BLM

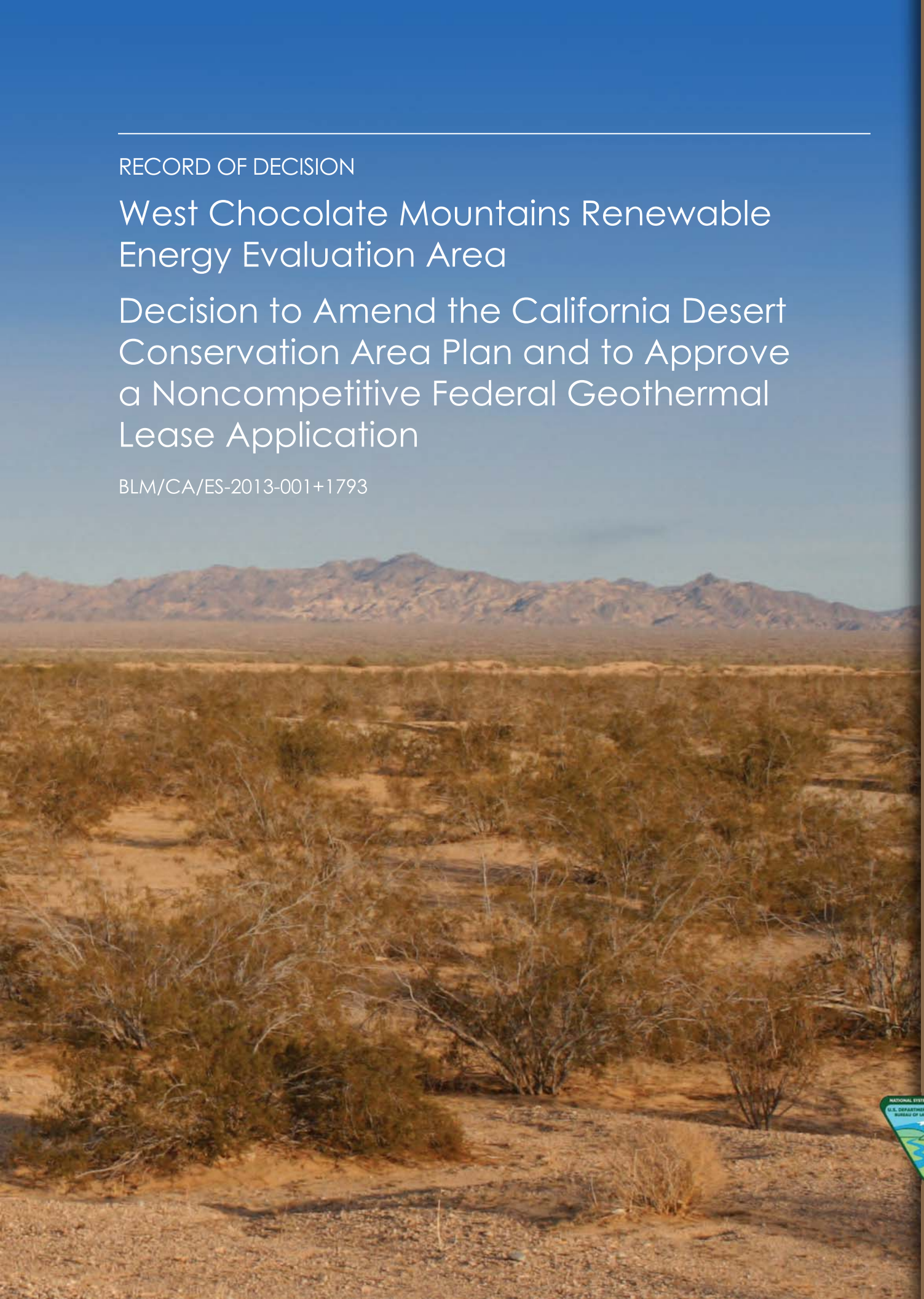
El Centro Field Office

RECORD OF DECISION

West Chocolate Mountains Renewable Energy Evaluation Area

Decision to Amend the California Desert Conservation Area Plan and to Approve a Noncompetitive Federal Geothermal Lease Application

BLM/CA/ES-2013-001+1793



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Executive Summary

In this Record of Decision (ROD), the Bureau of Land Management (BLM) is approving amendments to the California Desert Conservation Area (CDCA) Plan to allocate certain lands as suitable for consideration for geothermal resource leasing and solar energy development. The BLM selects Alternative 6 of the Final Environmental Impact Statement (EIS) and Proposed CDCA Plan Amendment for the West Chocolate Mountains Renewable Energy Evaluation Area (REEA).

In this ROD, the BLM is also making an implementation decision to approve the issuance of one pending noncompetitive federal geothermal leasing application (CACA 047196), subject to certain stipulations.

As explained in detail below, these decisions are based on a careful balancing of the need to provide opportunities for renewable energy development on public lands while conserving environmental and cultural values, and careful consideration of:

- The information generated during the analytical and consultation processes required by the National Environmental Policy Act (NEPA), National Historic Preservation Act (NHPA), Endangered Species Act (ESA), U.S. Department of the Interior tribal consultation policies and other applicable requirements;
- The potential for resource conflicts associated with, and reasonable alternatives to, the proposed actions of:
    - identifying approximately 18,765 acres of BLM managed surface lands as suitable for testing and development of solar and wind energy development facilities; and
    - allocating approximately 11,859 acres of federal mineral estate as open and available for geothermal resources leasing, exploration, and development.

This information was presented and analyzed in the Final EIS and Proposed CDCA Plan Amendment for the West Chocolate Mountains REEA, which was published on December 14, 2012. This ROD approves Alternative 6 from the EIS and makes the following decisions:

1. Amends the CDCA Plan to identify BLM managed lands in the West Chocolate Mountains REEA as suitable for geothermal leasing and development as well as moderate solar development, subject to constraints discussed in Chapter 2 of the Final EIS and Section 4 of this ROD, including (but not limited to) structure height limitations of less than 200 feet;
2. Approves issuance of the pending noncompetitive federal geothermal lease application (CACA 047196), consistent with the terms and conditions of the CDCA Plan as amended by this document, and subject to stipulations approved herein.

Subsequent proposals to explore for or develop geothermal resources on that lease would be assessed in future NEPA and other environmental review processes;

3. Identifies and adopts stipulations and other restrictions on uses to be applied, as appropriate, to solar or geothermal energy permits and use authorizations;
4. Identifies lands acquired by the BLM under donation agreements for mitigation/compensation purposes, and with Land and Water Conservation Funds (LWCF) (including Catellus lands), as avoidance areas for land use authorizations that could result in surface disturbing activities;
5. Designates the portion of the West Chocolate Mountains REEA west of the Coachella Canal as a Solar Energy Zone (SEZ); and
6. Limits total surface disturbance for solar and geothermal development east of the Coachella Canal to less than 10 percent of BLM managed surface lands in the REEA.

BLM sought input from the public throughout the public scoping and public comment processes and considered the concerns expressed by the public in development of the alternatives and analysis presented in the EIS. Specifically, the BLM developed Alternative 6 in response to public concerns regarding the presence of the desert tortoise east of the Coachella Canal. Alternative 6 limits the amount of potential solar development to a moderate level of development, as anticipated under the reasonably foreseeable development (RFD) scenario, closes the REEA to wind energy development, and limits surface disturbance east of the Coachella Canal to less than 10 percent of all BLM managed surface lands in the REEA.

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LIST OF APPENDICES

ACRONYMS AND ABBREVIATIONS

ACEC	Area of Critical Environmental Concern
APD	Application for Permit to Drill
BLM	Bureau of Land Management
BMP	best management practices
BO	Biological Opinion
BOR	Bureau of Reclamation
CDCA	California Desert Conservation Area
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CSP	concentrated solar power
CWA	Clean Water Act
DOD	U.S. Department of Defense
DWMA	Desert Wildlife Management Area
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FLPMA	Federal Land Policy and Management Act
IM	Instruction Memorandum
LWCF	Land and Water Conservation Funds
MUC	multiple use class
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOI	Notice of Intent
NRHP	National Register of Historic Places
OHV	off-highway vehicle
REEA	Renewable Energy Evaluation Area
RFD	reasonably foreseeable development
ROD	Record of Decision
ROW	right-of-way
RWQCB	Regional Water Quality Control Board
SEZ	Solar Energy Zone
SHPO	State Historic Preservation Office
SWRCB	State Water Resources Control Board
T&E	threatened and endangered
U.S.C.	United States Code
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WECO	Western Colorado
WSA	Wilderness Study Area

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RECORD OF DECISION

West Chocolate Mountains Renewable Energy Evaluation Area Final Environmental Impact Statement and Proposed California Desert Conservation Area Plan Amendment

1.0 Purpose and Need

The purpose of the proposed action is to facilitate appropriate testing and development of geothermal, solar, and wind energy in the West Chocolate Mountains Renewable Energy Evaluation Area (REEA) and to foster a more predictable process for renewable energy development. This would be accomplished by first identifying the existing resources associated with the land in the West Chocolate Mountains REEA and then making appropriate land use planning decisions regarding the location, development, and management of these resources. Appropriate management of these resources would include the identification of reasonable stipulations and measures in order to avoid potential resource conflicts, when feasible, and to mitigate the impacts related to geothermal, solar, and wind energy testing and development.

The need for the proposed action, and for the implementation action in deciding whether to issue an individual geothermal lease, arises from pending renewable energy applications, national policy, and Congressional direction to consider cleaner renewable energy resources, which included consideration in land use plans for areas having a high potential or suitability for renewable energy resources development. The Bureau of Land Management (BLM) has identified a need to respond in a more efficient manner to the interest in siting renewable energy projects on public lands having a high potential for these resources, such as in responding to applications for geothermal leases; at the same time, the BLM must ensure consistent application of measures to mitigate the potential adverse impacts of such development.

