the terms or conditions or for other reasons, including but not limited to the following: a. The information provided by the Applicant regarding streambed alteration is incomplete or inaccurate; b. New information becomes available that was not known to it in preparing the terms and conditions; or c. The Project or Project activities as described in the Staff Assessment have changed. 5. Best Management Practices: The Applicant shall also comply with the following conditions to protect drainages near the Project Disturbance Area: a. The Applicant shall minimize road building, construction activities and vegetation clearing within ephemeral drainages to the extent feasible. b. The Applicant shall not allow water containing mud, silt, or other pollutants from grading, aggregate washing, or other activities to enter ephemeral drainages or be placed in locations that may be subjected to high storm flows. c. The Applicant shall comply with all litter and pollution laws. All contractors, subcontractors, and employees shall also obey these laws, and it shall be the responsibility of the Applicant to ensure compliance. d. Spoil sites shall not be located at least 30 feet from the boundaries and drainages or in locations that may be subjected to high storm flows, where spoils might be washed back into drainages. e. Raw cement/concrete or washings thereof, asphalt, paint or other coating material, oil or other petroleum products, or any other substances that could be hazardous to vegetation or wildlife resources, resulting from Project-related activities, shall be prevented from contaminating the soil and/or entering waters of the state. These materials, placed within or where they may enter a drainage by the Applicant or any party working under contract or with the permission of the Applicant, shall be removed immediately. f. No broken concrete, debris, soil, silt, sand, bark, slash, sawdust, rubbish, cement or concrete or washings thereof, oil or petroleum products or other organic or earthen material from any construction or associated activity of whatever nature shall be allowed to enter into, or placed where it may be washed by rainfall or runoff into, waters of the state. g. When operations are completed, any excess materials or debris shall be removed from the work area. No rubbish shall be deposited within 150 feet of the high water mark of any drainage. h. No equipment maintenance shall occur within 150 feet of any ephemeral drainage where petroleum products or other pollutants from the equipment may enter these areas under any flow.						

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Vegetation (cont.)						
VEG-12: Channel Decommissioning and Reclamation Plan. At least 12 months prior to Project closure, the Applicant shall prepare a draft Decommissioning and Reclamation Plan to remove the engineered diversion channels from the Project site, and implement the final plan upon site closure. The goal of the plan shall be to restore the site's topography and hydrology to a relatively natural condition and to establish native plant communities within the Project Disturbance Area. The Channel Decommissioning and Reclamation Plan shall include a cost estimate for implementing the proposed decommissioning and reclamation activities, and shall be consistent with the guidelines in BLM's 43 CFR 3809.550 et seq., subject to review and revisions from the BLM AO in consultation with USFWS and CDFG.	Prior to Project closure.	Review and approve the Channel Decommissioning and Reclamation Plan at least 12 months prior to Project closure.				
VEG-13: Phasing. The Applicant shall provide compensatory mitigation for the total Project Disturbance Area and may provide such mitigation in multiple phases for distinct construction elements (e.g., Unit 1, Unit 2, etc.). These phases will generally include installation of fencing, clearing, grubbing and grading, and development of common facilities first, followed by the remaining power block units. All construction activities for the non-linear features during these subsequent phases will occur within desert tortoise exclusionary fenced areas that have been cleared in accordance with USFWS protocols. Prior to initiating each phase of construction the Applicant shall submit the actual construction schedule, a figure depicting the locations of proposed construction and amount of acres to be disturbed. Mitigation acres are calculated based on the compensation requirements for each resource type including desert tortoise (Mitigation Measure WIL-4), western burrowing owl (Mitigation Measure WIL-9), Mojave fringe-toed lizard (Mitigation Measure WIL-10), and state waters (Mitigation Measure VEG-11). Compensatory mitigation for each phase shall be implemented according to the timing required by each condition.	Prior to each phase of construction.	USFWS, CDFG, RWQCB	Review and approve phasing schedule, mitigation acreage, and compensatory mitigation for each phase of construction.			
Biological Resources – Wildlife						
APM BIO-1: Desert Tortoise-specific Protection Measures During Construction. a. ***Environmental Compliance Personnel*:** Environmental compliance personnel shall be employed to oversee the implementation of all desert tortoise protection measures in accordance with a BO. An ECM will be assigned to the Project who shall be an on-site staff member of the Project. The ECM will be responsible for facilitating implementation of the environmental conditions of the Project and for coordinating compliance with the BLM and USFWS. A Project Lead Biologist and alternate Lead Biologists with demonstrated expertise with desert tortoise shall oversee compliance with the protection measures for the desert tortoise and other special-status species. There also shall be ABs that have demonstrated expertise to conduct specific activities for desert tortoise protection; the Lead Biologist also will be an AB. Additionally, qualified BMs will assist the AB in enforcing APMs. McCoy Solar shall submit the names and qualifications of the proposed Lead Biologist(s) and all ABs to the USFWS and BLM for review and approval prior to pre-construction clearance surveys. Project activities involving ground disturbance shall not begin until the Lead Biologist and ABs are approved by the aforementioned agencies. Replacement of Lead Biologist and ABs would require USFWS and BLM approval. The ECM, ABs, and BMs shall have the authority to halt all non-emergency activities that are in violation of the protection measures, or if a desert tortoise wanders into a work site. Work will proceed only after hazards to the desert tortoise are removed, the species no longer is at risk, or the animal has been moved from harm's way by the AB. The ABs will document any incident occurring during Project activities which is in non-compliance with the protection measures stated in the BO. The Lead Biologist and ECM shall ensure that appropriate corrective action is taken. Corrective actions shall be documented by the AB or BM. The following incidents shall require immediate cessation of the Project activities causing the incident:	During construction	BLM, USFWS	Implement desert tortoise-specific protection measures, including: • Employment of environmental compliance personnel to oversee implementation of all desert tortoise protection measures in accordance with a BO • Construction of desert tortoise exclusion fencing • Pre-construction clearance surveys			

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Wildlife (cont.)						
1. Imminent threat of injury or death to a desert tortoise. 2. Unauthorized handling of a desert tortoise. 3. Operation of construction equipment or vehicles outside of areas secured with desert tortoise fencing without a BM present, except on designated roads. 4. Conducting any construction activity without an AB or BM present where one is required. b. ***Desert Tortoise Exclusion Fencing*:** Prior to the onset of ground disturbing activities, the entire solar plant site will be fenced with a permanent tortoise exclusion fence per current USFWS requirements (USFWS, 2009) to keep tortoises from entering the solar plant site during construction and operation phases. The fencing type will be 1-inch by 2-inch vertical mesh galvanized fence material, extending at least 2 feet above the ground and buried at least 1 foot. Where burial is impossible, the mesh will be bent at a right angle toward the outside of the fence and covered with dirt, rocks, or gravel to prevent tortoises from digging under the fence. Tortoise-proof gates will be established at all site entry points. Fence construction may be completed during any time of the year (USFWS, 2010). As necessary, linear facilities (e.g., gen-tie line and switchyard) will be temporarily fenced to prevent tortoise entry during construction. Alternatively, monitoring during construction can be used to protect tortoises instead of temporary fencing. Temporary fencing will follow current USFWS guidelines for permanent fencing and supporting stakes will be sufficiently spaced to maintain fence integrity; burial may be minimized to avoid surface disturbance. All fence construction will be monitored by an AB or BMs to ensure that no desert tortoises are harmed. Following installation, all permanent exclusion fencing will be inspected monthly and during all major rainfall events; temporary fencing will be inspected at least weekly, or more often as necessary. Any damage to the fencing will be repaired immediately. All fencing erected during a tortoise activity period or prior to tortoises exiting brumation will be inspected at least three times each day for a minimum of 2 weeks (or for a minimum of two weeks after tortoises become active following brumation), to search for any tortoises that might be fence-walking; at least one search will occur immediately prior to lethal ambient temperatures. c. ***Pre-Construction Clearance Surveys*:** Within 1 week prior to fence installation, the AB and/or approved BMs will survey the staked fence line location for all desert tortoise burrows and tortoises, covering a swath of at least 90 feet centered on the fence line, using 15-foot-wide transects. All potential desert tortoise burrows or pallets will be searched. Burrows along the fence line that must be disturbed will be excavated by ABs or approved BMs using hand tools. Tortoise burrows will be mapped using GPS, and the size and age identified. Where flagging would not attract poaching, burrows will also be flagged. All fence construction then will be monitored by BMs. A clearance survey for tortoises will be conducted inside all fenced areas. Consistent with the McCoy Desert Tortoise Translocation Plan (BIO-1[d]), a minimum of two consecutive clearance passes without finding any new tortoises must be completed and these must coincide with heightened tortoise activity from mid-March through May and September through early November, or as otherwise agreed to by BLM and USFWS. This will maximize the probability of finding all tortoises. Clearance transects will be a maximum of 15 feet (5 meters) apart per USFWS approved protocols (USFWS, 2009), except on broad patches of unvegetated, well-developed desert pavement, where the width may be increased to a maximum of 30 feet (9 meters) upon USFWS approval. Once the solar plant site is deemed free of tortoises, heavy equipment will be allowed to enter the site to perform construction activities. It is anticipated that very few tortoises will be found during clearance or monitoring activities, but if tortoises are observed, the biologists will implement the McCoy Desert Tortoise Translocation Plan. The AB and BMs also will conduct clearance surveys of construction areas outside of the solar plant site. Burrows will be avoided if at all possible (especially if this is temporary fencing). However, if a burrow must be destroyed for fencing to occur, then it will be visually and tactilely			• Preparation and implementation of Desert Tortoise Translocation Plan • Construction monitoring • Immediate notification to the BLM and USFWS if a dead, injured, or sick tortoise is observed.			

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Wildlife (cont.)						
examined for occupancy by tortoises and other wildlife. If occupancy is negative or cannot be established, the burrow will be carefully excavated with hand tools, using standardized techniques approved by USFWS (2009) and the Desert Tortoise Council (1994), including disinfection techniques for all tools. No burrows that can be avoided will be collapsed during perimeter fence construction. Other tortoise burrows will be flagged judiciously to avoid attraction of tortoise predators or people to the burrow. All BMs, the AB, and relevant construction personnel will be informed of all potential tortoise activity adjacent to an unfenced construction area. Following Project area clearance, a report will be prepared by the Project Lead Biologist to document the clearance surveys, the capture and release locations of all desert tortoises found, post-release monitoring, individual tortoise data, and other relevant data, consistent with the McCoy Desert Tortoise Translocation Plan. This report will be submitted to the BLM and USFWS. d. ***Desert Tortoise Translocation Plan*:** The Applicant will prepare and implement a Desert Tortoise Translocation Plan that will be approved by USFWS prior to construction. e. ***Construction Monitoring*:** No construction will occur in unfenced areas (see BIO-1[b], *Desert Tortoise Exclusion Fencing*) or on the linear facilities without BMs present. This includes both the construction phase (construction, revegetation) and maintenance activities during the operations phase that require new surface disturbance. An adequate number of trained and experienced monitors must be present during all construction activities in unfenced areas, depending on the various construction tasks, locations, and season. f. ***Dead, Injured, and Sick Desert Tortoises*:** The Lead Biologist will notify the BLM and USFWS immediately if a dead or injured desert tortoise is observed. Written notification must be made within 2 days of the date of the finding or incident (if known) and must include: Location of the tortoise, photographs, cause of death (if known), and other pertinent information. The AB will ensure that all tortoises injured by Project activities receive prompt veterinary care at the Applicant's expense. If an injured animal recovers, the BLM and USFWS will be contacted by the Applicant for final disposition of the animal. However, if efforts to keep the injured animal separate from other tortoises and turtles are successful during the tortoise's treatment, then it is recommended that it be released at or near its capture point to continue to contribute to the persistence of the local tortoise population. Tortoises fatally injured or killed from Project-related activities will be submitted for necropsy as outlined in Salvaging Injured, Recently Dead, Ill, and Dying Wild, Free-Roaming Desert Tortoises (*Gopherus agassizii*) (Berry, 2001) at the Applicant's expense. Care will be taken by the AB in handling dead specimens to preserve biological material in the best possible state.			•			
APM BIO-2: General Protection Measures During Construction. a. ***Biological Resources Mitigation and Monitoring Plan (BRMMP)*:** The BRMMP will outline steps to implement the protection measures; document their implementation; and monitor their effectiveness. The BRMMP will identify the terms and conditions of any permits associated with the Project, including, but not limited to, the USFWS §7 Biological Opinion, CDFG §2081 Incidental Take Permit, and CDFG Streambed Alteration Agreement. The BRMMP will be submitted to the BLM and USFWS for approval prior to the start of ground disturbance. b. ***Reporting*:** As part of implementing protection measures, regular reports will be submitted to the relevant resource agencies to document the Project activities, mitigation implemented and mitigation effectiveness, and provide recommendations as needed. A schedule of reporting will be specific to individual plans. However, the Lead Biologist will submit monthly reports to the ECM during construction, annual comprehensive reports, and special-incident reports. The Lead Biologist will be responsible for reviewing and signing reports prior to	Prior to and during construction	BLM, USFWS, CDFG	Implement general protection measures during construction, including: • BRMMP • Regular reporting of Project activities, mitigation implementation and effectiveness, and recommendations as needed			

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Wildlife (cont.)						
submittal to the agencies. In addition to a regular reporting schedule, all encounters with desert tortoises will be reported to the Lead Biologist, who will report the following information in Monthly and Annual Reports: 1. Location (narrative and maps) and dates of observations; 2. General condition and health, including injuries and state of healing; 3. Diagnostic markings, including identification numbers or markers; and 4. Disposition (if moved). c. ***Worker Environmental Training*:** The Applicant will prepare and implement site-specific Worker Environmental Training to inform Project personnel about the biological constraints of the Project. The training will be included in the BRMMP and will be developed and presented by a qualified Project biologist prior to the commencement of construction activity. All Project personnel must attend the training. The training will include information regarding the sensitive biological resources, restrictions, protection measures, and individual responsibilities associated with the Project. Special emphasis will be placed on protection measures developed for the desert tortoise and the consequences of non-compliance. Written material will be provided to employees at orientation and participants will sign an attendance sheet documenting their participation. d. ***Construction-related Activities*:** Existing roads will be utilized wherever possible to avoid unnecessary impacts. New and existing roads that are planned for either construction or widening will not extend beyond the planned impact area and will minimize surface disturbance in native habitats, where practical. All vehicles passing or turning around will do so within the planned impact area or in previously disturbed areas. Along the linear facilities, the anticipated impact zones, including staging areas, equipment access, and disposal or temporary placement of spoils, will be delineated with stakes and/or flagging prior to construction to avoid natural resources, where possible. Outside the Project boundaries, personnel will utilize established roadways (paved or unpaved) for traveling to and from the Project Area, including for transmission line construction. No work in unfenced and uncleared habitat will occur except under the direct supervision of a BM. Cross-country vehicle and equipment use outside designated work areas will be prohibited. Best Management Practices will be employed to prevent loss of habitat due to erosion caused by Project-related impacts (i.e., grading or clearing for new roads). All detected erosion will be remedied within 2 days of discovery. Additionally, fueling of equipment will take place within existing paved or contained areas and not within or adjacent to drainages or native desert habitats. Contractor equipment will be checked for leaks prior to operation and repaired as necessary. All vehicles and equipment will be in proper working condition to minimize the potential for fugitive emissions of motor oil, antifreeze, hydraulic fluid, grease, or other hazardous materials. The AB and BM will be informed of any hazardous spills within 24 hours. Hazardous spills will be immediately cleaned up and the contaminated soil will be properly disposed of at a licensed facility. Employees and contractors will look under vehicles and equipment for the presence of desert tortoises prior to movement. No equipment will be moved until the animal has left voluntarily or an AB removes it. e. ***Construction Speed Limits*:** To minimize the likelihood for vehicle strikes of tortoises and other species during construction, a speed limit of 25 miles per hour will be established for travel on all dirt Project access roads. Signs will be posted at appropriate locations (for example, at Arizona crossings of drainages) to remind drivers to be aware of the potential for desert tortoise and other wildlife occurring on the roadways. f. ***Ground Excavations*:** The Applicant will ensure that Project features located outside the permanently fenced sites, such as open trenches, pits, bores and other excavations that might trap, entangle, or constitute as pitfalls to desert tortoises and other wildlife, be filled in, fenced, covered, or otherwise modified at the end of each work day so they are no longer a hazard to desert tortoises and other wildlife. All excavations in tortoise			• Worker environmental training • Use of established roadways and proper fuel use, spill prevention, and cleanup techniques • 25 mph speed limit • Cover, inspect, and remove trapped tortoises from ground excavation sites • Proper construction material storage and inspection for desert tortoises • Proper hazardous material storage and spill cleanup • Report road kills to a BM or AB daily, to ensure timely removal • No pets or firearms onsite • Prohibit the intentional killing or collection of all native plant or native wildlife species • Provide funds to the USFWS' range-wide raven monitoring and control program to support the more comprehensive goals of that program • Weed Management Plan • Apply water for dust suppression • Revegetation Plan			