2.0 Decisions

Alternative 6, identified as the preferred alternative in the Final Environmental Impact Statement (EIS), has been selected. Under this plan amendment alternative, a maximum of 29,758 acres (9,066 acres on BLM land) could be developed for solar energy (including an estimated 3,306 megawatts of power production) (Figure 1), and up to 1,026 acres of land could be disturbed for geothermal energy development (up to three geothermal power plants estimated at 50 megawatts each could be constructed, for a total of 150 megawatts) (Figure 2). No wind energy would be developed. The LWCF lands (Catellus acquisition) would be designated as avoidance areas for surface disturbance and surface disturbance east of the Coachella Canal would be limited to less than 10 percent of the available BLM managed surface lands in the West Chocolate REEA.

Allowing development of the potential renewable energy resources in the West Chocolate Mountains REEA at the moderate levels described above is expected to provide climate, employment, and energy security benefits to California and the nation. Most notably, leasing and development consistent with the terms, conditions, and decisions in the adopted California

Desert Conservation Area (CDCA) Plan Amendment will help realize important federal and state energy policy goals targeted towards increasing renewable energy generation and reducing greenhouse gas emissions. In summary, Alternative 6 provides the most public benefit, while also avoiding, to the greatest extent practicable, potential impacts to biological, cultural, and other resources as well as social uses and values (see Section 4.0, Required Mitigation, below).

2.1 Land Use Plan Amendments

The CDCA Plan is amended to:

1. Identify the West Chocolate Mountains REEA as suitable for geothermal and solar energy development, subject to certain identified constraints or stipulations regarding use and protection of other resource values;
2. Identify the REEA as unsuitable for wind energy development;
3. Adopt specific protective measures, as detailed in Sections 2.3, 2.4, and 2.6, below, and references cited therein; and
4. Exclude certain areas from authorization of renewable development, as specified in Section 3.0, below.

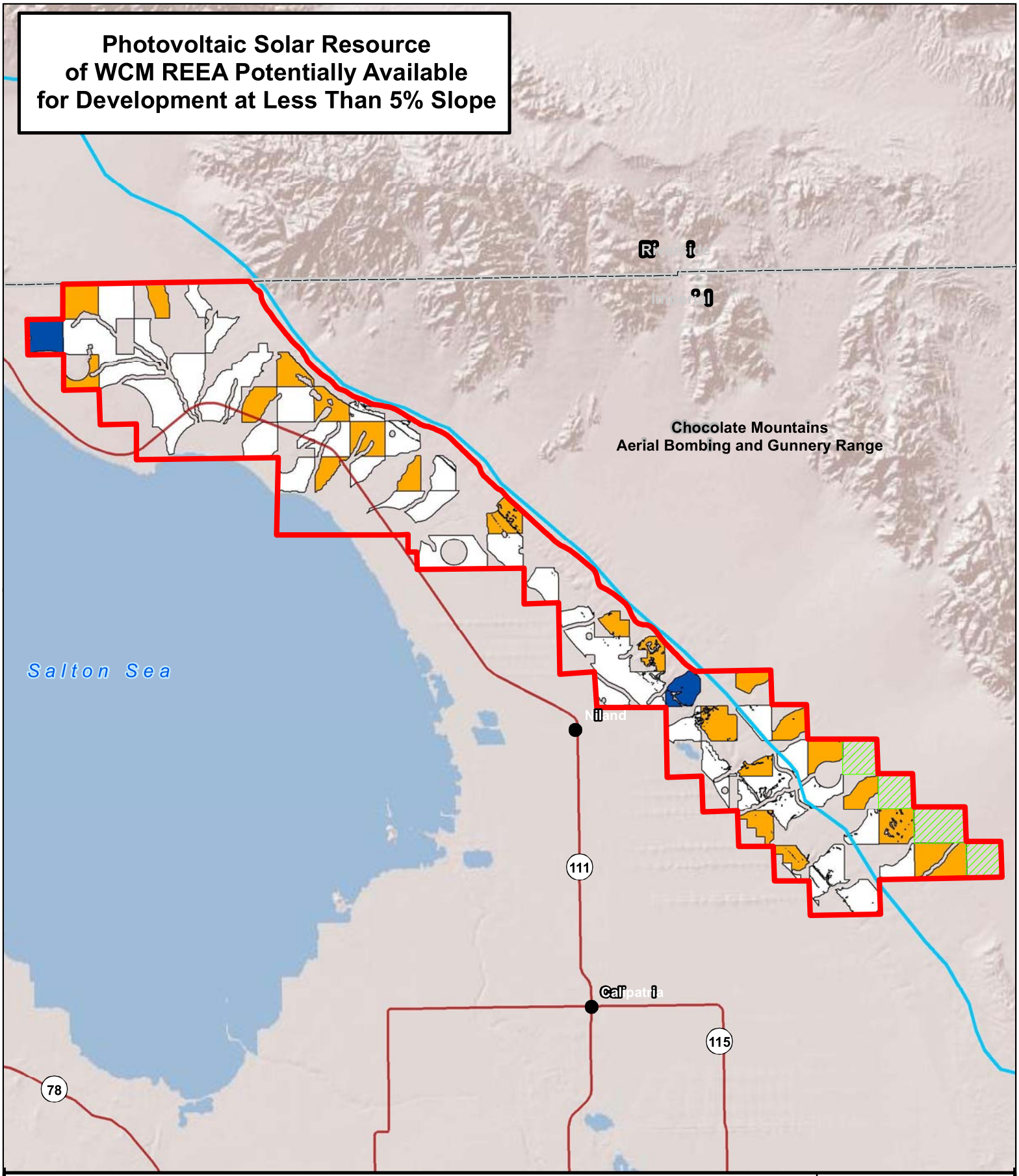
2.2 Approval of the Non-Competitive Geothermal Lease Application and Associated Use Restrictions

The BLM will approve the pending non-competitive geothermal lease application and shall issue Federal Geothermal Lease CACA 047196, as shown on Figure 3. A geothermal lease shall be issued for the lands described, and subject to the purposes analyzed, in the West Chocolate Mountains REEA Final EIS, in accordance with 43 CFR 3200 and the Geothermal Steam Act of 1970, as amended. The lease terms approved by the BLM will include attached lease stipulations as described in the Final EIS, the U.S. Fish and Wildlife Service (USFWS) Biological Opinion (BO) (Appendix A), and other applicable federal rules and regulations. As stated on the lease form, any and all of the referenced regulations may be amended to protect public health and safety, prevent unnecessary damage to the environment, and ensure that any future project(s) will not result in unnecessary or undue degradation of public lands. Site specific considerations and information will be analyzed in subsequent NEPA compliance documents when applications for surface disturbing exploration or development proposals are submitted, and may result in additional conditions of approval at the permitting stage.

2.3 Stipulations and Best Management Practices for Solar and Geothermal Development

The Final EIS (Sections 2.2.6.2 and 2.3 and Appendixes G and I) and this ROD (Appendix B and C) identify stipulations (including processes for waivers, exceptions, and modifications) and best management practices (BMPs) applicable to the development of geothermal energy and solar energy in the West Chocolate Mountains REEA.

Photovoltaic Solar Resource of WCM REEA Potentially Available for Development at Less Than 5% Slope



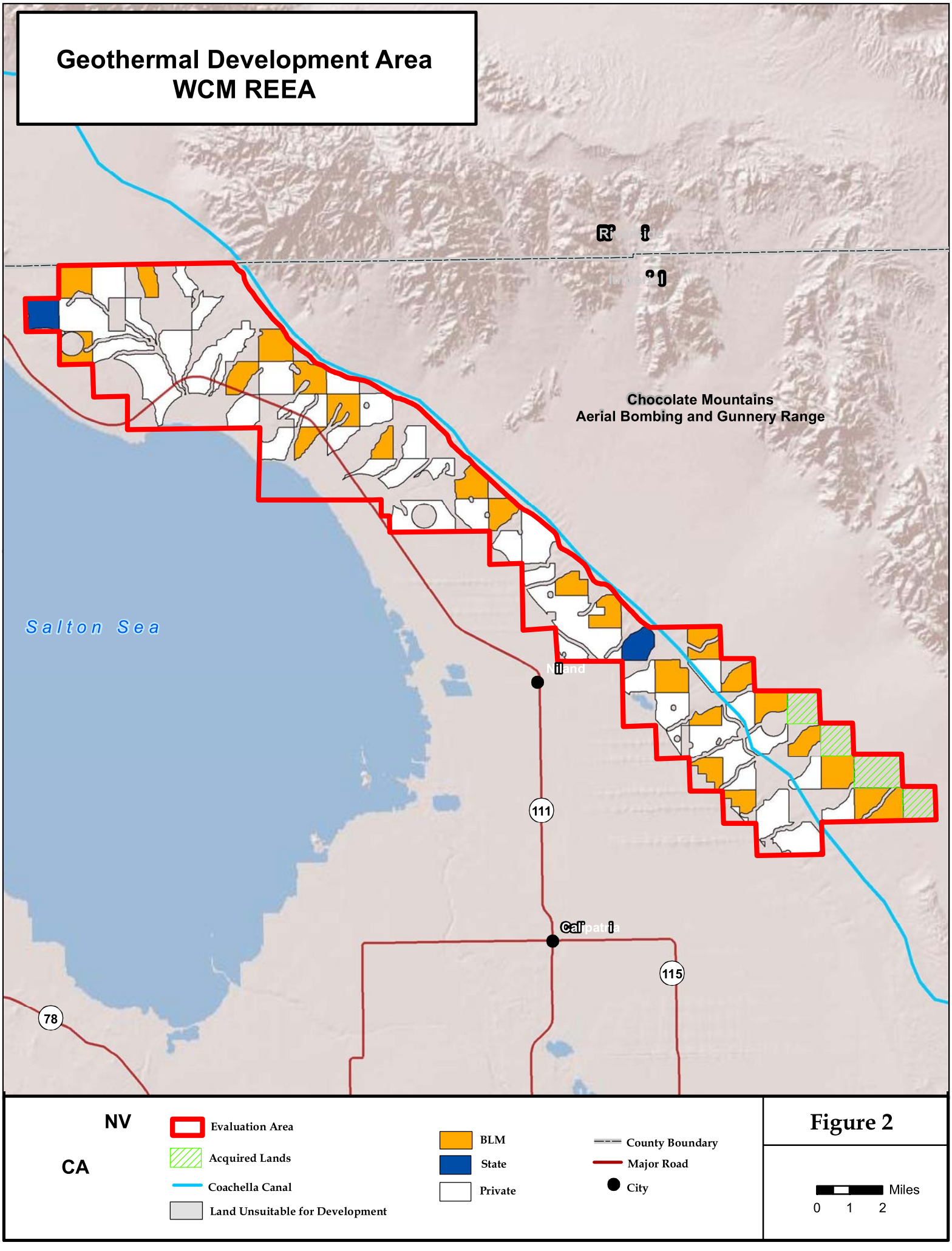
NV

CA

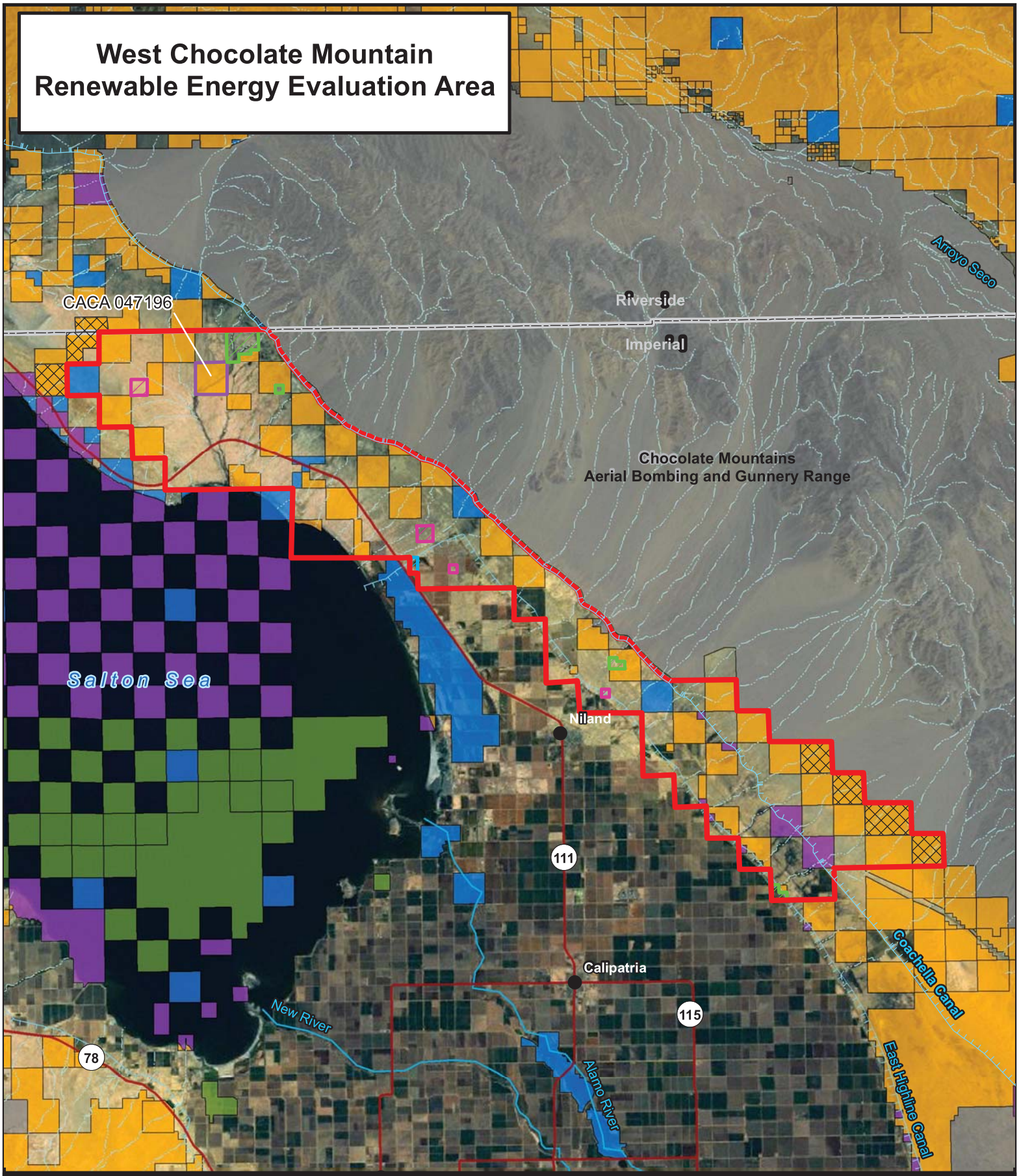
- Evaluation Area
- Acquired Lands
- Coachella Canal
- Land Unsuitable for Development
- BLM
- State
- Private
- County Boundary
- Major Road
- City

Miles
0 1 2

Figure 1


Geothermal Development Area
WCM REEA
Chocolate Mountains
Aerial Bombing and Gunnery Range
Salton Sea
111
115
78
NV
CA
Evaluation Area
Acquired Lands
Coachella Canal
Land Unsuitable for Development
BLM
State
Private
County Boundary
Major Road
City
Miles
0 1 2
Figure 2

West Chocolate Mountain Renewable Energy Evaluation Area



NV

CA

- Evaluation Area
- Catellus Acquisition
- Pending Geothermal Lease
- DOD Land
- USFWS Land
- CA State Land
- BLM Land
- BOR Land
- Split Estate - All Mineral Rights BLM Managed
- Split Estate - Geothermal Rights BLM Managed
- Split Estate - Oil and Gas Rights BLM Managed
- County Boundary
- Major Road
- City
- Canal
- River
- Intermittent Stream

Figure 3

Miles

0 1 2 3

2.4 Acquired Lands

Catellus donated 2,863 acres of land to the BLM for conservation purposes. Therefore, these lands are designated as ROW avoidance area. Applicants will be discouraged from applying for ROWs in these areas, or ROWs may have special stipulations for the protection of resources (BLM Land Use Planning Handbook 1601-1 Appendix C, Section E(9)).

2.5 Solar Energy Zone Designation

This ROD establishes a 10,759-acre Solar Energy Zone (SEZ) west of the Coachella Canal. The Plan Amendment is designed to be consistent with BMPs in the Solar PEIS. The designation of a SEZ in the REEA partially fulfills the variance process requirements proposed through the Supplement to the Solar PEIS. Specifically, for utility-scale solar development, the West Chocolate Mountains REEA serves as a step-down analysis for a portion of variance lands identified in the Solar PEIS. It is anticipated that solar energy development applications proposed in the West Chocolate Mountains REEA would comply with the Solar PEIS variance process for most resources and, therefore, could qualify for priority processing.

2.6 Development Cap East of the Coachella Canal

Lands in the West Chocolate Mountains REEA that are east of the Coachella Canal will be limited in surface disturbance for solar and geothermal development to less than 10 percent of BLM managed surface lands.

3.0 Alternatives

As discussed in Chapter 2 of the Final EIS, the BLM analyzed six alternatives in detail. In all alternatives, surface development would be avoided or excluded in areas where the following resource values are found (Note: the assumptions and constraints described below are not applicable to the pending lease issuance implementation decision):

- National Register of Historic Places (NRHP) eligible cultural resources;
- Threatened and endangered (T&E) species and/or critical habitat for T&E species, including unique plant assemblages;
- Avian nesting habitat;
- Wildlife corridors;
- Bureau of Reclamation (BOR) withdrawn land (development not allowed);
- Major urban areas;
- Setbacks from natural and man-made hydrologic features including lakes, reservoirs, ponds, and intermittent ephemeral or small perennial streams, larger perennial streams, rivers, and domestic water supplies (inclusive of an up to 300-foot protection area);
- Environmentally sensitive lands, such as national parks or wilderness areas;
- Isolated BLM parcels less than 0.39 square mile (1 square kilometer) in size;

- Unsuitable topography (only applicable to solar energy);
- Airport runways or heliports (only applicable to structures exceeding 200 feet in height, certain types of concentrated solar power technology, and wind energy within 2 nautical miles of a runway or flight path); and
- U.S. Department of Defense (DOD)/military low fly zones (only applicable to structures taller than 200 feet, certain types of CSP technology, and wind energy).

3.1 Alternatives Evaluated But Not Selected

Alternative 6 has been selected. The alternatives that were not selected are listed below:

- Alternative 1 – No Action/No CDCA Plan Amendment/No Geothermal Lease;
- Alternative 2 – CDCA Plan Amendment: No Development/No Geothermal Lease;
- Alternative 3 – Renewable Energy Development Emphasis;
- Alternative 4 – Geothermal Development Only; and
- Alternative 5 – Solar Energy Development Emphasis with Moderate Geothermal Development and No Wind Development.

3.1.1 Alternative 1: No Action

Alternative 1 was not selected because it would not meet the purpose and need for action.