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Wildlife (cont.)						
habitat outside the permanently fenced sites will be inspected for trapped desert tortoises at the beginning, middle, and end of the work day, at a minimum, but also will be continuously monitored by BMs as part of monitoring construction outside of fenced areas. Should a tortoise become entrapped, the AB will remove it immediately. These Project features will not need to be inspected if they are located within the permanently fenced solar plant site after the clearance surveys have been completed. However, any such Project features inside temporarily fenced locations that have been cleared of tortoises will be inspected daily for other wildlife.			•			
g. ***Construction Material Storage*:** The Applicant will ensure that any construction pipe, culvert, or similar structure stored less than 8 inches above the ground, stored for one or more nights, and within desert tortoise habitat outside the permanently fenced sites, will be inspected for tortoises before the material is moved, buried or capped. As an alternative, all such structures may be capped before being stored on the construction site or placed on pipe racks. These materials will not need to be inspected or capped if they are stored within the permanently fenced solar plant site after the clearance surveys have been completed or inside temporarily fenced locations.						
h. ***Hazardous Materials*:** The Applicant will ensure all vehicles and equipment are in proper working condition to ensure that there is no potential for fugitive emissions of motor oil, fuel, antifreeze, hydraulic fluid, grease, or other hazardous materials. Contractor equipment will be checked for leaks prior to operation and repaired as necessary. Fueling of equipment will take place within existing paved roads, where possible, and not within or adjacent to drainages. Hazardous spills will be immediately cleaned up and the contaminated soil will be properly disposed of at a licensed facility. The ECM, Lead Biologist, and BLM will be informed of any significant hazardous spills within 24 hours.						
i. ***Trash Abatement*:** Trash and food items will be contained in secure, closed lid (raven- and coyote-proof) containers. Trash will be removed regularly (at least once a week) to reduce the attractiveness to the site to opportunistic tortoise predators such as common ravens (*Corvus corax*) and coyotes (*Canis latrans*) and to reduce the possibility of animals ingesting or becoming entangled in foreign matter.						
j. ***Roadkill Removal*:** To preclude providing food to scavengers, including potential tortoise predators, such as ravens and coyotes, all road kills on construction entry roads will be collected, bagged, and put in a secure trash bin, daily. All personnel will be required to report road kills to a BM or AB daily, to ensure timely removal.						
k. ***Pets and Firearms*:** The Applicant will prohibit workers from bringing pets or firearms to the Project.						
l. ***Plant and Wildlife Collection*:** The Applicant will prohibit the intentional killing or collection of all native plant or native wildlife species, including, but not limited to desert tortoise. Workers will not disturb, capture, handle, or move animals, or their nests/burrows. Violations will be reported in the monthly and annual reports.						
m. ***Raven Management*:** The Applicant will provide funds to the USFWS' range-wide raven monitoring and control program to support the more comprehensive goals of that program. These funds will be in lieu of extensive quantitative monitoring at the Project site. The amount will be determined through negotiation with USFWS. In addition, a Raven Management Plan will be designed and implemented to identify the conditions of concern specific to the Project that may attract ravens to the Project and to define a plan that will 1) monitor raven activity and 2) specify management and control measures. The monitoring effort is intended to provide qualitative and semi-quantitative data to ensure that ravens do not pose a threat to desert tortoises from the Project.						
n. ***Weed Management Plan*:** The Applicant will prepare and implement a Weed Management Plan to prevent the spread of existing weeds and the introduction of new weeds to the Project Area.						

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Wildlife (cont.)						
o. ***Water Application for Dust Control*:** The Applicant will ensure water is applied to the construction area, dirt roads, trenches, spoil piles, and other areas where ground disturbance has taken place to minimize dust emissions and topsoil erosion. A BM will patrol these areas to ensure water does not pool for long periods of time and potentially attract desert tortoises, common ravens, and other wildlife. p. ***Cleanup and Restoration; Revegetation Plan*:** The Applicant will ensure that all unused material and equipment will be removed upon completion of construction activities or maintenance activities conducted outside the permanently fenced sites (this includes non-emergency and emergency repairs). Upon completion, all construction equipment and refuse, including, but not limited to wrapping material, cables, cords, wire, boxes, rope, broken equipment parts, twine, strapping, buckets, metal or plastic containers will be removed from the site and disposed of properly. Any unused or leftover hazardous products will be properly disposed of offsite. The Applicant will prepare and implement a Revegetation Plan to restore temporarily disturbed areas.						
APM BIO-3: Protection Measures During Operation and Maintenance. Road, transmission line, and pipeline maintenance activities are expected to occur during the life of the Project. To the extent possible, major road surface maintenance activities outside the solar plant site will be scheduled for the season with the least desert tortoise activity (typically November 1 through February 28), unless accompanied by an AB. During operation, all personnel who encounter a desert tortoise will immediately report the encounter to the ECM. An AB will monitor all major maintenance activities; minor maintenance (e.g., inspections) does not have to be accompanied by an AB. Only an AB may move tortoises during the operations phase and only if necessary. If feasible, all tortoises will be allowed to move into a safe area of their own accord. In order to prevent roadkills, any tortoise observed on the Project access road will be watched until it is safely off the road before the personnel can continue. If a desert tortoise is found inside the fenced solar plant site, an AB will be contacted immediately to translocate the desert tortoise from the solar plant site; in the interim, the tortoise will be captured, enclosed in a clean cardboard box with a lid, and held in a climate controlled situation until translocation by an AB, in accordance with details described in the McCoy Desert Tortoise Translocation Plan (BIO-1[d]). The ECM or AB will document the location (narrative and maps), date of observations, general condition and health (if known), including injuries and state of healing; diagnostic markings, including identification numbers or markers; and disposition, in the annual report.	During operation	BLM	• Schedule maintenance during the season with the least active desert tortoise activity • Report all tortoise activities to ECM • Monitor all major maintenance activities • Only an AB may move a tortoise if it's not able to move on its own accord			
APM BIO-4: Desert Tortoise Compensation. To fully mitigate for habitat loss and potential take of desert tortoise, the Applicant will provide compensatory mitigation at a 1:1 ratio for impacts to all Category 3 desert tortoise habitat in accordance with the NECO Plan (BLM, 2002). Approximately 4,500 acres of Category 3 habitat would be disturbed). This excludes 38 acres of sand dunes, agricultural areas, and areas that are currently developed or disturbed along the access road. Acreage of disturbance was based on the best available Project plans and would be adjusted, based on pre- and post-construction aerial photography, to reflect the final Project disturbance footprint. Because the construction of Unit 1, Unit 2, and the linear facilities would be phased, compensation obligations (e.g., security deposits and the actual funding or acquisition of mitigation land) should be apportioned as follows: a. Unit 1: 2,259 acres at a 1:1 ratio; b. Unit 2: 2,178 acres at a 1:1 ratio; and c. Linear facilities: 106 acres at a 1:1 ratio. The following qualitative criteria would be used to select compensation lands to ensure that they provide mitigation for the incidental take of desert tortoises:	Prior to construction	BLM, CDGF, USFWS				

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Wildlife (cont.)						
a. Compensation lands should be part of a larger block of lands that are either already protected or planned for protection, or feasibly could be protected by a public resource agency or a private biological reserve organization. b. Parcels should provide habitat that is as good as or better than the habitat being impacted by the Project. Preferably, the lands would comprise sufficiently good habitat that they are either currently occupied or could be occupied by the desert tortoise once they are protected from anthropogenic impacts and/or otherwise enhanced. c. Parcels should not be subject to such intensive recreational, grazing, or other uses that recovery is rendered unlikely or lengthy. Nor should those invasive species that are likely to jeopardize habitat recovery (e.g., Sahara mustard [*Brassica tournefortii*]) be present in uncontrollable numbers, either on or immediately adjacent to the parcels under consideration. d. The parcels should be connected to occupied desert tortoise habitat or in sufficiently close proximity to known occupied tortoise habitat such that an unencumbered genetic flow is possible. Preferably, the existing populations of desert tortoise on these lands would represent populations that are stable, recovering, or likely to recover. e. The parcels should be consistent with the goals, objectives, and recovery actions of an accepted recovery strategy (e.g., recovery plan) for the desert tortoise if possible.						
APM BIO-5: Protection Measures during Decommissioning/Closure: Project Decommissioning: The planned operating life of the Project is 30 years. In the event the Project permanently shuts down, and no other project will occupy the same industrial space, the Applicant will prepare and implement a Decommissioning Plan to ensure that the environment is protected during the decommissioning phase. Prior to decommissioning, a plan will be finalized and approved by the BLM. The Applicant shall retain an AB for the decommissioning phase of the Project to ensure that all environmental protection measures are implemented. The Applicant will submit the names and qualifications of all proposed biologists to the USFWS and BLM for review and approval at least 30 days prior to decommissioning activities and prior to initiation of any tortoise handling. Decommissioning activities will not begin until the ABs are approved by the aforementioned agencies.	At least 30 days prior to decommissioning.	BLM	Review and approve the decommissioning plan.			
WIL-1: Measures to Avoid Take of Desert Tortoise. The Applicant shall undertake appropriate measures to manage the construction site and related facilities in a manner to avoid or minimize impacts to desert tortoise. Methods for clearance surveys, fence specification and installation, tortoise handling, artificial burrow construction, egg handling, and other procedures shall be consistent with those described in the USFWS (2009) *Desert Tortoise Field Manual* or more current guidance provided by CDFG and USFWS. The Applicant shall also implement all terms and conditions described in the Biological Opinion prepared by USFWS. The Applicant shall implement the following measures: 1. ***Desert Tortoise Exclusion Fence Installation.*** To avoid impacts to desert tortoises, permanent exclusion fencing shall be installed along the permanent perimeter security fence (boundaries) as phases are constructed. Temporary fencing shall be installed along linear features or any subset of the plant site phasing that does not correspond to permanent perimeter fencing. All fencing installation corridors shall be flagged to assist biologists in studying the fence route and surveyed within 24 hours prior to the initiation of fence construction. Clearance surveys of the desert tortoise exclusionary fence and utility rights-of-way alignments shall be conducted by the Designated Biologist(s) using techniques outlined in the USFWS' 2009 *Desert Tortoise Field Manual* and may be conducted in any season with USFWS and CDFG approval. Biological	Prior to and during construction.	CDFG, USFWS				

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Wildlife (cont.)						
Monitors may assist the Designated Biologist under his or her supervision. These fence clearance surveys shall provide 100-percent coverage of all areas to be disturbed and an additional transect along both sides of the fence line. Disturbance associated with desert tortoise exclusionary fence construction shall not exceed 30 feet on either side of the proposed fence alignment. Prior to the surveys the Applicant shall provide to the BLM Authorized Officer (BLM AO), CDFG, and USFWS a figure clearly depicting the limits of construction disturbance for the proposed fence installation. The fence line survey area shall be 90 feet wide centered on the fence alignment. Where construction disturbance for fence line installation can be limited to 15 feet on either side of the fence line, this fence line survey area may be reduced to an area approximately 60 feet wide centered on the fence alignment. Transects shall be no greater than 15 feet apart. All desert tortoise burrows, and burrows constructed by other species that might be used by desert tortoises, shall be examined to assess occupancy of each burrow by desert tortoises and handled in accordance with the *Desert Tortoise Field Manual*. Any desert tortoise located during fence clearance surveys shall be handled by the Designated Biologist(s) in accordance with the *Desert Tortoise Field Manual*. a. *Timing, Supervision of Fence Installation*. The exclusion fencing shall be installed in any area subject to disturbance prior to the onset of site clearing and grubbing in that area. The fence installation shall be supervised by the Designated Biologist and monitored by the Biological Monitors to ensure the safety of any tortoise present. b. *Fence Material and Installation*. All desert tortoise exclusionary fencing shall be constructed in accordance with the USFWS' *Desert Tortoise Field Manual* (Chapter 8 – Desert Tortoise Exclusion Fence). c. *Security Gates*. Security gates shall be designed with minimal ground clearance to deter ingress by tortoises. The gates may be electronically activated to open and close immediately after the vehicle(s) have entered or exited to prevent the gates from being kept open for long periods of time. d. *Fence Inspections*. Following installation of the desert tortoise exclusion fencing for both the permanent site fencing and temporary fencing in the utility corridors, the fencing shall be regularly inspected. If tortoise were moved out of harm's way during fence construction, permanent and temporary fencing shall be inspected at least two times a day for the first 7 days to ensure a recently moved tortoise has not been trapped within the fence. Thereafter, permanent fencing shall be inspected monthly and during and within 24 hours following all major rainfall events. A major rainfall event is defined as one for which flow is detectable within the fenced drainage. Any damage to the fencing shall be temporarily repaired immediately to keep tortoises out of the site, and permanently repaired within 48 hours of observing damage. Inspections of permanent site fencing shall occur for the life of the Project. Temporary fencing shall be inspected weekly and, where drainages intersect the fencing, during and within 24 hours following major rainfall events. All temporary fencing shall be repaired immediately upon discovery and, if the fence may have permitted tortoise entry while damaged, the Designated Biologist shall inspect the area for tortoise. 2. ***Desert Tortoise Clearance Surveys within the Plant Site*.** Clearance surveys shall be conducted in accordance with the final USFWS-approved *Desert Tortoise Translocation Plan, McCoy Solar Energy Project* (Appendix F in the Biological Assessment; TetraTech EC Inc., 2012) and shall consist of two surveys covering 100 percent the Project area by walking transects no more than 15 feet apart. If a desert tortoise is located on the second survey, a third survey shall be conducted. Each separate survey shall be walked in a different direction or parallel but offset to allow opposing angles of observation. Clearance surveys for non-linear areas of Phase 1A may be conducted outside the active season. Clearance surveys of the remaining portions of the						

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Wildlife (cont.)						
power plant site may only be conducted when tortoises are most active in the Project vicinity (March through May or September through mid-November). Clearance surveys of linear features may be conducted during anytime of the year. Surveys outside of the active season in areas other than Phase 1A require approval by USFWS and CDFG. Any tortoise located during clearance surveys of the power plant site and linear features shall be relocated and monitored in accordance with the Desert Tortoise Relocation/Translocation Plan: a. *Burrow Searches*. During clearance surveys all desert tortoise burrows, and burrows constructed by other species that might be used by desert tortoises, shall be examined by the Designated Biologist, who may be assisted by the Biological Monitors, to assess occupancy of each burrow by desert tortoises and handled in accordance with the *Desert Tortoise Field Manual*. To prevent reentry by a tortoise or other wildlife, all burrows shall be collapsed once absence has been determined, but only on the last survey pass and if not occupied by other wildlife. Tortoises taken from burrows and from elsewhere on the power plant site shall be relocated or translocated as described in the Desert Tortoise Relocation/Translocation Plan. b. *Burrow Excavation/Handling*. All potential desert tortoise burrows located during clearance surveys would be excavated by hand, tortoises removed, and collapsed or blocked to prevent occupation by desert tortoises. All desert tortoise handling and removal, and burrow excavations, including nests, would be conducted by the Designated Biologist, who may be assisted by a Biological Monitor in accordance with the *Desert Tortoise Field Manual*. c. *Monitoring Following Clearing*. Following the desert tortoise clearance and removal from the power plant site and utility corridors, workers and heavy equipment shall be allowed to enter the Project site to perform clearing, grubbing, leveling, and trenching. A Designated Biologist shall directly monitor site clearing and shall be on-site during grading activities to find and move tortoises missed during the initial tortoise clearance survey. Should a tortoise be discovered, it shall be relocated or translocated as described in the Desert Tortoise Relocation/Translocation Plan. 3. ***Reporting*.** The Designated Biologist shall record the following information for any desert tortoises handled: a) the locations (narrative and maps) and dates of observation; b) general condition and health, including injuries, state of healing and whether desert tortoise voided their bladders; c) location moved from and location moved to (using GPS technology); d) gender, carapace length, and diagnostic markings (i.e., identification numbers or marked lateral scutes); e) ambient temperature when handled and released; and f) digital photograph of each handled desert tortoise as described in the paragraph below. Desert tortoise moved from within Project areas shall be marked and monitored in accordance with the Desert Tortoise Relocation/Translocation Plan (Mitigation Measure WIL-2).						
WIL-2: Desert Tortoise Relocation/Translocation Plan. The Applicant shall develop and implement a final Desert Tortoise Relocation/Translocation Plan (Plan) that is consistent with current USFWS approved guidelines, and meets the approval of the BLM AO. The Plan shall include guidance during different phases of Project construction and shall include measures to minimize the potential for repeated translocations of individual desert tortoises. The final Plan shall include all revisions deemed necessary by BLM, USFWS, and CDFG.						
WIL-3: Project Notifications and Reporting. The Applicant shall provide BLM staff with reasonable access to the Project site and compensation lands under the control of the Applicant and shall otherwise fully cooperate with BLM's efforts to verify the Project owner's compliance with, or the effectiveness of, mitigation measures. The Designated Biologist shall do all of the following:	Prior to, during, and after construction.	BLM, CDFG, USFWS				

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Wildlife (cont.)						
1. ***Notification.*** Notify the BLM AO at least 14 calendar days before initiating construction-related ground disturbance activities; immediately notify the BLM AO in writing if the Applicant is not in compliance with any required conditions of project approval, including but not limited to any actual or anticipated failure to implement mitigation measures within the specified time periods; 2. ***Monitoring During Grubbing and Grading.*** Remain onsite daily while vegetation salvage, grubbing, grading and other ground-disturbance construction activities are taking place to avoid or minimize take of listed species, to check for compliance with all impact avoidance and minimization measures, and to check all exclusion zones to ensure that signs, stakes, and fencing are intact and that human activities are restricted in these protective zones. 3. ***Monthly Compliance Inspections.*** Conduct compliance inspections at a minimum of once per month after clearing, grubbing, and grading are completed and submit a monthly compliance report to the BLM AO, USFWS, and CDFG during construction. 4. ***Notification of Injured, Dead, or Relocated Listed Species.*** In the event of a sighting in an active construction area (e.g., with equipment, vehicles, or workers), injury, kill, or relocation of any listed species, the BLM AO, CDFG, and USFWS shall be notified immediately by phone. Notification shall occur no later than noon on the business day following the event if it occurs outside normal business hours so that the agencies can determine if further actions are required to protect listed species. Written follow-up notification via FAX or electronic communication shall be submitted to these agencies within two calendar days of the incident and include the following information as relevant: a. *Injured Desert Tortoise*. If a desert tortoise is injured as a result of Project-related activities during construction, the Designated Biologist shall immediately take it to a CDFG-approved wildlife rehabilitation and/or veterinarian clinic. Any veterinarian bills for such injured animals shall be paid by the Applicant. Following phone notification as required above, the BLM AO, CDFG, and USFWS shall determine the final disposition of the injured animal, if it recovers. Written notification shall include, at a minimum, the date, time, location, circumstances of the incident, and the name of the facility where the animal was taken. b. *Desert Tortoise Fatality*. If a desert tortoise is killed by Project-related activities during construction or operation, submit a written report with the same information as an injury report. These desert tortoises shall be salvaged according to guidelines described in the USGS publication *Salvaging Injured, Recently Dead, Ill, and Dying Wild, Free-Roaming Desert Tortoise*. The Applicant shall pay to have the desert tortoises transported and necropsied. The report shall include the date and time of the finding or incident. 5. ***Stop Work Order.*** The BLM AO may issue the Applicant a written stop work order to suspend any activity related to the construction or operation of the Project to prevent or remedy a violation of one or more required conditions of project approval (including but not limited to failure to comply with reporting, monitoring, or habitat acquisition obligations) or to prevent the illegal take of an endangered, threatened, or candidate species. The Applicant shall comply with the stop work order immediately upon receipt thereof.						
WIL-4: Compensatory Mitigation for Desert Tortoise Habitat Losses. To fully mitigate for habitat loss and potential take of desert tortoise, the Applicant shall provide compensatory mitigation at a 1:1 ratio for impacts to 4,900 acres, adjusted to reflect the final footprint of the selected Project alternative. For the purposes of this measure, the Project footprint means all lands directly disturbed in the construction and operation of the Project, including all linear features, as well as undeveloped areas inside the Project's boundaries that will no longer provide	Prior to construction	BLM, CDFG, USFWS	Review and approve the acquisition proposal.			

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Wildlife (cont.)						
viable long-term habitat for the desert tortoise. To satisfy this measure, the Applicant shall acquire, protect and transfer 1 acre of desert tortoise habitat for every acre of habitat within the final Project footprint, and provide associated funding for the acquired lands, as specified below. Mitigation Measure WIL-15 may provide the Applicant with another option for satisfying some or all of the requirements in this measure. In lieu of acquiring lands itself, the Applicant may satisfy the requirements of this measure by depositing funds into the REAT Account established with the NFWF, as provided below in section 3.h. of this measure. The timing of the mitigation shall correspond with the timing of the site disturbance activities. However, if security is posted in accordance with 3.g. below (Mitigation Security), the Applicant shall acquire, in fee or in easement, the land, no more than 18 months after the start of Project ground-disturbing activities. If compensation lands are acquired in fee title or in easement, the requirements for acquisition, initial improvement and long-term management of compensation lands include all of the following: 1. ***Selection Criteria for Compensation Lands*.** The compensation lands selected for acquisition in fee title or in easement shall a. be within the Colorado Desert Recovery Unit, with potential to contribute to desert tortoise habitat connectivity and build linkages between desert tortoise designated critical habitat, known populations of desert tortoise, and/or other preserve lands; b. provide habitat for desert tortoise with capacity to regenerate naturally when disturbances are removed; c. be prioritized near larger blocks of lands that are either already protected or planned for protection, or which could feasibly be protected long-term by a public resource agency or a non-governmental organization dedicated to habitat preservation; d. be connected to lands with desert tortoise habitat equal to or better quality than the Project site, ideally with populations that are stable, recovering, or likely to recover; e. not have a history of intensive recreational use or other disturbance that does not have the capacity to regenerate naturally when disturbances are removed or might make habitat recovery and restoration infeasible; f. not be characterized by high densities of invasive species, either on or immediately adjacent to the parcels under consideration, that might jeopardize habitat recovery and restoration; g. not contain hazardous wastes that cannot be removed to the extent that the site could not provide suitable habitat; and h. have water and mineral rights included as part of the acquisition, unless the BLM AO, in consultation with CDFG and USFWS, agrees in writing to the acceptability of land. 2. ***Review and Approval of Compensation Lands Prior to Acquisition*.** The Applicant shall submit a formal acquisition proposal to the BLM AO, CDFG, and USFWS describing the parcel(s) intended for purchase. This acquisition proposal shall discuss the suitability of the proposed parcel(s) as compensation lands for desert tortoise in relation to the criteria listed above. Approval from the BLM AO and CDFG, in consultation with BLM and the USFWS, shall be required for acquisition of all compensatory mitigation parcels. 3. ***Compensation Lands Acquisition Requirements*.** The Applicant shall comply with the following requirements relating to acquisition of the compensation lands after the BLM AO and CDFG, in consultation with BLM and the USFWS, have approved the proposed compensation lands:						

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Wildlife (cont.)						
a. *Preliminary Report*. The Applicant, or approved third party, shall provide a recent preliminary title report, initial hazardous materials survey report, biological analysis, and other necessary or requested documents for the proposed compensation land to the BLM AO and CDFG. All documents conveying or conserving compensation lands and all conditions of title are subject to review and approval by the BLM AO and CDFG, in consultation with the USFWS. For conveyances to the state, approval may also be required from the California Department of General Services, the Fish and Game Commission, and the Wildlife Conservation Board. b. *Title/Conveyance*. The Applicant shall transfer fee title to the compensation lands, a conservation easement over the lands, or both fee title and conservation easement as required by the BLM AO and CDFG. Transfer of either fee title or an approved conservation easement will usually be sufficient, but some situations, e.g., the donation of lands burdened by a conservation easement to BLM, will require that both types of transfers be completed. Any transfer of a conservation easement or fee title must be to CDFG, a non-profit organization qualified to hold title to and manage compensation lands (pursuant to California Government Code §65965), or to BLM under terms approved by the BLM AO and CDFG. If an approved non-profit organization holds title to the compensation lands, a conservation easement shall be recorded in favor of CDFG in a form approved by CDFG. If an approved non-profit holds a conservation easement, CDFG shall be named a third party beneficiary. c. *Initial Habitat Improvement Fund*. The Applicant shall fund the initial protection and habitat improvement of the compensation lands. Alternatively, a non-profit organization may hold the habitat improvement funds if it is qualified to manage the compensation lands (pursuant to California Government Code §65965) and if it meets the approval of CDFG and the BLM AO. If CDFG takes fee title to the compensation lands, the habitat improvement fund must be paid to CDFG or its designee. d. *Property Analysis Record*. Upon identification of the compensation lands, the Applicant shall conduct a PAR or PAR-like analysis to establish the appropriate long-term maintenance and management fee to fund the in-perpetuity management of the acquired mitigation lands. e. *Long-term Maintenance and Management Fund*. The Applicant shall deposit in NFWF's REAT Account a non-wasting capital long-term maintenance and management fee in the amount determined through the PAR analysis conducted for the compensation lands. The BLM AO, in consultation with CDFG, may designate another non-profit organization to hold the long-term maintenance and management fee if the organization is qualified to manage the compensation lands in perpetuity. If CDFG takes fee title to the compensation lands, CDFG shall determine whether it will hold the long-term management fee in the special deposit fund, leave the money in the REAT Account, or designate another entity to manage the long-term maintenance and management fee for CDFG and with CDFG supervision. f. *Interest, Principal, and Pooling of Funds*. The Applicant, the BLM AO and CDFG shall ensure that an agreement is in place with the long-term maintenance and management fee holder/manager to ensure the following conditions: i. Interest. Interest generated from the initial capital long-term maintenance and management fee shall be available for reinvestment into the principal and for the long-term operation, management, and protection of the approved compensation lands, including reasonable administrative overhead, biological monitoring, improvements to carrying capacity, law enforcement measures, and any other action approved by CDFG designed to protect or improve the habitat values of the compensation lands.						