3.1.2 Alternative 2: CDCA Plan Amendment: No Development/No Geothermal Lease

Alternative 2 was not selected because it would not meet the purpose and need. Alternative 2 would amend the CDCA Plan to identify the West Chocolate Mountains REEA as closed to, and unsuitable for, geothermal leasing and development and for wind and solar energy development. The BLM would deny the existing noncompetitive geothermal lease application.

3.1.3 Alternatives 3, 4, and 5: The Development Alternatives

Actions Common to Alternatives 3, 4, and 5

- Surface disturbance east of the Coachella Canal would have a solar and geothermal energy development cap of less than 10 percent on all BLM managed surface lands in the West Chocolate Mountains REEA;
- The BLM would approve the existing noncompetitive geothermal lease application; and
- Lands acquired by the BLM under donation agreements for mitigation/compensation purposes and with Land and Water Conservation Funds (LWCF) (including Catellus lands) would be managed as avoidance areas for land use authorizations that could result in surface disturbing activities.

Alternative 3 – Renewable Energy Development Emphasis

- Geothermal, solar, and wind energy could be developed to the maximum extent of the reasonably foreseeable development (RFD) scenario; and
- The CDCA Plan would be amended to identify sites within the West Chocolate Mountains REEA as suitable for geothermal leasing and solar and wind energy development. The West Chocolate Mountains REEA would be designated as a SEZ.

Alternative 3 was not selected because the environmental impacts associated with the renewable energy development emphasis alternative were determined to be too extensive and represent an inappropriate balance between energy development, conservation of resources, and social impacts.

Alternative 4 – Geothermal Development Only

- Geothermal energy could be developed to the maximum extent of the RFD scenario;
- The CDCA Plan would be amended to identify the West Chocolate Mountains REEA as suitable for geothermal leasing and unsuitable for solar and wind energy development; and
- The West Chocolate Mountains REEA would not be designated as a SEZ.

Alternative 4 was not selected because the BLM determined that solar energy could and should be permitted in the REEA. Solar development would help meet the purpose and need and would still allow for conservation of resources and human uses of the West Chocolate Mountains REEA while also meeting Federal goals for renewable energy development.

Alternative 5 – Solar Development Emphasis with Moderate Geothermal Development

- Geothermal energy could be developed to a moderate extent of the RFD scenario;
- Solar energy could be developed to the maximum extent of the RFD scenario;
- The CDCA Plan would be amended to identify the West Chocolate Mountains REEA as suitable for geothermal leasing and solar energy ROW, and unsuitable for wind energy development; and
- The West Chocolate Mountains REEA would be designated as a SEZ.

Alternative 5 was not selected because the environmental impacts associated with solar development to the maximum extent of the RFD were determined to too extensive. This amount of solar development would represent an inappropriate balance between energy development, conservation of resources, and social impacts.

3.1.4 Alternatives Not Fully Analyzed

Other alternatives (see below) were considered but eliminated from detailed analysis in accordance with 40 CFR 1502.14(a) and the BLM NEPA Handbook H-1790-1.

Alternative Project Area Configurations

A comment noted there are six to seven sections of public land in the southern third of the planning area that abut the Chocolate Mountain Aerial Gunnery Range and the Catellus Corporation property acquired from the Wildlands Conservancy. These are intact blocks of public lands that appear to be largely free of impacting multiple uses at this time. It was recommended that these lands be protected from surface disturbing activities.

The BLM also received additional information from the USFWS indicating that the area east of the Coachella Canal was high-value desert tortoise habitat and should be removed from the planning area. Rather than removing these lands from consideration in the EIS, the BLM considered this information and has added several stipulations (Appendix B) designed to greatly reduce impacts east of the Coachella Canal by limiting surface disturbance to less than 10 percent of the BLM managed surface lands in the West Chocolate Mountains REEA.

Another comment suggested the REEA exclude all high value habitats associated with the Salton Sea, its shoreline, and any wetland or riparian habitats associated with natural drainages between Bombay Beach and the Imperial State Wildlife Area due to these habitats' importance for a number of listed and declining bird species as well as the endangered desert pupfish. Rather than removing these lands from consideration in the EIS, the BLM considered this information and added several development constraints that eliminated development within critical habitat, Areas of Critical Environmental Concern (ACECs), Desert Wildlife Management Areas (DWMAs), designated off-highway vehicle (OHV) areas, Wilderness Study Areas (WSAs), Wilderness Areas or other sensitive areas. The BLM also added stipulations that would provide setbacks from hydrologic features and wetland/riparian areas.

3.2 Environmentally Preferred Alternative

Alternative 4, geothermal development only, is the BLM's environmentally preferred alternative. Since only geothermal development would be allowed, the amount of ground disturbance would be significantly less than would be experienced under Alternatives 3, 5, and 6, all of which would allow for solar and/or wind development.

3.3 Information Developed Since the Final EIS, and NEPA Adequacy

Since the publication of the Draft EIS, Final EIS, and the close of the protest period, additional information has become available for inclusion in the Final EIS or in this ROD. The BLM received comment letters on the Draft EIS/Proposed CDCA Plan Amendment from 26 federal, state, and local agencies, companies and organizations, and individuals. The comments received and the BLM's responses to these comments are provided in Appendix J of the Final EIS. Additionally, Table 5-1 of the Final EIS lists the commenter, the topic of their comment, and the location of the BLM's response to the comment.

Some comments indicated a misunderstanding of the current action, which is consideration of allowing energy development leases (geothermal) and ROWs (solar and wind) in the West Chocolate Mountains REEA. Since the Proposed Action does not involve actual development of energy facilities, specific impacts of specific projects could not be determined or analyzed, but were addressed in the EIS at a general landscape level.

Further details on corrections of errors in the Final EIS can be found in Appendix D, which is an errata sheet for material not included or that was erroneous in the Final EIS. None of these changes substantively change the nature or degree of anticipated impacts or conclusions made in the Final EIS; therefore, a supplemental EIS is not warranted and will not be prepared. BLM will consider all technologies with a bias towards reduced water use and require that any technology using significant amounts of water will conduct a water supply assessment and comply with BMPs prior to project authorization.

4.0 Required Mitigation

This ROD adopts the following measures, terms, and conditions from the Final EIS:

- Terms and Conditions in the USFWS BO (Appendix A), as may be amended;
- Stipulations and Lease Notices, Exception, Modification, and Waiver Criteria (Appendix B), as may be amended; and
- BMPs (Appendix C).

As required in BLM NEPA Handbook H-1790-1 and 40 CFR 1505.2(c), all practicable means to avoid or minimize environmental harm from the selected alternative have been adopted by the ROD (Appendices B and C).

5.0 Management Considerations

5.1 Decision Rationale

Respond to Purpose and Need

As more thoroughly described in Sections 1.1 and 1.2, the BLM's purpose and need for the project is to facilitate appropriate development of geothermal, solar, and wind energy in the West Chocolate Mountains REEA and to foster a consistent and predictable process for renewable energy development in the REEA.

Alternative 6 meets the BLM purpose and need because it makes an implementation decision to approve the issuance of one pending noncompetitive federal geothermal leasing application (CACA 047196), subject to certain stipulations. It also responds to pending national policy and Congressional direction to develop these resources by allocating certain lands as suitable for consideration for geothermal resource leasing and solar energy development. The process for selecting Alternative 6 has included extensive effort on the part of BLM, the USFWS, other agencies, and members of the public to identify an alternative that accomplishes the purpose and need and other project objectives. In response to comments received on the Draft EIS, BLM added the following constraints to energy development in the West Chocolate Mountains REEA while still accomplishing the purpose and need and meeting other project objectives. These included use restrictions, stipulations, and BMPs which can be found in

Section 2.2.6.2 and Appendices G and I of the Final EIS. In addition, the following constraints were added to the action alternatives:

- Designate LWCF lands (Catellus acquisition) as avoidance areas for surface disturbance;
- Limit surface disturbance east of the Coachella Canal to less than 10 percent of the available BLM managed surface lands in the West Chocolate Mountains REEA;
- Restrict development near hydrologic features;
- Restrict development near certain special status species; and
- Close the West Chocolate Mountains REEA to wind energy development.

Based on the comparative analysis of the ability of each alternative to meet the purpose and need, and the environmental impacts that would be associated with each alternative, as discussed in the Final EIS and as summarized previously, Alternative 6 was identified by the BLM as the alternative that best achieves the purpose and need, consistent with BLM's management of public lands pursuant to the FLPMA and other authorities referenced below.

Achieve BLM Goals and Objectives

Alternative 6 will meet federal and state objectives for renewable energy development. Alternative 6 also will assist the BLM in addressing several management and policy objectives advanced through the following authorities applicable to the BLM:

1. Executive Order 13212, dated May 18, 2001, which mandates that agencies act expediently and in a manner consistent with applicable laws to increase the "production and transmission of energy in a safe and environmentally sound manner;"
2. Section 211 of the Energy Policy Act of 2005, which established a goal for the Secretary of the Interior to approve 10,000 megawatts of electricity from non-hydropower renewable energy projects located on public lands; and
3. Secretarial Order 3285A1 (March 11, 2009, as amended February 22, 2010), which "establishes the development of renewable energy as a priority for the Department of the Interior."

Additionally, the BLM consulted extensively with affected Native American tribes and other responsible parties to modify the West Chocolate Mountains REEA to minimize impacts to biological, cultural, and water resources. Alternative 6 provides the best balance between maximizing renewable energy capacity while reducing adverse impacts.

Incorporate CDCA Plan Management Considerations

The CDCA Plan amendment is warranted. The Selected Alternative will result in fewer significant, unmitigable impacts to biological and water resources than would occur with the other action alternatives, while still providing the opportunity for solar and geothermal energy development. Approval of the Plan amendment, based upon NEPA analysis, satisfies the

requirements of the CDCA Plan related to the approval of renewable energy facilities on unclassified lands outside of existing energy generation and transmission corridors.