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Wildlife (cont.)						
ii. Withdrawal of Principal. The long-term maintenance and management fee principal shall not be drawn upon unless such withdrawal is deemed necessary by the CDFG or the approved third-party long-term maintenance and management fee manager to ensure the continued viability of the species on the compensation lands. If CDFG takes fee title to the compensation lands, monies received by CDFG pursuant to this provision shall be deposited in a special deposit fund established solely for the purpose to manage lands in perpetuity unless CDFG designates NFWF or another entity to manage the long-term maintenance and management fee for CDFG.						
iii. Pooling Long-Term Maintenance and Management Fee Funds. CDFG, or a BLM AO- and CDFG-approved non-profit organization qualified to hold long-term maintenance and management fees solely for the purpose to manage lands in perpetuity, may pool the endowment with other endowments for the operation, management, and protection of the compensation lands for local populations of desert tortoise. However, for reporting purposes, the long-term maintenance and management fee fund must be tracked and reported individually to the CDFG and BLM AO.						
iv. Other expenses. In addition to the costs listed above, the Applicant shall be responsible for all other costs related to acquisition of compensation lands and conservation easements, including but not limited to title and document review costs, expenses incurred from other state agency reviews, and overhead related to providing compensation lands to CDFG or an approved third party; escrow fees or costs; environmental contaminants clearance; and other site cleanup measures.						
g. *Mitigation Security*. The Applicant shall provide financial assurances to the BLM AO and CDFG with copies of the document(s) to the USFWS, to guarantee that an adequate level of funding is available to implement the mitigation measures described herein. These funds shall be used solely for implementation of the measures associated with the Project in the event the Applicant fails to comply with the requirements specified in this measure, or shall be returned to the Applicant upon successful compliance with the requirements in this measure. The BLM AO's or CDFG's use of the security to implement required measures may not fully satisfy the Applicant's obligations under this condition. Financial assurance can be provided to the BLM AO and CDFG in the form of an irrevocable letter of credit, a pledged savings account or another form of security ("Security"). Prior to submitting the Security to the BLM AO, the Applicant shall obtain the BLM AO's and CDFG's approval, in consultation with the USFWS, of the form of the Security. Security shall be provided in the amounts calculated as follows:						
i. land acquisition costs for compensation land, calculated at $500/acre.						
ii. initial protection and improvement activities on the compensation land, calculated at $330/acre.						
iii. Long term maintenance and management fee, calculated at $1,450 an acre.						
The amount of security shall be adjusted for any change in the Project footprints for each phase as described above.						
h. The Applicant may elect to fund the acquisition and initial improvement of compensation lands through NFWF by depositing funds for that purpose into NFWF's REAT Account. Initial deposits for this purpose must be made in the same amounts as the security required in 3.g., above, and may be provided in lieu of security. If this option is used for the acquisition and initial improvement, the Applicant shall make an additional deposit into the REAT Account if necessary to cover the actual acquisition costs and administrative costs and fees of the compensation land purchase once land is identified and the actual costs are known. If the actual costs for acquisition and administrative costs and fees are less than $500 an acre, the excess money deposited in the REAT Account shall be returned to the Applicant. Money						

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Wildlife (cont.)						
deposited for the initial protection and improvement of the compensation lands shall not be returned to the Applicant. The responsibility for acquisition of compensation lands may be delegated to a third party other than NFWF, such as a non-governmental organization supportive of desert habitat conservation, by written agreement of the BLM AO and CDFG. Such delegation shall be subject to approval by the BLM AO and CDFG, in consultation with the USFWS, prior to land acquisition, initial protection or maintenance and management activities. Agreements to delegate land acquisition to an approved third party, or to manage compensation lands, shall be implemented with 18 months of the BLM's approval.						
WIL-5: Raven Monitoring and Control Plan. The Applicant shall implement a Raven Monitoring and Control Plan that is consistent with the most current USFWS-approved raven management guidelines, and which meets the approval of the BLM AO in consultation with USFWS and CDFG. A raven management plan included in the Applicant's BA to BLM shall provide the basis for the final plan, subject to review, revisions and approval from the BLM AO, CDFG, and USFWS. The management plan shall include but not be limited to a program to monitor raven presence in the Project vicinity, determine if raven numbers are increasing, and to implement raven control measures as needed based on monitoring results. The purpose of the plan is to avoid any Project-related increases in raven numbers during construction, operation, and decommissioning. The Applicant shall also provide funding for implementation of the USFWS Regional Raven Management Program, as described below. 1. The Raven Plan shall: a. Identify conditions associated with the Project that might provide raven subsidies or attractants; b. Describe management practices to avoid or minimize conditions that might increase raven numbers and predatory activities; c. Describe control practices for ravens; d. Establish thresholds that would trigger implementation of control practices; e. Address monitoring and nest removal during construction and for the life of the Project, and; f. Discuss reporting requirements. 2. ***USFWS Regional Raven Management Program*:** The Applicant shall submit payment to the project sub-account of the REAT Account held by NFWF to support the USFWS Regional Raven Management Program. The one-time fee shall be as described in the cost allocation methodology or more current guidance as provided by USFWS or CDFG.	Prior to construction.	BLM, CDFG, and USFWS	Review and approve the Raven Monitoring and Control Plan. Ensure the collection of fees for the USFWS Regional Raven Management Program.			
WIL-6: Avian and Bat Protection Plan. The Applicant shall prepare and implement an Avian and Bat Protection Plan (sometimes referred to as "Bird and Bat Conservation Strategies") to monitor the death and injury of birds and bats from collisions with facility features such as transmission lines and tower structures (e.g., meteorological towers). The monitoring data shall be used to inform an adaptive management program that would avoid and minimize Project-related avian and bat impacts. The study design shall be approved by the BLM AO in consultation with CDFG and USFWS, and shall be incorporated into the Project's Biological Resources Mitigation, Implementation, and Monitoring Plan (BRMIMP; see Mitigation Measure VEG-2) and implemented. The applicant shall follow APLIC guidelines for avian protection on powerlines and shall use current guidelines to reduce bird mortality from collision and electrocution with powerlines. The APLIC (2006) and USFWS recommend the following:	Prior to operation.	BLM, CDFG, USFWS	Review and approve the Avian and Bat Protection Plan.			

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Wildlife (cont.)						
1. Provide 60-inch minimum horizontal separation between energized conductors or energized conductors and grounded hardware; 2. Insulate hardware or conductors against simultaneous contact if adequate spacing is not possible; 3. Use structure designs that minimize impacts to birds; and 4. Shield wires to minimize the effects from bird collisions.						
WIL-7: Pre-construction Nest Surveys. Pre-construction nest surveys shall be conducted if construction activities would begin from February 1 through July 31. The Designated Biologist or Biological Monitor conducting the surveys shall be experienced bird surveyors familiar with standard nest-locating techniques such as those described in Martin and Guepel (1993). The goal of the nesting surveys shall be to identify the general location of the nest sites, sufficient to establish a protective buffer zone around the potential nest site, and need not include identification of the precise nest locations. Surveyors performing nest surveys shall not concurrently be conducting desert tortoise surveys. The bird surveyors shall perform surveys in accordance with the following guidelines: 1. Surveys shall cover all potential nesting habitat areas that could be disturbed by each phase of construction. Surveys shall also include areas within 500 feet of the boundaries of the active construction areas (including linear facilities); 2. At least two pre-construction surveys shall be conducted, separated by a minimum 10-day interval. One of the surveys shall be conducted within a 14-day period preceding initiation of construction activity. Additional follow-up surveys may be required if periods of construction inactivity exceed 3 weeks, an interval during which birds may establish a nesting territory and initiate egg laying and incubation; 3. If active nests or suspected active nests are detected during the survey, a buffer zone (protected area surrounding the nest, the size of which is to be determined by the Designated Biologist in consultation with CDFG) and monitoring plan shall be developed. Nest locations shall be mapped and submitted, along with a report stating the survey results, to the BLM AO; and 4. The Designated Biologist shall monitor the nest until he or she determines that nestlings have fledged and dispersed; activities that might, in the opinion of the Designated Biologist, disturb nesting activities, shall be prohibited within the buffer zone until such a determination is made.	Prior to construction.	BLM, CDFG	Ensure the completion of required surveys to CDFG protocol standards.			
WIL-8: American Badger and Desert Kit Fox Protection. To avoid direct impacts to American badgers and desert kit fox, the Applicant shall implement the following measures: 1. ***Baseline Kit Fox Census and Population Health Survey:*** A qualified biologist with demonstrated mammal experience shall complete a baseline study of desert kit fox populations on the Project site and the anticipated dispersal areas from passive relocation at least 60 days prior to initiation of construction activities. The study shall characterize the demographics (e.g., size, structure, and distribution) of the kit fox population on the site and receiving areas. The Applicant shall coordinate with and fund studies by federal or State wildlife health officials [e.g., the CDFG Wildlife Investigations Lab (WIL)] to establish baseline health conditions. 2. ***Prepare Desert Kit Fox Management Plan*:** At least 45 days prior to construction, the Applicant shall submit a Desert Kit Fox Management Plan that: 1) incorporates baseline desert kit fox census and health survey findings into a cohesive management strategy that minimizes disease risk to kit fox populations; 2) specifically identifies preconstruction survey methods for kit foxes and large carnivores (e.g., badgers) in the Project area; 3) describes preconstruction and construction-phase passive relocation methods from the site, and; 4)	Prior to construction.	BLM, CDFG	Review and approve the Desert Kit Fox Management Plan.			

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Wildlife (cont.)						
coordinates survey findings prior to and during construction to meet the information needs of wildlife health officials in monitoring the health of kit fox populations. The Plan shall include contingency measures that would be performed if canine distemper were documented in the Project area possible dispersal areas adjacent to the Project site, and measures to address potential kit fox reoccupancy of the site (as documented at the Genesis site). The contents and requirements of the Plan shall be subject to review and approval by the BLM and CDFG. 3. ***Implement Desert Kit Fox Management Plan:*** If canine distemper is not identified in the Project area or relocation areas during baseline surveys, the mitigation strategy may utilize passive means or active means with appropriate CDFG authorization to relocate kit foxes from the site. The approach below assumes that canine distemper is not detected during baseline surveys. a. *Pre-Construction Surveys:* Biological Monitors shall conduct pre-construction surveys for desert kit fox and American badger no more than 30 days prior to initiation of construction activities. Surveys shall also consider the potential presence of dens within 100 feet of the project boundary (including utility corridors and access roads) and shall be performed for each phase of construction. If dens are detected each den shall then be further classified as inactive, potentially active, or definitely active. b. Inactive dens that would be directly impacted by construction activities shall be excavated by hand and backfilled to prevent reuse by badgers or kit fox. c. Potentially and definitely active dens that would be directly impacted by construction activities shall be monitored by the Biological Monitor for three consecutive nights using a tracking medium (such as diatomaceous earth or fire clay) and/or infrared camera stations at the entrance. d. If no tracks are observed in the tracking medium or no photos of the target species are captured after three nights, the den shall be excavated and backfilled by hand. e. If tracks are observed, the den shall be progressively blocked with natural materials (rocks, dirt, sticks, and vegetation piled in front of the entrance) for the next three to five nights to discourage the badger or kit fox from continued use. After verification that the den is unoccupied it shall then be excavated and backfilled by hand to ensure that no badgers or kit fox are trapped in the den. BLM approval may be required prior to release of badgers on public lands. f. If an active natal den (a den with pups) is detected on the site, the BLM AO and CDFG shall be contacted within 24 hours to determine the appropriate course of action to minimize the potential for animal harm or mortality. The course of action would depend on the age of the pups, location of the den on the site (e.g., is the den in a central area or in a perimeter location), status of the perimeter site fence (completed or not), and the pending construction activities proposed near the den. A 500-foot no-disturbance buffer shall be maintained around all active dens. g. The following measures are required to reduce the likelihood of distemper transmission: i. No pets shall be allowed on the site prior to or during construction, with the possible exception of vaccinated kit fox scat detection dogs during preconstruction surveys, and then only with prior CDFG approval; ii. Any sick or diseased kit fox, or documented kit fox mortality shall be reported to CDFG and the BLM AO within 8 hours of identification. If a dead kit fox is observed, it shall be collected and stored according to established protocols distributed by CDFG WIL, and the WIL contacted to determine carcass suitability for necropsy.						

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Wildlife (cont.)						
WIL-9: Burrowing Owl Protection and Mitigation. The Applicant shall implement the following measures to avoid, minimize and offset impacts to burrowing owls: 1. ***Pre-Construction Surveys*:** The Designated Biologist or Biological Monitor shall conduct pre-construction surveys for burrowing owls no more than 30 days prior to initiation of construction activities. Surveys shall be focused exclusively on detecting burrowing owls, and shall be conducted from two hours before sunset to one hour after or from one hour before to two hours after sunrise. The survey area shall include the Project Disturbance Area and surrounding 500-foot survey buffer for each phase of construction in accordance with VEG-13 (*Phasing*). 2. ***Implement Burrowing Owl Mitigation Plan*:** The Applicant shall prepare and implement a final Burrowing Owl Mitigation Plan. The Plan shall be approved by the BLM AO in consultation with USFWS and CDFG, and shall: a. identify suitable sites as close as possible to the Project site, and within 1 mile of the Project Disturbance Areas for creation or enhancement of burrows prior to passive relocation efforts; b. provide guidelines for creation or enhancement of at least two natural or artificial burrows per relocated owl; c. provide detailed methods and guidance for passive relocation of burrowing owls occurring within the Project disturbance area; and d. describe monitoring and management of the passive relocation effort, including the created or enhanced burrow location and the project area where burrowing owls were relocated from and provide a reporting plan. e. include the following elements related to artificial burrow relocation: i. A brief description of the project and project site pre-construction; ii. The mitigation measures that will be implemented; iii. Potential conflicting site uses or encumbrances; iv. A comparison of the occupied burrow site(s) and the artificial burrow site(s) (e.g., vegetation, habitat types, fossorial species use in the area, and other features); v. Artificial burrow(s) proximity to the project activities, roads and drainages; vi. Artificial burrow(s) proximity to other burrows and entrance exposure; Photographs of the site of the occupied burrow(s) and the artificial burrows; vii. Map of the project area that identifies the burrow(s) to be excluded as well as the proposed sites for the artificial burrows; viii. A brief description of the artificial burrow design; ix. Description of the monitoring that will take place during and after project implementation including information that will be provided in a monitoring report. x. A description of the frequency and type of burrow maintenance f. address the following elements related to the exclusion plan:	No more than 30 days prior to construction.	BLM, CDFG, USFWS	Ensure completion of preconstruction surveys and review and approve the Burrowing Owl Mitigation Plan. Ensure acquisition of mitigation for burrowing owl habitat.			

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Wildlife (cont.)						
i. Confirm by site surveillance that the burrow(s) is empty of burrowing owls and other species by use of a fiber-optic endoscope or comparable device; ii. Describe the type of scope and appropriate timing of scoping to avoid impacts; iii. Describe occupancy factors to look for and what will guide determination of vacancy and excavation timing (e.g., one-way doors should be left in place 48 hours to ensure burrowing owls have left the burrow before excavation, visited twice daily and monitored for evidence that owls are inside and can't escape); iv. Identify how the burrow(s) will be excavated (excavation using hand tools with refilling to prevent reoccupation is preferable whenever possible (may include using piping to stabilize the burrow to prevent collapsing until the entire burrow has been excavated and it can be determined that no owls reside inside the burrow); v. Describe removal of other potential owl burrow surrogates or refugia on site; Photographing the excavation and closure of the burrow to demonstrate success and sufficiency; vi. Describe required monitoring of the exclusion site to evaluate success and, if needed, to implement remedial measures to prevent subsequent owl use to avoid take; vii. Identify how the impacted site will continually be made inhospitable to burrowing owls and fossorial mammals (e.g., by allowing vegetation to grow tall, heavy disking, or immediate and continuous grading) until development is complete. 3. ***Implement Avoidance Measures*:** If an active burrowing owl burrow is detected within 500 feet from the Project disturbance area the following avoidance and minimization measures shall be implemented: a. *Establish Non-Disturbance Buffer*: Fencing shall be installed at a 250-foot radius from the occupied burrow to create a non-disturbance buffer around the burrow. The non-disturbance buffer and fence line may be reduced to 160 feet if all Project-related activities that might disturb burrowing owls would be conducted during the non-breeding season (September 1st through January 31st). Signs shall be posted in English and Spanish at the fence line indicating no entry or disturbance is permitted within the fenced buffer. b. *Monitoring*: If construction activities would occur within 500 feet of the occupied burrow during the nesting season (February 1 to August 31st) the Designated Biologist or Biological Monitor shall monitor to determine if these activities have potential to adversely affect nesting efforts, and shall make recommendations to minimize or avoid such disturbance. 4. ***Acquire Compensatory Burrowing Owl Habitat*:** Consistent with CDFG mitigation guidance (CBOC, 1993), the Applicant shall acquire, in fee or in easement, at least 45 acres of land suitable to support a resident population of burrowing owls and shall provide funding for the enhancement and long-term management of these compensation lands (based on three owl pairs and four unpaired owls observed during focused surveys and 6.5 acres per pair or individual bird; to be adjusted based on final survey findings). The responsibilities for acquisition and management of the compensation lands may be delegated by written agreement to CDFG or to a third party, such as a non-governmental organization dedicated to habitat conservation, subject to approval by the BLM AO, in consultation with CDFG prior to land acquisition or management activities. Additional funds shall be based on the adjusted market value of compensation lands at the time of construction to acquire and manage habitat.						