Incorporate Appropriate Protective Measures

The USFWS BO (April 23, 2013) stated:

- The USFWS has jurisdiction over threatened and endangered species listed under the Endangered Species Act (ESA) of 1973, as amended (16 United States Code [U.S.C.] 1531 et seq.). The BLM complied with its obligations under ESA Section 7(a)(2) by consulting with the USFWS regarding the programmatic/plan-level effects on the threatened Mojave desert tortoise for the land use plan amendment. After reviewing the current status of the desert tortoise, environmental baseline for the action area, and effects of the proposed action and cumulative effects on the desert tortoise, the USFWS determined that the proposed action is not likely to jeopardize the continued existence of the desert tortoise. Because the project is not in or adjacent to designated critical habitat for the tortoise, critical habitat would not be affected.
- The USFWS did not provide an exemption from the prohibitions against take, as described in Section 9 of the ESA, or for the incidental take that may result from future actions that will require separate review and authorization by BLM. The USFWS will review the effects of those actions and, through project-specific Section 7 consultation, issue incidental take statements in the future, if appropriate, when BLM requests formal consultation on future discretionary actions. As noted in the BO, the geothermal lease within the West Chocolate Mountains REEA (CACA 047196) will be subject to standard stipulations, and additional conservation measures will be developed as a part of future, site-specific analyses and permitting considerations covering subsequent proposed exploration, development, or utilization.
- That all terms and conditions identified in the BO are adopted in this ROD;
- That stipulations and BMPs adopted by this ROD (Appendices B and C) to ensure compliance with all applicable laws, regulations, standards, guidelines and policies will mitigate the impacts to cultural, biological, and other environmental resources to the maximum extent practicable, including water resources, riparian/wetland habitat, Munz cholla, bald and golden eagles, desert pupfish, southwestern willow flycatcher, Yuma clapper rail, least Bell's vireo, flat-tailed horned lizard, desert tortoise, and Nelson's bighorn sheep, among others.

6.0 Land Use Plan Conformance

6.1 CDCA Plan

The CDCA Plan is a comprehensive, long-range plan that was adopted in 1980 and has since been amended numerous times. The CDCA is a 25 million-acre area that contains over 12 million acres of BLM-administered public lands in the California Desert. The site proposed for the West Chocolate Mountains REEA includes approximately 64,058 acres of BLM-administered land in the CDCA. Goals and actions for each resource managed by the BLM are

established in the 12 elements in the CDCA Plan. Each plan element provides a Desert-wide perspective of the planning decisions for one major resource or issue of public concern, as well as a more specific interpretation of multiple-use class guidelines for a given resource and its associated activities.

The West Chocolate Mountains REEA multiple use class (MUC) is identified in the CDCA Plan as unclassified. Unclassified lands are scattered and isolated public lands that have not been assigned a MUC designation. These lands are managed on a case-by-case basis, as described in the Land Tenure Adjustment Element of the CDCA Plan and are provisionally available for geothermal leasing and authorization of solar and wind projects. Any future applications for geothermal, solar, or wind projects would be processed on an individual basis, including separate NEPA and other environmental review, with any necessary plan amendments initiated at that time, consistent with the goals and objectives of the CDCA Plan.

This ROD amends the CDCA Plan to designate the West Chocolate Mountains REEA as suitable for geothermal and solar energy development; therefore, further planning is not likely to be necessary in this respect.

The West Chocolate Mountains REEA ROD is also consistent with the Western Colorado (WECO) Route of Travel Plan, which amended the CDCA Plan in 2003 to designate and manage off-road trail use in the region.

Land Use Plan Amendment Analysis

All land use actions and resource management activities on public lands within a MUC designation must meet the guidelines for that class. Unclassified lands are managed on a case-by-case basis, and there are no specific guidelines for them. The only guidelines applicable to unclassified lands are those described below.

Land Tenure Adjustment Element

Pursuant to the Land Tenure Adjustment Element of the CDCA Plan, the sale of public lands, including unclassified lands, may be allowed in accordance with the FLPMA and other applicable federal laws and regulations. The BLM will consider retaining or transferring to other appropriate managing agencies those unclassified parcels containing sensitive resources. Parcels with known mineral resources will be selectively retained. All other unclassified lands will be evaluated, and determinations will be made on retention or disposal. The West Chocolate Mountains REEA ROD is consistent with this guidance.

Motorized Vehicle Access Element

Pursuant to the CDCA Plan, new open, closed, and limited route designations may be made under ROW grants and leases in unclassified lands. Vehicle access limitations will be implemented, where necessary, in unclassified lands. Existing routes of travel may be used in unclassified lands, unless other limitations are in effect. The West Chocolate Mountains REEA ROD is consistent with this guidance.

CDCA Plan Decision Criteria

The CDCA Plan defines specific decision criteria to be used by the BLM in evaluating applications in the Energy Production and Utility Corridors Element of Chapter 3. The consideration of these decision criteria for both the plan amendment and the lease application elements of Alternative 6 is described below:

- **Minimize the number of separate ROWs by utilizing existing ROWs as a basis for planning corridors**. This ROD grants a geothermal lease; it does not constitute an application for a ROW associated with any Application for Permit to Drill (APD). Depending on where they are sited, the geothermal facilities that could be constructed within the geothermal lease may or may not be within designated corridors. Placement of the transmission interconnections in all existing designated corridors maximizes the joint use of these corridors for electrical transmission.
- **Provide alternative corridors to be considered during processing of applications**. This decision criterion is not applicable to the West Chocolate Mountains REEA. Placement of geothermal facilities adjacent to existing corridors does not require designation of alternative corridors.
- **Avoid sensitive resources wherever possible**. This ROD grants a geothermal lease; it does not constitute an APD. Once an APD is received, the application will be evaluated and direction regarding the avoidance or minimization of impact to sensitive resources will be provided.
- **Conform to local plans whenever possible**. The extent to which the West Chocolate Mountains REEA conforms to local plans is addressed in Section 4.12 of the Final EIS. The West Chocolate Mountains REEA ROD conforms to the Imperial County General Plan, to the extent applicable. As the California Environmental Quality Act (CEQA) lead agency, the County of Imperial would ensure conformity with the County General Plan for any projects that would be developed on Imperial County property. A Governor's Consistency Review (dated January 7, 2013, and available as part of the administrative file for this planning initiative) did not identify any inconsistencies with local plans, policies, or programs.
- **Consider wilderness values and be consistent with the final wilderness recommendations**. The West Chocolate Mountains REEA is not within a designated Wilderness Area or WSA. Additionally, it is not located on lands with wilderness characteristics, as described in Section 4.16 of the Final EIS.
- **Complete the delivery systems network**. This decision criterion is not applicable to the West Chocolate Mountains REEA.
- **Consider ongoing projects for which decisions have been made**. This decision criterion is not applicable to the West Chocolate Mountains REEA.
- **Consider corridor networks that take into account power needs and alternative fuel sources**. This decision criterion is not applicable to the West Chocolate Mountains REEA.

6.2 WECO OHV Routes of Travel Designation Plan Amendment to the CDCA Plan

The WECO planning area is located in the western half of Imperial County in southern California and offers outstanding recreational opportunities for OHV touring in the California Desert District. In 2002, the WECO Plan Amendment to the CDCA Plan amended previous route designations and existing routes on approximately 475,000 acres of public lands designated as limited use areas for OHV use. The WECO OHV Routes of Travel Designation Plan Amendment encompasses all lands within the West Chocolate Mountains REEA.

The BLM must carefully manage OHV use so that the conditions of special status species and other natural and cultural resources are maintained or improved. The type and level of OHV use also must be carefully managed to create an environment that promotes the health and safety of visitors, employees, and nearby residents.

This ROD is intended to build on the provisions in the WECO Plan Amendment. With the proposed BMPs and stipulations described in the EIS and adopted in the ROD, the intent and purpose of the WECO Plan Amendment should remain unaltered, except for management guidelines specific to the West Chocolate Mountains REEA. These guidelines include improved air quality standards and more stringent or protective measures for most resources within the West Chocolate Mountains REEA. These guidelines will complement and/or enhance the mitigation provisions in the WECO Plan Amendment and add protections for other resources not specifically mentioned.

6.3 Utility Corridors

The purpose of the designated CDCA utility corridors is to implement a network of joint-use planning corridors to meet the projected utility needs and concentrate the effects of energy related projects and utilities in manageable locations. Two corridors (M and T) cross the West Chocolate Mountains REEA. Corridor M is a utility corridor that has always been in the CDCA Plan, even after it was amended. There are utility ROWs within Corridor M, and a major ROW includes the Imperial Irrigation District's 230-kilovolt transmission line. Corridor M crosses the length of the REEA, from the northwest to the southeast, and is adjacent to the East Highline Canal. Corridor T was designated as a contingent corridor because of the level of uncertainty associated with any power plants and utilities proposed in the area. Further, Corridor T is an alternative for the transmission of energy generated by either geothermal or conventional power plants, and is improved with existing electric transmission facilities. Corridor T splits off of Corridor M and continues along the east side of the Imperial Sand Dunes Recreation Area. This ROD makes no changes to these corridors.

7.0 Authority for Action

7.1 Federal Land Policy and Management Act

The FLPMA provides the BLM's overarching mandate to manage the public lands and resources under its stewardship through the principles of multiple use and sustained yield. Multiple use is a concept that directs management of public lands and their resource values in a

way that best meets the present and future needs of Americans and is defined as "a combination of balanced and diverse resource uses that takes into account the long-term needs of future generations for renewable and nonrenewable resources" (FLPMA Section 103(c)). Section 202 of the FLPMA also requires the BLM to manage public lands consistent with land use plans developed through a public process (FLPMA Section 202(f)). Title V of the FLPMA authorizes the BLM to grant ROWs over, upon, under, or through public lands for uses such as solar and wind energy projects and transmission lines (FLPMA Section 501(a)).