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Wildlife (cont.)						
a. *Criteria for Burrowing Owl Mitigation Lands*: The terms and conditions of this acquisition or easement shall be as described in Mitigation Measure WIL-4 [Desert Tortoise Compensatory Mitigation], with the additional criteria to include: 1) the 45 acres of mitigation land must provide suitable habitat for burrowing owls, and 2) the acquisition lands must either currently support burrowing owls or be no farther than 5 miles from an active burrowing owl nesting territory. The 45 acres of burrowing owl mitigation lands may be included with the desert tortoise mitigation lands ONLY if these two burrowing owl criteria are met. If the 45 acres of burrowing owl mitigation land is separate from the acreage required for desert tortoise compensation lands, the Applicant shall fulfill the requirements described below in this measure. b. *Security*: If the 19.5 acres of burrowing owl mitigation land is separate from the acreage required for desert tortoise compensation lands, the Applicant or an approved third party shall complete acquisition of the proposed compensation lands within the time period specified for this acquisition (see the verification section at the end of this measure). Alternatively, financial assurance can be provided by the Applicant to the BLM AO and CDFG, according to the measures outlined in Mitigation Measure WIL-4. These funds shall be used solely for implementation of the measures associated with the Project. Financial assurance can be provided to the BLM AO in the form of an irrevocable letter of credit, a pledged savings account, or another form of security ("Security") prior to initiating ground-disturbing Project activities. Prior to submittal, the Security shall be approved by the BLM AO in consultation with CDFG and the USFWS to ensure funding. The final amount due will be determined by an updated appraisal and PAR analysis conducted as described in Mitigation Measure WIL-4.						
WIL-10: Compensatory Mitigation for Mojave Fringe-toed Lizard Habitat Losses. To mitigate for permanent habitat loss and direct impacts to Mojave fringe-toed lizards the Applicant shall provide compensatory mitigation at a 3:1 ratio, which may include compensation lands purchased in fee or in easement in whole or in part, for impacts to stabilized or partially stabilized desert dune habitat (19 acres x 3 = 57.0 acres); or the three times (3X) the acreage of sand dune/partially stabilized sand dune habitat permanently impacted by the final Project footprint, whichever is greater). If compensation lands are acquired, the Applicant shall provide funding for the acquisition in fee title or in easement, initial habitat improvements and long-term maintenance and management of the compensation lands. 1. ***Criteria for Compensation Lands*:** The compensation lands selected for acquisition shall: a. Be sand dune or partially stabilized sand dune habitat within the McCoy Valley or Chuckwalla Valley with potential to contribute to Mojave fringe-toed lizard habitat connectivity and build linkages between known populations of Mojave fringe-toed lizards and preserve lands with suitable habitat; b. To the extent feasible, be connected to lands currently occupied by Mojave fringe-toed lizard; c. To the extent feasible, be near larger blocks of lands that are either already protected or planned for protection, or which could feasibly be protected long-term by a public resource agency or a non-governmental organization dedicated to habitat preservation; d. Provide quality habitat for Mojave fringe-toed lizard, that has the capacity to regenerate naturally when disturbances are removed; e. Not have a history of intensive recreational use or other disturbance that might make habitat recovery and restoration infeasible; f. Not be characterized by high densities of invasive species, either on or immediately adjacent to the parcels under consideration, that might jeopardize habitat recovery and restoration;	Prior to operation.	BLM, CDFG, USFWS	Ensure compensatory mitigation is acquired.			

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Wildlife (cont.)						
g. Not contain hazardous wastes that cannot be removed to the extent the site is suitable for habitat; h. Not be subject to property constraints (i.e. mineral leases, cultural resources); and i. Be on land for which long-term management is feasible. 2. ***Security for Implementation of Mitigation*:** The Applicant shall provide financial assurances to the BLM AO to guarantee that an adequate level of funding is available to implement the acquisitions and enhancement of Mojave fringe-toed lizard habitat as described in this measure. These funds shall be used solely for implementation of the measures associated with the Project. Financial assurance can be provided to the BLM AO according to the measures outlined in Mitigation Measure WIL-4. The final amount due will be determined by an updated appraisal and a PAR analysis conducted as described in Mitigation Measure WIL-4. 3. ***Preparation of Management Plan*:** The Applicant shall submit to the BLM AO, CDFG and USFWS a draft Management Plan that reflects site-specific enhancement measures for the Mojave fringe-toed lizard habitat on the acquired compensation lands. The objective of the Management Plan shall be to enhance the value of the compensation lands for Mojave fringe-toed lizards, and may include enhancement actions such as weed control, fencing to exclude livestock, erosion control, or protection of sand sources or sand transport corridors.						
WIL-11: [Removed from FEIS]						
WIL-12. Measures to Minimize Impacts to Golden Eagles. The Applicant shall implement the following measures to avoid or minimize Project-related construction impacts to golden eagles during initial Project construction and again prior to Project decommissioning. 1. ***Annual Inventory During Construction*:** For each calendar year during which construction will occur an inventory shall be conducted to determine if golden eagle territories occur within one mile of the Project boundaries. Survey methods for the inventory shall be as described in the *Interim Golden Eagle Inventory and Monitoring Protocols; and Other Recommendations* (Pagel et al., 2010) or more current guidance from the USFWS. 2. ***Inventory Data*:** Data collected during the inventory shall include at least the following: territory status (unknown, vacant, occupied, breeding successful, breeding unsuccessful); nest location, nest elevation; age class of golden eagles observed; nesting chronology; number of young at each visit; digital photographs; and substrate upon which nest is placed. 3. ***Determination of Unoccupied Territory Status*:** A nesting territory or inventoried habitat shall be considered unoccupied by golden eagles ONLY after completing at least 2 full surveys in a single breeding season. In circumstances where ground observation occurs rather than aerial surveys, at least 2 ground observation periods lasting at least 4 hours or more are necessary to designate an inventoried habitat or territory as unoccupied as long as all potential nest sites and alternate nests are visible and monitored. These observation periods shall be at least 30 days apart for an inventory, and at least 30 days apart for monitoring of known territories. 4. ***Monitoring and Adaptive Management Plan*:** If an occupied nest[4] is detected within 1 mile of the Project boundaries, the Applicant shall prepare and implement a Golden Eagle Monitoring and Management Plan for	Prior to construction and decommissioning.	USFWS	Ensure completion of surveys for Golden Eagles pursuant to USFWS survey methods. Ensure collection of data and review and approve a Golden Eagle Monitoring and Management Plan			

[4] An occupied nest is one used for breeding by a pair of golden eagles in the current year. Presence of an adult, eggs, or young, freshly molted feathers or plucked down, or current years' mutes (whitewash) also indicate site occupancy. Additionally, all breeding sites within a breeding territory are deemed occupied while raptors are demonstrating pair bonding activities and developing an affinity to a given area. If this culminates in an individual nest being selected for use by a breeding pair, then the other nests in the nesting territory will no longer be considered occupied for the current breeding season. A nest site is considered occupied throughout the periods of initial courtship and pair-bonding, egg laying, incubation, brooding, fledging, and post-fledging dependency of the young.

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Wildlife (cont.)						
the duration of construction to ensure that Project construction activities do not result in injury or disturbance to golden eagles. The monitoring methods shall be consistent with those described in the *Interim Golden Eagle Inventory and Monitoring Protocols; and Other Recommendations* (Pagel et al., 2010) or more current guidance from the USFWS. The Monitoring and Management Plan shall be prepared in consultation with the USFWS. Triggers for adaptive management shall include any evidence of Project-related disturbance to nesting golden eagles, including but not limited to: agitation behavior (displacement, avoidance, and defense), increased vigilance behavior at nest sites, changes in foraging and feeding behavior, or nest site abandonment. The Monitoring and Management Plan shall include a description of adaptive management actions, which shall include, but not be limited to, cessation of construction activities that are deemed by the Designated Biologist to be the source of golden eagle disturbance.						
WIL-13: Measures to Minimize Wildlife Impacts from Evaporation Ponds. The Applicant shall cover the evaporation ponds prior to any discharge with 1.5-inch mesh netting designed to exclude birds and other wildlife from drinking or landing on the water of the ponds. Netting with mesh sizes other than 1.5 inches may be installed if approved by the BLM AO in consultation with CDFG and USFWS. The netted ponds shall be monitored regularly to verify that the netting remains intact, is fulfilling its function in excluding birds and other wildlife from the ponds, and does not pose an entanglement threat to birds and other wildlife. The ponds shall include a visual deterrent in addition to the netting, and the pond shall be designed such that the netting shall never contact the water. Monitoring of the evaporation ponds shall include the following: 1. ***Monthly Monitoring*:** The Designated Biologist or Biological Monitor shall regularly survey the ponds at least once per month starting with the first month of operation of the evaporation ponds. The purpose of the surveys shall be to determine if the netted ponds are effective in excluding birds, if the nets pose an entrapment hazard to birds and wildlife, and to assess the structural integrity of the nets. The monthly surveys shall be conducted in 1 day for a minimum of 2 hours following sunrise (i.e., dawn), a minimum of 1 hour mid-day (i.e., 11:00 to 13:00), and a minimum of 2 hours preceding sunset (i.e., dusk) in order to provide an accurate assessment of bird and wildlife use of the ponds during all seasons. Surveyors shall be experienced with bird identification and survey techniques. Operations staff at the Project site shall also report finding any dead birds or other wildlife at the evaporation ponds to the Designated Biologist within one day of the detection of the carcass. The Designated Biologists shall report any bird or other wildlife deaths or entanglements within two days of the discovery to the BLM AO, CDFG, and USFWS. 2. ***Dead or Entangled Birds*:** If dead or entangled birds are detected, the Designated Biologist shall take immediate action to correct the source of mortality or entanglement. The Designated Biologist shall make immediate efforts to contact and consult the CPM, CDFG, and USFWS by phone and electronic communications prior to taking remedial action upon detection of the problem, but the inability to reach these parties shall not delay taking action that would, in the judgment of the Designated Biologist, prevent further mortality of birds or other wildlife at the evaporation ponds. 3. ***Quarterly Monitoring*:** If after 12 consecutive monthly site visits no bird or wildlife deaths or entanglements are detected at the evaporation ponds by or reported to the Designated Biologist, monitoring can be reduced to quarterly visits. 4. ***Biannual Monitoring*:** If after 12 consecutive quarterly site visits no bird or wildlife deaths or entanglements are detected by or reported to the Designated Biologist and with approval from the BLM AO, USFWS and CDFG, future surveys may be reduced to two surveys per year, during the spring nesting season and during fall migration. If approved by the BLM AO, USFWS and CDFG, monitoring outside the nesting season may be conducted by the Environmental Compliance Manager.	Throughout pond operation	BLM, CDFG, USFWS	Retain and schedule Designated Biologist and Biological Monitor Cover the evaporation ponds prior to any discharge			

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Biological Resources – Wildlife (cont.)						
5. ***Modification of Monitoring Program*:** Without respect to the above requirements the Applicant, CDFG or USFWS may submit to the BLM AO a request for modifications to the evaporation pond monitoring program based on information acquired during monitoring, and may also suggest adaptive management measures to remedy any problems that are detected during monitoring or modifications if bird impacts are not observed. Modifications to the evaporation pond monitoring described above and implementation of adaptive management measures shall be made only after approval from the BLM AO, in consultation with USFWS and CDFG.						
WIL-14: [Removed from FEIS]						
WIL-15: In-Lieu Fees to Satisfy Compensation Requirements. The Applicant may choose to satisfy its mitigation obligations by paying an in-lieu fee instead of acquiring compensation lands, pursuant to California Fish and Game Code §§2069 and 2099 or any other applicable in-lieu fee provision, to the extent the in-lieu fee provision is found by the Fish and Game Commission to mitigate the impacts identified herein.	Prior to operation.	CDFG	Ensure payment of in-lieu fees, if required.			
Cultural Resources						
CUL-1: The BLM's execution of an MOA for the proposed undertaking in accordance with the requirements of §106 of the NHPA will lead to avoidance, minimization, or mitigation of potential adverse effects to historic properties. The BLM shall prepare the MOA in consultation with the ACHP, SHPO, the Applicant, Riverside County, Indian tribes, and other identified consulting parties. The MOA will be binding on the Applicant and the proposed undertaking. An executed MOA represents the BLM's completion of the NHPA §106 process. The MOA must be executed prior to the ROD. The MOA will contain measures to avoid, minimize, and mitigate adverse effects to historic properties and detail the process for activities to proceed in areas where historic properties are not now known to exist; procedures for treatment of unanticipated effects and post-review discoveries; recognition that BLM will comply with NAGPRA; compliance monitoring; dispute resolution; and tribal participation. Resolution of adverse effects to historic properties will be developed in consultation and may include research and documentation, data recovery excavations, curation, public interpretation, or use or creation of historic contexts. In addition, a HPTP shall be prepared, appended to the MOA, and implemented and shall contain procedures to avoid, minimize, and mitigate effects to historic properties, and could include measures similar to the following: a. On the basis of preliminary CRHR eligibility assessments, NRHP eligibility assessments, or existing NRHP eligibility determinations, the BLM may require the relocation of project components to avoid or reduce damage to cultural resource values. Where operationally feasible, potentially NRHP- or CRHR-eligible resources shall be protected from direct project impacts by project redesign within previously surveyed and analyzed areas. b. Where CRHR- or NRHP-eligible or -listed historic properties cannot be protected from direct effects by project redesign, the Applicant shall comply with appropriate mitigative treatment(s) that will be detailed in the HPTP. c. All CRHR-listed or eligible cultural resources and all NRHP-listed, eligible, and unevaluated cultural resources being treated as eligible (as determined by the BLM) that will not be affected by direct impacts, but are within 50 feet of project construction activities, shall be monitored by a qualified archaeologist. Protective fencing or other markers, at the BLM's discretion, shall be erected and maintained to protect these resources from inadvertent trespass for the duration of construction in the vicinity.	MOA executed prior to ROD.	BLM	Adhere to MOA during all phases of construction Comply with project component relocation requirements Comply with mitigative treatment(s) Retain and schedule archaeological monitor(s) during construction Retain and schedule all required tribal cultural consultants Develop and implement a Long Term Management Plan			

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Cultural Resources						
d. The HPTP shall contain a research design and a scope of work for evaluation of cultural resources and for data recovery or additional treatment of NRHP-listed or -eligible sites that cannot be avoided. Additional treatment for resources could include sample excavation and/or surface artifact collection, site documentation, curation, public interpretation, or use or creation of historic contexts. Additional content of the treatment plan will be dictated by the consultations associated with the development of the MOA. e. Construction work within 100 feet of historic properties that require data-recovery fieldwork shall not begin until authorized by the BLM. f. Archaeological monitoring shall be conducted by qualified archaeologists familiar with the types of historical and prehistoric resources that could be encountered within the project area, and under direct supervision of a principal archaeologist. All supervisory cultural resources personnel will be approved by the BLM through the agency's Cultural Resource Use Permitting process. A tribal cultural consultant may be required at culturally sensitive locations specified by the BLM following government-to-government consultation with Indian tribes. The HPTP shall indicate the locations where tribal cultural consultants may be required. The Applicant shall retain and schedule any required tribal cultural consultants. g. In the event of unanticipated effects or post-review discoveries during construction, operation and maintenance, or decommissioning, procedures outlined in the MOA shall be adhered to. At a minimum, this shall include stop work orders in the vicinity of the find, recordation and evaluation of the find by a qualified archaeologist, notification of the find to BLM, and appropriate treatment measures, possibly including data recovery or avoidance. h. The Applicant shall develop and implement a Long Term Management Plan for post-construction monitoring and condition assessment of sites in the APE which could be subject to impacts from project operation and maintenance activities.						
Geology and Soils Resources						
MM GEO-1: Conduct geotechnical studies to assess soil characteristics and aid in appropriate foundation design. The Applicant and/or its contractor shall perform a design-level geotechnical study that includes subsurface exploration and material testing necessary to determine the CBC seismic design category and site soil class for which each of the Project components must be designed. The geotechnical study shall identify the presence, if any, of potentially adverse soil conditions such as liquefiable soils, expansive soils, corrosive soils, and soils that may settle or experience hydrocompaction. Based on the nature, location and severity of adverse soil conditions, the geotechnical study shall recommend appropriate and feasible design features necessary to reduce the potential for liquefiable, expansive, corrosive or collapsible soils to adversely affect MSEP facilities. Such measures might include use of corrosion-resistant materials and coatings; use of non-corrosive, non-expansive backfills; use of cathodic protection systems; soil-treatment processes; redirection of surface water and drainage away from expansive foundation soils; and/or any other combination of soil preparation methods or foundation designs necessary to avoid or reduce the adverse affects of soils on Project structures. Studies shall be carried out by a registered geologist or certified geotechnical engineer, and shall conform to industry standards of care and ASTM standards for field and laboratory testing. For completeness and direct correlation to the Proposed Action, the Applicant shall provide the geotechnical consultant with the most recent copy of the project case exhibit (tract map, parcel map, plot plan, etc.) for incorporation into the report. Furthermore, the consultant shall plot all appropriate geologic and geotechnical data on this case exhibit and include it as an appendix/figure/plate in their report. Study results and proposed solutions shall be provided for review and approval to the BLM at least 60 days before final Project design.	Study results and proposed solutions shall be provided for review and approval to the BLM at least 60 days before final Project design	BLM	Conduct geotechnical studies to assess soil characteristics and aid in appropriate foundation design			

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Greenhouse Gas Emissions and Global Climate Change						
MM GHG-1: All SF_6-containing circuit breakers that will be installed for each power unit shall be hermetically sealed.	During construction	BLM	Hermetically seal all of the SF_6-containing circuit breakers that will be installed for each power unit			
MM CLIMATE-1: In order to ensure that on site facilities are protected from increased intensity stormwater flows and flood flows that could occur as a result of climate change, the application of Mitigation Measures WATER-2, WATER-3, and WATER-4 shall account for potential increases in flows associated with the indirect effects of climate change. Specifically, the proposed mitigation measures shall require implemented design features and management practices that account for a climate-related increase in potential maximum flow volumes of at least 20 percent. All flood control and stormwater management facilities shall be designed accordingly.	During construction	BLM	Implement design features and management practices that account for a climate-related increase in potential maximum flow volumes of at least 20 percent			
Hazards and Hazardous Materials						
MM HAZ-1: The Applicant shall prepare and implement a site-specific Hazardous Materials Safety Plan. The plan shall identify the chemicals potentially present in on-site soils, health and safety hazards associated with those chemicals, monitoring to be performed during site activities, soil handling methods required to minimize the potential for harmful exposures, appropriate personal protective equipment, and emergency response procedures. The Plan shall be included in and implemented as part of the Project's larger Safety and Health Program. The plan shall be submitted to the BLM for approval prior to commencement of construction activities and shall be distributed to all construction crew members prior to construction and operation of the Project.	Prior to construction	BLM	Develop and implement a site-specific Hazardous Materials Safety Plan			
MM HAZ-2: Broken PV Module Detection and Handling Plan. If photovoltaic (PV) panels containing cadmium telluride (CdTe) are used on the Project site, the Applicant shall prepare and implement a Broken PV Module Detection and Handling Plan. The plan shall describe the Applicant's plan for identifying and handling photovoltaic (PV) modules that may break, chip, or crack at some point during the Project's life cycle. The plan shall describe and define methods for detecting and handling broken PV modules to ensure the safe handling, storage, transport, and recycling and/or disposal of the modules and related electrical components in a manner that is compliant with applicable law and protective of human health and the environment. The plan shall be submitted to the BLM for approval prior to commencement of construction activities and shall be distributed to all construction crew members and temporary and permanent employees prior to construction and operation of the Project.	Prior to construction	BLM	Develop and implement a Broken PV Module Detection and Handling Plan			
Paleontological Resources						
APM Paleo-1. To address potential paleontological impacts during the pre-construction phase: a. Prior to the start of any Project-related construction (defined as construction-related vegetation clearing, ground disturbance and preparation, and site excavation activities), the project owner shall ensure that a qualified paleontologist is available for field activities and is prepared to implement the conditions of approval. The qualified paleontologist shall be responsible for implementing all the paleontological conditions of approval and for using qualified personnel to assist in this work.	Prior to construction	BLM	Prior to construction a qualified paleontologist shall: • Be responsible for implementing all of the paleontological conditions of approval			

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Paleontological Resources (cont.)						
b. Prior to the start of construction, the qualified paleontologist shall prepare a worker's environmental awareness training program. The paleontological training program shall address the potential to encounter paleontological resources in the field, the sensitivity and importance of these resources, and the legal obligations to preserve and protect such resources. The training program shall also include the set of reporting procedures that workers are to follow if paleontological resources are encountered during Project activities. The training program shall be presented by a qualified paleontologist and may be combined with other training programs prepared for cultural and biological resources, hazardous materials, or any other areas of interest or concern.			• prepare a worker's environmental awareness training program			
APM Paleo-2. To address potential paleontological impacts during the construction phase: a. The qualified paleontologist or paleontological monitor shall be present at all times he or she deems appropriate to monitor construction-related grading, excavation, trenching, and/or augering in areas with a significant potential for fossil-bearing sediments to occur. All ground-disturbing activities in areas determined to have a high sensitivity shall be monitored on a full-time basis at the start of the Project. All ground disturbances in areas determined to have low to high sensitivity at depths of 1.5 m (5 feet) or greater shall also require monitoring on a full-time basis, initially. If no significant fossils are found, then the frequency of monitoring shall be adjusted at the discretion of the qualified paleontologist after an adequate amount of time is spent observing the geologic deposits in the project area. No monitoring is required in areas determined to have a low sensitivity. b. Paleontological monitoring will include inspection of exposed rock units and collection of matrix to be tested for the presence of microscopic fossils. Paleontological monitors will have authority to temporarily divert excavations or drilling away from exposed fossils in order to efficiently and professionally recover the fossil specimens and collect associated data. Any paleontological fieldwork occurring on lands administered by the BLM would require a Paleontological Resources Use Permit issued by the BLM state office.	During construction	BLM	During construction a qualified paleontologist shall: • Monitor construction related grading, trenching, and/or augering • Inspect exposed rock and collection of a matrix to be tested for the presence of microscopic fossils			
APM Paleo-3. To address potential paleontological impacts during the post- construction phase: The Project owner shall ensure preparation of a paleontological resources monitoring report by the qualified paleontologist. The report shall be completed following the analysis of any recovered fossil materials and related information. The report shall include, but not be limited to, a description and inventory list of recovered fossil materials (if any); a map showing the location of paleontological resources found in the field; determinations of scientific significance; and a statement by the qualified paleontologist that project impacts to paleontological resources have been mitigated.	During post-construction	BLM	During the post-construction phase a qualified paleontologist shall prepare a paleontological resources report.			
Recreation and Public Access						
MM REC-1: The Applicant shall prepare and distribute interpretive materials, including a construction schedule and safety information regarding trucks and other heavy equipment on local roads, to users of the Midland, Mule Mountains, and La Posa LTVAs, Wiley's Well and Coon Hollow Campgrounds, and BLM kiosks announcing the development of the solar facilities at the Project site and the permanent closure of approximately 4,300 acres of public land to recreational use. The Applicant shall prepare a one-page fact sheet about the Project and submit it to the PSSCFO for review. The BLM AO shall approve the draft materials prior to distribution.	Prior to construction	BLM	Prepare and distribute interpretive materials, including a construction schedule and safety information			

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Recreation and Public Access (cont.)						
MM REC-2: No less than 15 days prior to construction, the Applicant shall coordinate construction activities and the Project construction schedule with the AO for the recreation areas impacted. The Applicant shall schedule construction activities to avoid heavy recreational use periods in coordination with and at the discretion of the AO. The Applicant shall locate construction equipment to avoid temporary preclusion of recreation areas in accordance with the recommendation of the AO. The Applicant shall document its coordination efforts with the AO and provide this documentation to the Lead Agencies and affected jurisdictions at least 30 days prior to construction.	Begin coordination no less than 60 days prior to construction and provide documentation of the coordination effort to the Lead Agencies and affected jurisdictions at least 30 days prior to construction.	BLM	Coordinate construction activities and the Project construction schedule with the AO for the recreation areas impacted			
MM REC-3: No less than 60 days prior to construction, the Applicant shall coordinate with the AO administering any NECO Plan-designated open routes to establish temporary closure of the routes to avoid construction area hazards, if the route is deemed unsafe to use during construction. The Applicant shall post a public notice of the temporary route closure and penalties for any off-route OHV activities. The Applicant shall document its coordination efforts with the AO and submit this documentation to the BLM and other agencies affected at least 30 days prior to construction.	Begin coordination no less than 60 days prior to construction and provide documentation of the coordination effort to the Lead Agencies and affected jurisdictions at least 30 days prior to construction.	BLM	Coordinate with the AO administering any NECO Plan-designated open routes to establish temporary closure of the routes to avoid construction area hazards			
MM REC-4: The Applicant shall encourage Project workers to utilize local housing or private RV parks in Blythe and/or nearby communities.	Prior to and during construction	BLM	Encourage Project workers to utilize local housing or private RV parks			
MM REC-5: The BLM may require the Applicant to reestablish north/south OHV connectivity to the west side of the Big Maria Wilderness Area and to the northeast side of the Palen-McCoy Wilderness Area. The Applicant may choose to allow continuous public access along the previously designed open route (Black Rock Road) while providing for separate site security to the solar facilities.		BLM	Reestablish north/south OHV connectivity to the west side of the Big Maria Wilderness Area and to the northeast side of the Palen-McCoy Wilderness Area			

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Special Designations and Lands with Wilderness Characteristics						
MM LWC-1: Wilderness Characteristics Mitigation Plan. Prior to issuance of a Notice to Proceed in those areas of in Unit 2 of the MSEP having wilderness characteristics, the Applicant shall prepare a proposal to mitigate for the loss of approximately 1,089 acres of lands with wilderness characteristics that would result from the construction of Unit 2. On-site mitigation is infeasible. Therefore, the mitigation plan shall be focused in the Big Maria Mountains and Palen-McCoy Wilderness Areas, which are the closest designated wilderness areas to the project. Mitigation may be implemented in either of these areas or a combination of them and may include: 1. Removal and restoration of approximately 15 miles of unauthorized vehicle routes; 2. Conversion of approximately 3 miles of vehicle route into a hiking trail; 3. Installation of vehicle barriers and signing along publicly accessible portions of the wilderness boundaries; and/or 4. Development of a visitor education and information program aimed at reducing illegal vehicle access into the areas.	Prior to issuance of a Notice to Proceed for Unit 2	BLM	Prepare and implement a proposal to mitigate impacts to LWCs.			
Transportation and Traffic						
APM TRANS-1: To minimize the potential for any peak a.m. or p.m. work day delays associated with the Mesa Drive, Black Rock Road, and Hobson Way intersections: The Applicant would reduce the number of vehicles on these approaches by splitting construction crews with staggered start times to reduce peak arrivals by about half; encouraging carpooling by workers; and scheduling Project deliveries and truck trips for off-peak hours in order to avoid interference with the peak on-site worker a.m. and p.m. commute	During construction	BLM	The applicant shall reduce traffic by: • Staggering worker start times • Encouraging carpooling • Scheduling deliveries during off peak hours			
MM TRN-1: The Applicant and/or its contractor shall prepare and implement a traffic control plan to reduce construction- and decommissioning-related traffic impacts on the roadways at, and near the work site, as well as to reduce potential traffic safety hazards and ensure adequate access for emergency responders. The Applicant and/or its contractor shall coordinate development and implementation of this plan with the BLM and other jurisdictional agencies (e.g., Riverside County, City of Blythe, and Caltrans), as appropriate. To the extent applicable, the traffic control plan shall conform to Part 6 (Temporary Traffic Control) of the *California Manual on Uniform Traffic Control Devices* (Caltrans, 2010), and shall include, but not be limited to, the following elements: 1. Implementing circulation and detour plans to minimize impacts on local road circulation during temporary lane closures. Flaggers and/or signage shall be used to guide vehicles through and/or around the work zone. 2. Identifying truck routes designated by Riverside County and local jurisdictions. Haul routes that minimize truck traffic on local roadways shall be utilized to the extent possible. 3. Providing sufficient-sized staging areas for trucks accessing work zones to minimize disruption of access to adjacent public right-of-ways. 4. Controlling and monitoring worker vehicle movement through the enforcement of standard construction specifications by on-site inspectors.	Prior to construction	BLM and other jurisdictional agencies	Develop and implement a Traffic Control Plan			

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Transportation and Traffic (cont.)						
5. Scheduling truck trips outside the peak morning and evening commute hours to the extent possible. 6. Limiting the duration of lane closures to the extent possible. 7. Storing all equipment and materials in designated contractor staging areas on or adjacent to the worksite, such that traffic obstruction is minimized. 8. Implementing roadside safety protocols. Advance "Road Work Ahead" warning and speed control signs (including those informing drivers of state-legislated double fines for speed infractions in a work zone) shall be posted to reduce speeds and provide safe traffic flow through the work zone. 9. Providing advance notification to administrators of police and fire stations (including fire protection agencies), ambulance service providers, and recreational facility managers of the timing, location, and duration of construction and decommissioning activities and the locations of detours and lane closures, where applicable. Maintain access for emergency vehicles within, and/or adjacent to, roadways affected by construction and decommissioning activities at all times. **10.** Repairing and restoring adversely affected roadway pavements to their pre-construction condition.						
MM TRN-2: Prior to construction, the Applicant shall develop a Coordinated Transportation Management Plan and work with the BLM and Riverside County to prepare and implement a transportation management plan for roadways adjacent to and directly affected by the planned Project facilities, and to address the transportation impact of the multiple overlapping construction projects within the vicinity of the Project in the region. The transportation management plan shall include, but not be limited to, the following requirements: 1. Coordination of individual traffic control plans for Project and nearby projects. 2. Coordination between the contractor and Riverside County in developing circulation and detour plans that include safety features (e.g., signage and flaggers). The circulation and detour plans shall address: a. Full and partial roadways closures; b. Circulation and detour plans to include the use of signage and flagging to guide vehicles through and/or around the construction zone, as well as any temporary traffic control devices; c. Bicycle detour plans, where applicable; d. Parking along arterial and local roadways; and e. Haul routes for construction trucks and staging areas for instances when multiple trucks arrive at the work sites. 3. Protocols for updating the transportation management plan to account for delays or changes in the schedules of individual projects.	Prior to construction	BLM and Riverside County	Develop and implement a Coordinated Transportation Management Plan			
Utilities						
MM UTILITIES-1: In order to ensure that the selected reverse osmosis brine disposal method would not conflict with Colorado River RWQCB requirements or policies, the Applicant shall not use brine as a land-applied dust suppressant or apply brine to the ground for any other purpose.	During construction	BLM	Refrain from using brine as a land-applied dust suppressant or apply brine to the ground for any other purpose.			