The BLM processes ROW grant applications for solar and wind energy development in accordance with regulations implementing the FLPMA at 43 CFR 2804.25 and BLM's Instruction Memorandum (IM) 2011-060 Solar and Wind Energy Applications – Due Diligence. The IM ensures BLM-wide consistency in processing ROW applications and managing authorizations for wind energy site testing and development on public lands.

7.2 California Desert Conservation Area Plan

Consistent with the requirements of the FLPMA, the BLM manages public lands pursuant to land use plans. For the West Chocolate Mountains REEA, the relevant land use plan is the CDCA Plan. The CDCA Plan groups lands into four MUCs. The lands in the West Chocolate Mountains REEA are unclassified. These are scattered and isolated public lands that are managed on a case-by-case basis. Thus, intensive renewable energy development would be allowed, but the development cap, which would limit surface disturbance east of the Coachella Canal to less than 10 percent of the BLM managed surface land (700 acres) in the REEA, would minimize resource impacts east of the Coachella Canal.

7.3 Geothermal Steam Act

The Geothermal Steam Act, as amended, governs the leasing of geothermal steam and related resources on public lands. This act authorizes the Secretary of the Interior to issue leases for development of geothermal resources and also prohibits leasing on a variety of public lands, such as those administered by the USFWS. The BLM approves the pending noncompetitive lease application and shall issue federal geothermal lease CACA 047196 in accordance with federal regulations at 43 CFR 3200 and the Geothermal Steam Act of 1970, as amended.

8.0 Relationship of Action to Other Plans, Programs, and Policies including Consultation with Other Agencies

8.1 National Environmental Policy Act

When taking actions such as approving ROW grants or amending plans, the BLM must comply with the applicable requirements of NEPA and its implementing regulations (40 CFR Parts 1500-1508, and 43 CFR Part 46). The Draft EIS, Final EIS, and this ROD document the BLM's compliance with these requirements.

Future proposed actions, such as applications for leases, ROWs, or other authorizations that may be associated with development of renewable energy resources, will be reviewed, as appropriate, pursuant to NEPA, when such actions are proposed.

8.2 Endangered Species Act Section 7

The BLM's authorization of the requested geothermal lease, including the resulting consultation and coordination with the USFWS, complies with Section 7 of the ESA regarding potential take of desert tortoise. Formal consultation with the USFWS concluded with the April 23, 2013 issuance of a BO (Appendix A) for the West Chocolate Mountains REEA related to potential impacts to desert tortoise. Implementation of the conservation measures identified in the BO will reduce potential adverse impacts to this species. The BO concluded that the levels of anticipated take associated with the West Chocolate Mountains REEA are not likely to jeopardize the continued existence or significantly impair the recovery of the desert tortoise. Implementation of the terms and conditions to minimize take identified in the BO is mandatory and a condition of approval set forth in this ROD. The geothermal lease for the project contains a standard stipulation requiring compliance with the BO, as amended.

8.3 National Historic Preservation Act Section 106 & Government-to-Government Consultation

The BLM sent letters to 17 Native American tribes, chapters, and bands, and followed up with additional letters, phone calls, emails, and meetings, to determine levels of interest in further discussions regarding the West Chocolate Mountains REEA EIS. The BLM El Centro Field Office sent a letter to the tribes in February 2010 inviting government-to-government consultation, followed by an April 2010 letter from the BLM California Desert District Office inviting those tribes to be cooperating parties. In February 2011, the BLM El Centro Field Office sent a letter inviting tribes to engage in government-to-government consultation and providing notification of the availability of the Class I Cultural Resource Report and the upcoming release of the Draft EIS. In July 2011, the BLM El Centro Field Office sent a letter inviting tribes to engage in government-to-government consultation, providing notification of the Draft EIS and the availability of the cultural resources records and literature report, and inviting tribes to attend an August 18, 2011 open house. Additionally, the BLM El Centro Field Office sent a letter to the tribes, dated December 17, 2012, notifying them of the availability of the Final EIS, with a continued invitation to engage in government-to-government consultation pursuant to Section 106.

The BLM El Centro Field Office made follow-up phone calls to the tribes who received the Final EIS in February 2013. The primary concern expressed by the tribes during these calls was the treatment of cultural resources within tribal traditional use areas. That concern would be addressed at the time a project is proposed through surveys, project design, and mitigation to avoid or reduce impacts.

In accordance with the *State Protocol Agreement Between the California State Director of the Bureau of Land Management and the California State Historic Preservation Officer and the Nevada State Historic Preservation Officer*[1] (State Protocol Agreement, revised 2012, Section II(D)(1), p. 7) the BLM has considered the views of the State Historic Preservation Office (SHPO). The BLM El Centro Field Office sent a letter to the SHPO on February 5, 2013, requesting concurrence on the BLM's findings of no adverse effect to historic properties. The BLM received a letter from the SHPO dated July 26, 2013 concurring with the finding of no adverse effect and stating that Section 106 consultation is concluded for the planning effort.

8.4 Clean Water Act

The Clean Water Act (CWA) regulates discharges of pollutants into the waters of the United States. Section 404 of the CWA requires authorization, through the U.S. Army Corps of Engineers (USACE), for the discharge of dredged or fill material into all waters of the United States, including wetlands, both adjacent and isolated. Section 401(a)(1) of the CWA made it unlawful to discharge any pollutant from a point source into navigable waters, unless a permit was obtained as required under Section 401. Per Section 401, any activity which may result in a discharge into waters of the United States must be certified by the California State Water Resources Control Board (SWRCB), as administered by the Regional Water Quality Control Boards (RWQCBs). The proposed West Chocolate Mountains REEA is located in the jurisdiction of the Colorado River RWQCB.

It is assumed that all streams or aquatic resources located on site within the West Chocolate Mountains REEA are jurisdictional, should be considered provisionally restricted from development, and the BLM would accept USACE mitigation requirements for permitting projects. Some of these streams may flow directly into the Salton Sea or into canals and drainages prior to entering the Salton Sea; a Section 404 permit is likely required for any type of discharge of dredged or fill material in ephemeral streams within the West Chocolate Mountains REEA. The USACE would restrict from development all jurisdictional waters from high water mark to high water mark and impose strict conditions on the use of any lands within (such as road crossings).

All washes identified by the U.S. Geological Survey (USGS) National Hydrography Dataset within the West Chocolate Mountains REEA would be expected to have restrictions on development and/or significant stipulations. Submittal of a Jurisdictional Determination for streams within the REEA and submittal of a Preliminary Jurisdictional Determination form required by the USACE to expedite the determination process would be required. Consultation with the USACE through pre-application meetings during the design phase of projects will be encouraged to avoid and minimize impacts to aquatic resources.

[1] The Supplemental Procedures for Fluid Minerals Leasing, a supplement to the State Protocol Agreement, outlines the process for managing noncompetitive geothermal lease applications and the approval of any ground disturbing activity that might result from such a lease.

8.5 Solar Programmatic EIS

The Solar Programmatic EIS ROD was signed on October 12, 2012. The purpose of the proposed action considered in the Solar Programmatic EIS was to evaluate utility-scale solar energy development, to develop and implement agency-specific programs or guidance that would establish environmental policies and mitigation strategies for solar energy projects, and to amend relevant BLM land use plans with the consideration of establishing a new BLM Solar Energy Program. The BMPs proposed for consideration in the Solar Programmatic EIS were incorporated into the West Chocolate Mountains REEA Final EIS and are adopted in this ROD.

8.6 United States Department of Defense

The BLM coordinated with the DOD prior to selection of Alternative 6 to ensure this alternative would not interfere with military training routes. The BLM received correspondence from Marine Corps Installations West on the Draft EIS regarding potential military mission impacts associated with the project. Marine Corps Installations West highlighted concerns related to:

- The effect of the heights of renewable energy structures and transmission lines on aviation operations;
- The effect on military ground activity on and around the Chocolate Mountain Aerial Gunnery Range;
- Certain types of ambient lighting that could affect night vision goggle usage;
- The potential for ground and airborne Doppler radar interference from wind turbine blades;
- Radio frequency spectrum impacts; and
- Displacement of recreational users onto the Chocolate Mountain Aerial Gunnery Range.

As a result of these comments, structures taller than 200 feet are prohibited in the West Chocolate Mountains REEA so that military flight operations will not be affected. The military's other concerns would be considered during site-specific review of future proposed projects in the REEA.

8.7 Consultation with State, Regional, and Local Agencies

Governor's Consistency Review

The BLM provided the proposed CDCA Plan Amendment/Final EIS to the Governor of California's Office of Planning and Research, pursuant to BLM's consistency review regulations at 43 CFR 1610.3-2. In their letter dated January 7, 2013, the Governor's Office found no inconsistencies between the Plan Amendment and state or local plans, policies, or programs. The Governor's Consistency Review is available as part of the administrative file for this planning initiative.

9.0 Public Involvement

9.1 Scoping

The BLM solicited internal and external input on the issues, impacts, and potential alternatives to be addressed in the planning initiative and EIS. Internal input was provided by the BLM and cooperating agency staff through an interdisciplinary process to help define issues, alternatives, and data needs. External scoping involved notification and opportunities for feedback from other agencies, organizations, tribes, local governments, and the public. The BLM published the Notice of Intent (NOI) in the Federal Register on February 10, 2010, 75(27):6698-6699. An initial 30-day scoping period for the Proposed Action was held from February 10, 2010 to March 12, 2010. On February 10, 2010, the BLM extended the scoping period to March 19, 2010 to provide an opportunity for all interested parties to participate in the process.