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Visual Resources						
MM VIS-1: Project Design, Building and Structural Materials. Visual design elements shall be integrated into the construction plans, details, shop drawings and specifications; these shall include, but not be limited to, grubbing and clearing, vegetation thinning and clearing, grading, revegetation, drainage, and structural plans. Visual design elements within the plans shall be measureable and monitored while under construction, while operational, and when decommissioned. The plans shall include a monitoring and compliance plan that establishes the monitoring requirements and thresholds for acceptable performance. A careful study of the site shall be performed to identify appropriate colors and textures for materials; both summer and winter appearance shall be considered as well as seasons of peak visitor use (September 15 to April 15). Visual design elements to be integrated into construction plans, details, shop drawings and specifications must at a minimum include: 1. Vegetation and ground disturbance associated with access road construction, gen-tie and distribution line installations, and the perimeter access road shall be minimized and take advantage of existing clearings wherever feasible. 2. Along all off-site access roads, all off-site gen-tie and distribution line corridors, and all internal access roads 16 feet or wider, graveled surfaces, areas to be permanently cleared of vegetation, and (if applicable) cut slopes shall be treated with rock stains or other color treatment appropriate with the surrounding landscape. 3. Openings in vegetation for facilities, structures, roads, and gen-tie line monopoles (and/or H-frames), shall be feathered and shaped to repeat the size, shape, and characteristics of naturally occurring openings. 4. The backs or non-energy gathering side of the solar panels shall be color-treated to reduce visual contrast with the landscape setting. Since not all of the panels are visible outside the project footprint, the exact number and location of panels that will require color treatment shall be determined prior to installation. 5. Security fencing shall be coated with black poly-vinyl or other visual contrast reducing color. 6. Materials, coatings, or paints having little or no reflectivity shall be used whenever possible. 7. Grouped structures, including the water tanks and prefabricated buildings, shall be painted the same color to reduce visual complexity and color contrast. 8. The gen-tie line and the distribution line shall utilize nonspecular conductors and nonreflective coatings on insulators. 9. The choice of color treatments shall be based on the appearance at typical viewing distances and consider the entire landscape around the proposed development as it would be viewed from publically accessible locations. Appropriate colors for smooth surfaces often need to be two to three shades darker than the background color to compensate for shadows that darken most textured natural surfaces. Choice of colors shall be made from the BLM Standard Environmental Color Chart CC-001 in consultation with a BLM landscape architect or other designated visual resource specialist. 10. A lighting plan shall be prepared that documents how lighting will be designed and installed to minimize night-sky impacts during facility construction and operations. Lighting for facilities should not exceed the minimum number of lights and brightness required for safety and security, and should not cause excessive reflected glare. Low-pressure sodium light sources should be used to reduce light pollution. Full cut-off luminaires should be used to minimize uplighting. Lights should be directed downward or toward the area to be illuminated. Light fixtures should not spill light beyond the project boundary. Lights in highly illuminated areas that are not occupied on a continuous basis should have switches, timer switches, or motion detectors so that the lights operate only when the area is occupied. Where feasible, vehicle mounted lights should be used for night maintenance activities. Wherever feasible, consistent with safety and security, lighting should be kept off when not in use. The lighting plan should include a process for promptly addressing and mitigating complaints about potential lighting impacts.	Prior to construction	BLM	• Integrate visual design elements into the construction plans, details, shop drawings and specifications • Develop and implement a monitoring and compliance plan for integrating the visual design elements			

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Visual Resources (cont.)						
MM VIS-2: Construction Phase Visual Mitigation. A pre-construction meeting with BLM landscape architects or other designated visual/scenic resource specialists shall be held before construction begins to coordinate on the VRM mitigation strategy and confirm the compliance-checking schedule and procedures. Final design and construction documents will be reviewed for completeness with regard to the visual mitigation elements, assuring that requirements and commitments are adequately addressed. The construction documents shall include, but not be limited to grading, drainage, revegetation, vegetation clearing, and feathering plans, and must demonstrate how VRM objectives will be met, monitored, and measured for conformance. Specific measures shall include the following: 1. The Applicant shall reduce visual impacts during construction by clearly delineating construction boundaries and minimizing areas of surface disturbance; preserving existing, native vegetation to the extent feasible; utilizing undulating surface-disturbance edges; stripping, salvaging, and replacing topsoil; using contoured grading; controlling erosion; using dust suppression techniques; and restoring exposed soils to their original contour and vegetation. 2. Visual impact mitigation objectives and activities shall be discussed with equipment operators before construction activities begin. 3. Existing rocks, vegetation, and drainage patterns shall be preserved to the extent feasible. 4. Brush-beating or mowing or using protective surface matting rather than removing vegetation shall be employed where feasible. 5. Slash from vegetation removal shall be mulched and spread to cover fresh soil disturbances as part of the revegetation plan. Slash piles shall not be left in sensitive viewing areas. 6. The visual color contrast of graveled surfaces shall be reduced with approved color treatment practices. 7. No paint or permanent discoloring agents shall be applied to rocks or vegetation to indicate surveyor construction activity limits. 8. All stakes and flagging shall be removed from the construction area and disposed of in an approved facility.	Prior to construction	BLM	• Develop a VRM mitigation strategy • Include grading, drainage, revegetation, vegetation clearing, and feathering plans in the construction documents • demonstrate how VRM objectives will be met, monitored, and measured for conformance in the construction documents			
MM VIS-3: Operation and Maintenance Phase Visual Mitigation. Terms and conditions for VRM mitigation compliance should be maintained and monitored for compliance with visual objectives, adaptive management adjustments, and modifications as necessary and approved by the BLM landscape architect or other designated visual/scenic resource specialist. Minimum measures are as follows: 1. The Applicant shall maintain revegetated surfaces until a self sustaining stand of vegetation is re-established and visually adapted to the undisturbed surrounding vegetation. No new disturbance shall be created during operations without completion of a VRM analysis and approval by the AO. 2. Interim restoration shall be undertaken during the operating life of the Project as soon as possible after disturbances. 3. Painted facilities shall be kept in good repair and repainted when color fades or flakes. 4. Color-treated solar panel backs/supports shall be kept in good repair, and retreated when color fades and/or flakes.	During operation	BLM	Maintain and monitor compliance with the visual objectives, adaptive management adjustments, and modifications approved by the BLM landscape architect or other designated visual/scenic resource specialist			

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Visual Resources (cont.)						
MM VIS-4: Decommissioning and Site Reclamation Plan. A Decommissioning and Site Reclamation Plan, covering visual impact mitigation measures, shall be in place prior to construction, and reclamation activities should be undertaken as soon as possible after disturbances occur and be maintained throughout the life of the Project. The following decommissioning/reclamation activities/practices shall be implemented to partially mitigate visual impacts associated with solar energy development, where feasible: 1. Pre-development visual conditions, and the B-Quality scenery (north of I-10), and the C-Quality scenery (south of I-10), and integrity shall be reviewed, and the visual elements of form, line, color, and texture shall be restored to pre-development visual compatibility or to that of the surrounding landscape setting conditions, whichever achieves the better visual quality and most ecologically sound outcome. 2. A Decommissioning and Site Reclamation Plan shall be developed, approved by the BLM, and implemented. The plan shall require that all aboveground and near-ground structures be removed. Some structures shall be removed only to a level below the ground surface that will allow reclamation/restoration. Topsoil from all decommissioning activities shall be salvaged and reapplied during final reclamation. The plan shall include provisions for monitoring and determining compliance with the Project's visual mitigation and reclamation objectives. 3. Soil borrow areas, cut-and-fill slopes, berms, water bars, and other disturbed areas shall be contoured to approximate naturally occurring slopes, thereby avoiding form and line contrasts with the existing landscapes. The Applicant shall contour to a rough texture (i.e., use large rocks/boulders, grade uneven surfaces, and/or vegetation mulches/debris) in order to trap seed and to discourage off-road travel, thereby reducing associated visual impacts. 4. A combination of seeding, planting of nursery stock, transplanting of local vegetation within the proposed disturbance areas, and staging of decommissioning activities enabling direct transplanting shall be considered. Where feasible, native vegetation shall be used for revegetating to establish a composition consistent with the form, line, color, and texture of the surrounding undisturbed landscape. 5. Stockpiled topsoil shall be reapplied to disturbed areas, and the areas shall be revegetated by using a mix of native species selected for visual compatibility with existing vegetation, where applicable, or by using a mix of native and non-native species if necessary to ensure successful revegetation. Gravel and other surface treatments shall be removed or buried. 6. Rocks, brush, and vegetal debris shall be restored whenever possible to approximate pre-existing visual conditions. 7. Edges of revegetated areas shall be feathered to reduce form and line contrasts with the existing landscapes. 8. A decommissioning VRM Monitoring and Compliance Plan shall be prepared by the Applicant and approved by the BLM that establishes the schedule and terms for monitoring and the conditions and methods of measurement for determining compliance.	Prior to construction	BLM	Implement Decommissioning and Site Reclamation Plan			
Water Resources						
APM HYDRO-1: To address impacts to state jurisdictional washes: a. The Project will be designed to ensure that post-development downstream hydrology will remain essentially the current downstream hydrology. b. The final locations of poles and spur roads associated with the linear facilities will be designed to be flexible so that drainages that cross the linear corridor will be avoided to the extent feasible.	Prior to construction	BLM	Address impacts to jurisdictional washes			

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Water Resources (cont.)						
c. The Applicant proposes the following mitigation ratios to be used for the state jurisdictional waters that will be impacted by the Project:						

SOLAR PLANT SITE

Vegetation Community/Land Cover	Permanent Impacts (acres)		Proposed Mitigation Ratio	Mitigation Acres		
	Unit 1	Unit 2		Unit 1	Unit 2	Total
Ephemeral "Riparian" Drainages						
Desert Dry Wash Woodland (Blue Palo Verde-Ironwood Woodland Alliance)	0	1.5	3:1	0	4.5	4.5
Mesquite Bosque	0	0	3:1	0	0	0
Vegetated Ephemeral Channels (Wash-dependent Vegetation with Sparsely Scattered Trees)	2.8	38.1	1.5:1	4.2	57.2	61.4
Vegetated Ephemeral Channels (Vegetated with No Trees)	47.3	50.4	1:1	47.3	50.4	97.7
Unvegetated (approximately less than or equal to 5% cover)	10.2	15.1	1:1	10.2	15.1	25.3
Subtotal Ephemeral "Riparian" Drainages	**60.3**	**105.1**	-	**61.7**	**127.2**	**188.9**
Upland Vegetation						
Sonoran Creosote Bush Scrub	2198.7	2072.9	1:1	2198.7	2072.9	4271.6
Stabilized and Partially Stabilized Desert Dunes (Sand Sheets and Dunes: Creosote Bush-White Burr Sage-Galleta Grass)	0	0	3:1	0	0	0
Subtotal Upland Vegetation	**2198.7**	**2072.9**		**2198.7**	**2072.9**	**4271.6**
Other Cover Types						
Agricultural Land (Crops, Ruderal Vegetation, or Bare Ground)	0	0	0	0	0	0
Developed (No Vegetation)	0	0	0	0	0	0
Subtotal Other Cover Types	**0**	**0**	-	0	0	0
Subtotals for Solar Plant Site	**2,259**	**2,178**	**-**	**2260.4**	**2200.1**	**4460.5**
	4,437					

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Water Resources (cont.)						

LINEAR FACILITIES

Vegetation Community/Land Cover	Gen-tie and Access Rd Impacts[1] (acres)		Distribution Line Impacts (acres)		Proposed Mitigation Ratio	Mitigation Acres
	Temporary	Permanent	Temporary	Permanent		
Ephemeral "Riparian" Drainages						
Desert Dry Wash Woodland (Blue Palo Verde-Ironwood Woodland Alliance)	0.5	0.7	0.1	0.8	3:1	6.3
Mesquite Bosque	0.2	0.2	0	0	3:1	1.2
Vegetated Ephemeral Channels (Wash-dependent Vegetation with Sparsely Scattered Trees)	0.0	0.0	0	0	1.5:1	0
Vegetated Ephemeral Channels (Vegetated with No Trees)	0.1	0.1	0	0	1:1	0.2
Unvegetated (approximately less than or equal to 5% cover)	0.2	0.1	0	0	1:1	0.3
Upland Vegetation						
Sonoran Creosote Bush Scrub	9.8	15.0	1.5	2.6	1:1	28.9
Stabilized and Partially Stabilized Desert Dunes (Sand Sheets and Dunes: Creosote Bush-White Burr Sage-Galleta Grass)	19.0	19.0	0	0	3:1	114
Other Cover Types						
Agricultural Land (Crops, Ruderal Vegetation, or Bare Ground)	0	0	0.3	2	0	0
Developed (No Vegetation)	14.5	21.8	0	0	0	0
Subtotal for Linear Facilities	**44.3**	**56.9**	**1.9**	**5.4**	**-**	**150.9**
Grand Total (Solar Plant Site and Linear Facilities)	**4545.5**				**-**	**4611.4**
Grand Total without Developed Area[2]	**4509.2**				**-**	**4575.1**

[1] Includes impacts associated with poles, spur roads, gen-tie maintenance road, pull sites, laydown yard, and the main access road.

[2] The developed area refers to a portion of the main access road.