The BLM held one public scoping meeting near the project location, at the Calipatria Inn and Suites, located at 700 North Sorensen Avenue, Calipatria, California, from 6:30 p.m. to 8:30 p.m., on March 4, 2010. There were 19 attendees at the meeting. An open house was held 30 minutes prior to the meeting to allow participants to review displays, maps, and literature, as well as to meet members of the EIS team and BLM staff.

The public meeting was recorded, a transcript was prepared, and written electronic comments received during the scoping period were catalogued. During the scoping period, 179 comments were received from 12 commenters: one electronic comment was received from the Agua Caliente Indian Tribe; three comment letters were received from agencies; three comment letters, one comment card, and two verbal comments were received from non-governmental organizations; and one comment letter and one verbal comment were received from individuals at the public scoping meeting. These scoping comments helped guide development of the range of alternatives and helped identify issues to be analyzed.

9.2 Draft EIS Publication Comment Period and Publication of Final EIS

Publication of the West Chocolate Mountains REEA Draft EIS/CDCA Plan Amendment initiated a 90-day public comment period from June 30 to September 30, 2011. The BLM held one public comment meeting near the project location, at the Fairfield Inn and Suites, located at 503 East Danenberg Road, El Centro, California, from 6:30 p.m. to 8:30 p.m., on September 1, 2011. Five members of the public attended the meeting. An open house was held 30 minutes prior to the meeting to allow participants to review displays, maps, and literature, as well as to meet members of the EIS team and BLM staff. To encourage public comment, repositories were provided for the public to deposit written comments.

The BLM received 26 comment letters on the Draft EIS/CDCA Plan Amendment from federal, state, and local agencies, tribes, companies and organizations, and individuals. The comments received and the BLM's responses to those comments are provided in Appendix J of the Final EIS. Additionally, Table 1-2 in Chapter 1 of the Final EIS lists the commenter, the topic of their comment, and the location of the BLM's response to the comment in the text of the Final EIS/Proposed CDCA Plan Amendment.

Changes to the EIS that resulted from public comments included:

- Limiting surface disturbance on solar and geothermal development east of the Coachella Canal to less than 10 percent of all BLM managed surface land in the REEA;
- Identification of stipulations to be applied as appropriate to solar or geothermal energy development;
- Restrictions on development in proximity to hydrologic features;
- Restrictions on development in proximity to certain special status species and their habitats; and
- Preparation of a water supply assessment.

The Final EIS/Proposed CDCA Plan Amendment was published in the Federal Register (76 FR 21402) on November 30, 2012. An amendment to an approved land use plan is to be approved by the State Director only after resolution of any protests by the BLM Director (43 CFR 1610.5). No protests were received on this proposed plan amendment.

10.0 Administrative Remedies

Administrative remedies may be available to those who believe they will be adversely affected by the leasing decision. Appeals may be made to the Office of Hearings and Appeals, Office of the Secretary, U.S. Department of Interior, Board of Land Appeals in strict compliance with the regulations in 43 CFR Part 4. Notices of appeal must be filed with the State Director within 30 days after publication of this decision pursuant to 43 CFR Part 4, Subpart E. If a notice of appeal does not include a statement of reasons, such statement must be filed with this office and the Board of Land Appeals within 30 days after the notice of appeal is filed. The notice of appeal and any statement of reasons, written arguments, or briefs must also be served upon the Regional Solicitor, Pacific Southwest Region, U.S. Department of Interior, 2800 Cottage Way, E-1712, Sacramento, California 95825. Please consult the appropriate regulations (43 CFR Part 4 Subpart E) for further appeal requirements.

The effective date of this decision (and the date initiating the appeal period) will be the date this decision is posted on the BLM California website.

11.0 Decisions

11.1 Plan Amendment

It is my decision to amend the CDCA Plan to identify the West Chocolate Mountains REEA as suitable for geothermal and solar energy development and unsuitable for wind energy development, as detailed above. This approval is effective on the date this ROD is signed.

11.2 Geothermal Lease

It is also my decision to approve the pending geothermal lease (CACA 047196) subject to the terms, conditions, stipulations, and environmental protection measures reflected in this ROD. This decision is effective on the date this ROD is signed.

Approved by: _____ Date: August 12, 2015

James G. Kenna
State Director, California
Bureau of Land Management

Appendix A

U.S. Fish and Wildlife Service Biological Opinion

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Carlsbad Fish and Wildlife Office
6010 Hidden Valley Road, Suite 101
Carlsbad, California 92011

In Reply Refer To:
FWS-IMP-11B0326-13F0101

APR 23 2013

Memorandum

To: District Manager, California Desert District Office, Bureau of Land Management
Moreno Valley, California

From: Field Supervisor, Carlsbad Fish and Wildlife Office
Carlsbad, California

Subject: Section 7 Biological Opinion on the West Chocolate Mountains Renewable Energy Evaluation Area, Imperial County, California

This memorandum transmits the U.S. Fish and Wildlife Service's (Service) biological opinion on the Bureau of Land Management's (BLM) proposed amendment of the California Desert Conservation Area (CDCA) Plan to allocate rights-of-ways on BLM-managed lands within the West Chocolate Mountains Renewable Evaluation Area (WCMREEA) for developing solar facilities and leasing the sub-surface Federal mineral estate for geothermal energy testing and development. The WCMREEA is located in Imperial County, California, north of the city of Calipatria, east of the Salton Sea, west of the Chocolate Mountains Aerial Gunnery Range (AGR) (Figure 1). This biological opinion analyzes the landscape level effects of the land use plan amendment on the federally threatened Mojave desert tortoise (*Gopherus agassizii*, tortoise or desert tortoise) in accordance with section 7 of the Endangered Species Act of 1973 (Act), as amended (16 U.S.C. 1531 *et seq.*). Although this opinion addresses plan-wide effects of potential future development, it does not authorize future individual projects within the WCMREEA without separate consultation requirements. We received a request for formal consultation, dated August 8, 2012, and requested more information about the action on September 8, 2012; we received the additional information on December 11, 2012. Because the proposed WCMREEA is not in or adjacent to designated critical habitat, tortoise critical habitat would not be affected.

This biological opinion is based on information provided in the following documents and communications: (1) *Biological Assessment West Chocolate Mountains Renewable Energy Evaluation Area* (BLM 2012a); (2) *Draft Environmental Impact Statement and Proposed California Desert Conservation Area Plan Amendment for the West Chocolate Mountains Renewable Energy Evaluation Area* (BLM 2012b); (3) *Final Environmental Impact Statement and Proposed California Desert Conservation Area Plan Amendment for the West Chocolate Mountains Renewable Energy Evaluation Area* (BLM 2012c); and (4) pertinent literature contained in our files. The project file for this consultation is located at the Carlsbad Fish and Wildlife Office.

CONSULTATION HISTORY

Discussions concerning consultation on the WCMREEA started in January 2011, and continued as the Service and BLM met and exchanged emails to develop conservation measures to minimize potential impacts to listed species. We discussed avoidance measures for desert pupfish (*Cyprinodon macularius*), Yuma clapper rail (*Rallus longirostris yumanensis)*, southwestern willow flycatcher (*Empidonax traillii extimus*), and least Bell's vireo (*Vireo bellii pusillus*). Avoidance measures for the aforementioned species included developing setbacks from wetland habitat that is or could be occupied by species, and buffers from drainage features that function as wildlife movement corridors. On this basis, we concur with the BLM that the proposed action is not likely to adversely affect these listed species.

The Service also worked collaboratively with the BLM El Centro Field Office in developing conservation measures for desert tortoise and a conservation-oriented alternative for the Environmental Impact Statement (EIS). In addition, we provided comments during the EIS process recommending exclusion of the acquired Catellus land from potential development, and restrictions to the extent of development in desert tortoise habitat in undisturbed habitats in the southeastern portion of the plan amendment area. A new threatened and endangered species list was sent on June 27, 2012, from the Palm Springs Fish and Wildlife Office (PSFWO). We began the 135-day timeline for formal consultation upon receipt of an updated biological assessment on December 11, 2012 (BLM 2012a).

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The proposed action is to amend the CDCA plan and identify BLM lands within the WCMREEA as suitable for geothermal leasing and development, and solar energy production. According to the biological assessment, solar thermal power tower technology is not being considered for development within the WCMREEA (BLM 2012a). The CDCA plan identifies Multiple Use Classes (i.e., C- Controlled Use, L- Limited Use, M- Multiple Use, I- Intensive Use and U- Unclassified) for lands within the planning area (BLM 1980). The classification strategy was the primary component used in designing the plan and was based on the sensitivity of resources and existing or anticipated uses of each geographic area. Each class described a different type and level or degree of use permitted in any given geographic area. Unclassified lands were intended to be managed on a case-by-case basis.

The lands within the WCMREEA were left unclassified and remain so today. Parcels of these lands containing sensitive resources were to be retained by the BLM or transferred to other appropriate managing agencies to protect resource values. Lands with known mineral values are to be selectively retained by the BLM. Under this amendment, the west side of the Coachella Canal would be identified as a Solar Energy Zone (SEZ) and will allow project-specific consideration, processing, and potential approval of geothermal and solar energy development. However, the lands east of the Coachella Canal would not be considered as a SEZ (BLM 2012c).

The planning area has existing infrastructure, such as railroads, power transmission lines, and major highways; and contains previously designated transmission line corridors. Lands within the WCMREEA generally meet some of the criteria found to be favorable to renewable energy development. For example, much of the land west of the Coachella canal has been previously disturbed by mining, agricultural, and military activities; thus, focusing renewable energy development on these lands would reduce the potential need for development in undisturbed desert habitats in the southeastern portion of the plan area and other regions.