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Water Resources (cont.)						
MM WATER-1: Implementation of a SWPPP. To ensure that stormwater quality is protected during the construction and decommissioning period for the MSEP, as well as any maintenance done during the operational period, the Applicant shall comply with the National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction and Land Disturbance (Order No. 2009-0009-DWQ) (Construction General Permit). Compliance with the Construction General Permit will ensure that the proposed construction activities would include BMPs to manage stormwater and control sediment and other pollutants from leaving the Project construction site. Compliance with the Construction General Permit will require completion and implementation of a Stormwater Pollution Prevention Plan (SWPPP) for the MSEP site that shall be in effect during all construction, maintenance, and decommissioning activities for the solar field, the gen-tie line, and all associated facilities. The SWPPP shall identify pollutant sources that may affect the quality of stormwater discharge and shall require the implementation of BMPs to reduce pollutants in storm water discharges. BMPs may include, but would not be limited to: 1. If grading occurs during the rainy season (Oct. 15 to Apr. 15), storm runoff from the construction area shall be regulated through a storm water management/erosion control plan that shall include temporary on-site silt traps and/or basins with multiple discharge points to natural drainages and energy dissipaters. Stockpiles of loose material shall be covered and runoff diverted away from exposed soil material. If work stops due to rain, a positive grading away from slopes shall be provided to carry the surface runoff to areas where flow would be controlled, such as the temporary silt basins. Sediment basins/traps shall be located and operated to minimize the amount of off-site sediment transport. Any trapped sediment shall be removed from the basin or trap and placed at a suitable location on-site, away from concentrated flows, or removed to an approved disposal site. 2. To minimize discharge of sediment during storm events, temporary erosion control measures (such as fiber rolls, staked straw bales, detention basins, check dams, geofabric, sandbag dikes, check dams, erosion control blankets, matting, and other fabrics or other ground cover as available) shall be implemented and remain in place until surface sediments can be stabilized. 3. Sediment shall be retained on-site by a system of sediment basins, traps, or other appropriate measures. 4. No disturbed surfaces may be left without erosion control measures in place during the rainy season. 5. Erosion protection shall be provided on all cut-and-fill slopes, as relevant to the MSEP, and shall be initiated as soon as possible after completion of grading and prior to the onset of the rainy season. 6. BMPs selected and implemented for the Project shall be in place and operational prior to the onset of construction on the site. The construction and decommissioning phase facilities shall be maintained regularly and cleared of accumulated sediment as necessary. Effective mechanical and structural BMPs that could be implemented at the Project site include the following: a. Mechanical storm water filtration measures, including oil and sediment separators or absorbent filter systems such as the Stormceptor® system, shall be installed within the storm drainage system to provide filtration of storm water prior to discharge. b. Roof drains shall discharge to natural surfaces or swales where possible to avoid excessive concentration and channelizing storm water. c. Permanent energy dissipaters shall be included for drainage outlets. d. The water quality detention basins shall be designed to provide effective water quality control measures including the following:	During Construction	BLM	Implement a SWPPP			

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Water Resources (cont.)						
i. Maximize detention time for settling of fine particles; ii. Establish maintenance schedules for periodic removal of sedimentation, excessive vegetation, and debris that may clog basin inlets and outlets; iii. Maximize the detention basin elevation to allow the highest amount of infiltration and settling prior to discharge. 7. Hazardous materials such as fuels and solvents used on the construction sites shall be stored in covered containers and protected from rainfall, runoff, vandalism, and accidental release to the environment. All stored fuels and solvents shall be contained in an area of impervious surface with containment capacity equal to or greater than the volume of materials stored. A stockpile of spill cleanup materials shall be readily available at all construction sites. Employees shall be trained in spill prevention and cleanup, and individuals shall be designated as responsible for prevention and cleanup activities. 8. Equipment shall be properly maintained in designated areas with runoff and erosion control measures to minimize accidental release of pollutants. 9. Impervious surface areas shall be graded or constructed to drain to a filtration BMP or equally effective alternative.						
MM WATER-2: The proposed evaporation ponds shall be sized to accommodate operational discharges plus a 25-year storm event, with no less than 1 foot of freeboard.	During construction	BLM	Evaporation ponds must be able to accommodate operational discharge plus a 25-year storm event			
MM WATER-3: Comprehensive Drainage, Stormwater, and Sedimentation Control Plan (Plan). The Applicant shall ensure that the Plan is completed prior to the initiation of construction (or decommissioning as relevant), and ensure that recommendations of that plan are implemented. The Applicant shall ensure that additional stormwater retention measures and facilities, including but not limited to retention basins and other facilities or features designed to retain stormwater on site, shall be implemented within the MSEP site. Stormwater retention facilities shall be designed to accommodate increases in flows that would be generated as a result of MSEP implementation, in comparison to existing conditions, as identified in Table 4.20-2 and 4.20-3, such that MSEP implementation would not result in a net increase in discharge from the site under either a 10-year or 100-year storm event. At the installation sites for new buildings, roads, the switchyard, transformers, solar panels, the gen-tie line, transmission towers, and other facilities that would be installed in association with the MSEP, designs for these facilities shall be reviewed and approved by the BLM with respect to potential generation of altered stormwater flows, erosion, and sedimentation. The use of flow-obstructing fencing shall be avoided; instead, fencing that allows for the passage of water while minimizing buildup of debris shall be utilized on site. To ensure implementation of Applicant Proposed Measure BIO-1b and Mitigation Measure WIL-1, the Applicant shall coordinate with the BLM, CDFG, and USFWS to determine appropriate fencing design. All proposed grading and impervious surfaces on site shall be reviewed and approved by the BLM, with respect to its potential to cause or result in additional erosion and sedimentation, increased stormwater flows, or altered drainage patterns that could lead to unintentional ponding or flooding on site or downstream, and/or additional erosion and sedimentation. Stormwater flows emanating from	Prior to construction	BLM, CDFG, and USFWS	Develop and implement a Comprehensive Drainage, Stormwater, and Sedimentation Control Plan			

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Water Resources (cont.)						
proposed impervious surfaces shall be retained on site and/or directed into channels and other stormwater infrastructure, and shall be sized such that unintentional ponding, flooding, erosion, or sedimentation would not occur on site or downstream.						
MM WATER-4: In order to ensure that proposed on site buildings, and staff therein are protected from flooding, all on site buildings and fill areas shall be placed outside of frequent flood flow areas. Additionally, proposed on-site buildings, maintenance areas, designated parking lots, and associated facilities shall be constructed at a finished floor elevation of at least 2 feet above the highest anticipated flood flows during a 100-year event. The proposed evaporation pond shall include berms of levees that reach at least 2 feet above the highest anticipated flood flows during a 100-year storm event, or at least 2 feet above the highest adjacent ground, whichever is greater, in order to protect the evaporation pond from incident flooding events and ensure that the ponds are not inundated by flood flows. Slope protection shall be provided for all fill areas exposed to erosive flows. In specific areas where frequent flows are anticipated, posts for solar panels shall be constructed on a deepened footing, as recommended by the geotechnical engineer, in order to withstand anticipated scouring.	Prior to construction	BLM	• Plan construction of all buildings and fill areas outside of frequent flood flow areas • Plan development of all other staff-use areas at a finished floor elevation of at least 2 feet above the highest anticipated flood flows during a 100-year event			
MM WATER-5: Flood Safety Plan. Prior to initiation of MSEP operation, the Applicant shall complete a Flood Safety Plan for the site. The Flood Safety Plan shall delineate specific actions to be completed during a flood event, in order to protect workers and facilities as relevant. The Plan shall identify refuge areas that would not be susceptible to 100-year flooding, and provide requirements and guidance with respect to avoiding injury, death, or equipment damage during a flood event. The Plan shall be adhered to and updated, as needed, during the entire operation period of the MSEP.	Prior to operation	BLM	Complete a Flood Safety Plan for the site			
MM WATER -6: Construction period flood protection. The Applicant shall ensure that during construction, temporary construction related structures such as bridges, roads, berms, and other facilities, would be constructed so as to avoid interference with 100-year flood flows. Temporary installation of the following types of facilities shall be avoided: temporary elevated earthen structures such as roads and berms; earthen bridges or other structures within a waterway or flood conveyance that could interfere with flood flows; dams; unnecessary ditches; other major structures that could concentrate flood flows. Additionally, to the extent practicable, the Applicant shall ensure that the construction process proceeds in a manner so as to minimize exposure of facilities to construction period flooding. Temporary ditches and trenches (such as for pipes, wires, or other infrastructure) should be completed and backfilled as quickly as possible, and should not be left open for extended periods. Drainage infrastructure should be installed prior to installation of the solar arrays and other facilities on site. Other facilities that may be susceptible to flood damage during construction should be managed so as to minimize construction time of those facilities.	Prior to construction	BLM	Ensure that temporary construction structures such as bridges, roads, berms, and other facilities, would be constructed so as to avoid interference with 100-year flood flows.			
MM WATER-7: Groundwater Monitoring and Mitigation Plan. A Groundwater Monitoring and Mitigation Plan shall be prepared prior to construction. The Groundwater Monitoring and Mitigation Plan shall be prepared by a qualified hydrogeologist registered in the State of California and submitted by the Applicant to the BLM for approval, and to the RWQCB for review and comment. This Plan shall provide detailed methodology for monitoring background and site groundwater levels, water quality, and flow. Monitoring shall be performed during pre-construction, construction, and operation of the Project, with the intent to establish pre-construction and Project-	Prior to construction	BLM	Prepare and implement a Groundwater Monitoring and Mitigation Plan; submit quarterly and annual data reports to BLM.			

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Water Resources (cont.)						
related groundwater level and water quality trends that can be quantitatively compared against observed and simulated trends near the Project pumping wells and near potentially affected existing private wells, if any. Water quality monitoring shall include annual sampling and testing for constituents as required by the California Department of Health for the proposed on-site potable use. The Groundwater Monitoring and Mitigation Plan shall include a schedule for submittal of quarterly data reports by the Applicant to the BLM, for the duration of the monitoring period. These quarterly data reports shall be prepared and submitted to the BLM for review and approval, and shall include water level monitoring data (trend analyses) from all pumping and monitoring wells. Based on the results of the quarterly reports, the Applicant and the BLM shall determine if the Project's pumping activities have resulted in water level decline in the baseline at any of the monitoring wells, including nearby private wells, if any. If significant drawdown occurs at off-site wells, the Applicant shall immediately reduce groundwater pumping until water levels stabilize or recover, to a reasonable level. The Groundwater Monitoring and Mitigation Plan shall also include a schedule for submittal of annual data reports by the Applicant to the BLM, for the first 5 years of the project (including the construction period). These annual data reports shall be prepared and submitted to the BLM for review and approval, and shall include at a minimum the following information: • Daily usage, monthly range, and monthly average of daily water usage in gallons per day; • Total water used on a monthly and annual basis in acre-feet; summary of all water level data and water quality data; • Identification of trends that indicate potential for off-site wells to experience decline of water level; and • Identification of all sources of water by type (i.e., groundwater, surface water, municipal water) and well/location used on BLM Land. The BLM shall determine whether groundwater wells surrounding the Project site and Project supply well(s) are influenced by Project activities in a way that requires additional mitigation and, if so, shall determine what measures are needed. After the first 5 years of the Project, the Applicant and the BLM shall jointly evaluate the effectiveness of the Groundwater Monitoring and Mitigation Plan and determine if monitoring frequencies or procedures should be revised or eliminated.						
Wildland Fire Ecology						
MM FIRE-1: The Applicant shall prepare and implement a Fire Safety Plan to ensure the safety of workers and the public during Project construction, operation and maintenance, and decommissioning activities. This plan shall complement or supplement provisions of the Applicant's proposed Emergency Action Plan. The Fire Safety Plan shall be provided to the BLM and RCFD for approval before the Applicant receives a Notice to Proceed (NTP). The Fire Safety Plan shall include, but not be limited to, the following elements: 1. All internal combustion engines used at the Project site shall be equipped with spark arrestors. Spark arrestors shall be in good working order. 2. Once initial two-track roads have been cut and initial fencing completed, light trucks and cars shall be used only on roads where the roadway is cleared of vegetation. Mufflers on all cars and light trucks shall be maintained in good working order. 3. Fire rules shall be posted on the project bulletin board at the contractor's field office and areas visible to employees.	Prior to Construction	BLM and RCFD	Develop and implement fire safety plan			

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Wildland Fire Ecology (cont.)						
4. Equipment parking areas and small stationary engine sites shall be cleared of all extraneous flammable materials. 5. The Applicant shall make an effort to restrict use of chainsaws, chippers, vegetation masticators, grinders, drill rigs, tractors, torches, and explosives to outside of the official fire season. When the above tools are used, water tanks equipped with hoses, fire rakes, and axes shall easily accessible to personnel. 6. Smoking shall be prohibited in wildland areas and within 50 feet of combustible materials storage, and shall be limited to paved areas or areas cleared of all vegetation. 7. Each Project construction site (if construction occurs simultaneously at various locations) and the proposed solar plant site shall be equipped with fire extinguishers and fire-fighting equipment sufficient to extinguish small fires. 8. The Applicant shall coordinate with the RCFD to create a training component for emergency first responders to prepare for specialized emergency incidents that may occur at the Project site. 9. All construction workers, plant personnel, and maintenance workers visiting the plant and/or transmission lines to perform maintenance activities shall receive training on the proper use of fire-fighting equipment and procedures to be followed in the event of a fire. Training records shall be maintained and be available for review by the RCFD. 10. Vegetation near all solar panel arrays, ancillary equipment, and access roads shall be controlled through periodic cutting and spraying of weeds, in accordance with the Vegetation Management Plan. 11. The BLM and RCFD shall be consulted during plan preparation and fire safety measures recommended by the agencies included. 12. The plan shall list fire prevention procedures and specific emergency response and evacuation measures that would be required to be followed during emergency situations. 13. All on-site employees shall participate in annual fire prevention and response training exercises with the RCFD 14. The Applicant shall designate an emergency services coordinator from among the full-time on-site employees who shall perform routine patrols of the site during the fire season equipped with a portable fire extinguisher and communications equipment. The Applicant shall notify the BLM and County of the name and contact information of the current emergency services coordinator in the event of any change. 15. Remote monitoring of all major electrical equipment (transformers and inverters) will screen for unusual operating conditions. Higher than nominal temperatures, for example, can be compared with other operational factors to indicate the potential for overheating which under certain conditions could precipitate a fire. Units could then be shut down or generation curtailed remotely until corrective actions are taken. 16. Fires ignited onsite shall be immediately reported to BLM FIRE and the RCFD. 17. The engineering, procurement, and construction contract(s) for the proposed project shall clearly state the requirements of this mitigation measure.						

Mitigation Measure	Timing for Implementation	Monitoring Agency(s)	Compliance Action	Verification of Compliance		
				Initials	Date	Remarks
Unexploded Ordnance						
MM UXO-1: The Applicant shall prepare and implement a UXO Identification, Training, and Reporting Plan to properly train all site workers in the recognition, avoidance, and reporting of military waste debris and ordnance. The Applicant shall submit the plan to the BLM for review and approval prior to the start of construction. The plan shall contain, at a minimum, the following: 1. A description of the training program outline and materials, and the qualifications of the trainers; 2. Identification of available trained experts that will respond to notification of discovery of any suspected ordnance (unexploded or not); 3. Procedures to stop work immediately in the vicinity of suspected UXO and to notify the local CUPA and the U.S. Army Corps of Engineers; 4. A work plan to recover and remove discovered ordnance, and complete additional field screening, possibly including geophysical surveys to investigate adjacent areas for surface, near-surface or buried ordnance in all proposed land disturbance areas. 5. Documentation of all surveys and investigations performed to evaluate and remove discovered ordnance. The Applicant shall submit the UXO Identification, Training, and Reporting Plan to the BLM for approval no less than 30 days prior to the initiation of construction activities at the site or within the linear corridors, as appropriate. The results of geophysical surveys shall be submitted to the BLM within 30 days of completion of the surveys.	Submit plan at least 30 days prior to the initiation of construction If required, submit survey results within 30 days of completion of the surveys	BLM	Develop and implement UXO Identification, Training, and Reporting Plan			