Reasonably foreseeable development scenarios have been prepared as a basis for analyzing environmental impacts resulting from future leasing and development of Federal lands within the plan area. A synopsis of each scenario is included as a part of the proposed action, which includes the potential impacts associated with solar or geothermal development. For a complete, detailed description of the technology, constraints, and specific potential effects associated with reasonably certain development scenarios for both geothermal and solar, please refer to the BLM Biological Assessment or the WCMREEA Final EIS (BLM 2012a, 2012c).

Our biological opinion is scaled to the programmatic approach associated with the CDCA plan amendment for WCMREEA, as envisioned in draft Service policy (Service 2003). Programmatic consultations can provide the benefit of streamlining the consultation process while leading to a more landscape-based approach to consultations that can minimize the potential "piecemeal" effects that can occur when evaluating individual projects out of the context of a complete agency program. Due to the number of potential solar energy projects and lack of project-level information, a tiered-programmatic approach has been taken by the Service in an attempt to analyze potential effects to desert tortoise associated with the proposed land-use change; future desert tortoise consultations will be tiered off this biological opinion. This programmatic biological opinion analyzes the potential for jeopardizing the continued existence of the desert tortoise regarding the land use plan amendment but does not exempt incidental take of any existing or future actions.

For individual projects proposed under the tiered programmatic consultation, project-specific information will be provided that describes: (1) each proposed action and the specific areas to be affected; (2) the manner in which the proposed action may affect desert tortoise or any newly listed species; (3) anticipated effects; (4) whether anticipated effects from the proposed project are consistent with those analyzed in the programmatic biological opinion; (5) proposed programmatic conservation measures and any measures to minimize potential effects of the action; and (6) any additional effects, if any, not considered in the programmatic consultation. The Service reviews this information and then completes a tiered biological opinion with a project-specific incidental take statement. This document, while meeting the basic requirements of biological opinions as specified at 50 CFR 402.14(h), generally requires less effort to complete because it references back, or tiers, to the program-level biological opinion.

The WCMREEA (BLM and non-BLM land) consists of approximately 63,486 acres with private lands, lands managed by the California State Lands Commission, Bureau of Reclamation (BOR) lands, split estate land with a privately-owned surface estate and a federally-owned minerals

estate, and land acquired from the Catellus Corporation in conjunction with the Wildlands Conservancy, using Land Water Conservation Fund monies (see Table 1).

Table 1. Surface and mineral ownership.

Land Owner	Land Interest	Acres
BLM	Federal surface/federal minerals	19,570
Bureau of Reclamation	Federal surface/Federal minerals	1,520
California State Lands Commission	State surface/State subsurface	3,806
Private Land	Private surface/Private subsurface	38,891
Catellus Corporation (acquired lands)	Federal surface/Private subsurface	2,863
Split Estate	Private surface/Federal minerals	1,702
	Total	**63,468**
	Total Base Acres Available for Renewable Energy Development	**59,085**
	Total BLM Acres Available for Renewable Energy Development	**19,570**

The BLM has developed stipulations for proposed renewable energy development in the WCMREEA. These stipulations are geared toward protecting wildlife habitat, riparian areas, wetlands, and surface waters, and avoiding development on donated/acquired conserved lands in accordance with BLM's Instruction Memorandum CA IM-2009-020 (BLM 2009). The following general stipulations will be applied to all future energy projects within the WCMREEA:

- A 10 percent cap on renewable energy development surface disturbance on 7,006 acres BLM lands east of the Coachella Canal (equals 701 acres of potential development);
- Avoidance of development on the 2,863 acres of donated/acquired Catellus lands, east of the Coachella Canal;
- Avoidance of geothermal or surface leasing on 1,520 acres of BOR withdrawn lands;
- A 3:1 compensation ratio for impacts to desert tortoise habitat east of the Coachella Canal;
- A minimum 100-foot buffer from drainage features that function as wildlife movement corridors but do not contain suitable habitat for listed species; and
- A 0.25-mile setback from wetland/riparian habitat that is occupied by listed species (i.e., desert pupfish) or that could be occupied by listed species (e.g., Yuma clapper rail, southwestern willow flycatcher, least Bell's vireo).

With implementation of the 0.25-mile buffer from wetlands and riparian habitat the BLM has determined that the potential effects of future projects would be insignificant and discountable and that the proposed action may affect but, is not likely to adversely affect desert pupfish, southwestern willow flycatcher, least Bell's vireo, and Yuma clapper rail. The Service worked collaboratively on helping develop these general stipulations and we concur with BLM's determination. Therefore, these species will not be discussed further in this biological opinion.

No changes in off-highway vehicle (OHV) route designations will be made for this action. However, if BLM receives proposals for renewable energy exploration or development, changes in route designations may be proposed. This alternative would allow for changes to routes of travel designations in the WCMREEA to be authorized through an implementation level National Environmental Policy Act action. Such proposed changes would be analyzed in a subsequent environmental document (environmental assessment or EIS) prepared for the proposed exploration or development project.

As a part of the land-use amendment, the BLM would grandfather in the pending existing noncompetitive geothermal lease application. The lease application in the WCMREEA (CACA 047196) for 640 acres was filed in May 2005, prior to the Energy Policy Act, and is, therefore, considered to be a noncompetitive application. The geothermal lease would be subject to standard stipulations within the WCMREEA and additional conservation measures would be developed as a part of future, site-specific analyses and permitting considerations covering subsequent proposed exploration, development, or utilization activities.

Decisions made as a result of this planning effort will allocate land uses and will not authorize specific energy developments at this time. Additional project-specific environmental analyses and consultations with the Service will be conducted prior to ground-disturbing development activities within the WCMREEA. The proposed action incorporates *Best Management Practices and Guidance Manual, Desert Renewable Energy Projects,* compiled by the Renewable Action Team agencies: California Energy Commission (CEC), California Department of Fish and Wildlife (CDFW), BLM, and Service, and *Best Management Practices from the 2010 BLM Geothermal, Solar, and Wind Programmatic Environmental Impact Statements*, both found in the Final EIS Volume 2 Appendix I (BLM 2012c). Tortoise-specific best management practices that will be included in future project-specific desert tortoise tiered consultations are listed in the "Conservation Measures" section.

Geothermal Development Reasonably Foreseeable Development Scenario

Under the proposed action, the CDCA Plan would be amended to identify sites within the WCMREEA as suitable for geothermal leasing and development. Additional conservation measures would be developed as a part of future, site-specific analyses and permitting considerations covering subsequent proposed exploration, development, or utilization activities. In addition to the stipulations listed above, the following constraints are specified for geothermal development:

- Adequate water supply (200-300 gallons of water per megawatt [MW] per hour); and
- Preparation of a Water Supply Assessment under SB-610.

Portions of the WCMREEA may be determined to be unsuitable for geothermal development if the constraints listed above are discovered during project planning or following further future studies as determined necessary by an authorized officer. For the reasonably foreseeable development scenario, it is assumed that three 50-MW power plants would be constructed.

Exploration

Exploration typically begins with a geochemical survey, in which ground waters (i.e., both thermal and non-thermal) are sampled and analyzed for their chemical content. This may involve creating access to areas with no roads or poor roads (e.g., using four- wheel drive vehicles or on foot). In vegetated areas, some cutting of vegetation may be required for access; however, this is unlikely to be the case in WCMREEA, where the vegetation is generally low and sparse. Sampling of groundwater would entail either drilling monitoring wells or using existing production wells.

In addition, soil gases may be measured installing gas collectors. Soil gas sampling may result in minor disturbances to a number of small areas (i.e., less than 3 square feet) because the sensors are partially buried. The gas collectors are left for a few days before they are removed from the site. Other than this, chemical sampling generally creates no impact.

Sites will probably be geologically mapped during geothermal exploration activity. Geologists may make on-the-ground observations to obtain more geologic detail and to sample rock units for petrologic or other analyses. There is little, if any impact on the area being mapped. Geophysical surveys may also be undertaken, using one of several methods. Surveys that may be undertaken could include gravity, magnetic, seismic, resistivity, and measurements of ground temperature by one of several means. The process of and potential disturbances from these geophysical techniques are discussed below.

Gravity and Magnetic Surveys

Gravity and magnetic surveys are passive (i.e., detecting naturally occurring events) measurements. A gravimeter or magnetometer is moved around the area, and measurements are taken at convenient locations, typically along roads. Where road access is limited, the measuring equipment must be carried to each measurement site. This is typically done either on foot or by using pack animals or all-terrain vehicles. The amount of disturbance to the land from such activities is minimal.

Seismic Surveys

Seismic surveys are typically undertaken by setting up a monitoring array of geophones (i.e., with the data transmitted to a central location) and creating a pulse or series of pulses of seismic energy. The pulse is created either by detonating a charge below the ground surface or by a "thumper truck" that is driven through the area on established roads. The monitoring array may be deployed at the ground surface, in small excavations made specifically for burying the geophones, and/or at the bottom of existing wells. These surveys are typically undertaken over the course of just a few days, thus limiting the impacts associated with the movements of a thumper truck or detonation of a charge. The vibrations from the seismic sources are negligible and would not cause damage to existing structures. Longer term deployment of geophones is sometimes undertaken in areas where natural seismic activity occurs; this is a completely passive data collection method that records naturally occurring earthquakes.

Resistivity Surveys

Resistivity surveys are common in geothermal exploration because variation in the earth's resistivity can occur directly as a result of the presence (or absence) of geothermal fluids. Several possible methods may be used. Some involve laying out long lines (up to several hundred meters) of cable on the surface, typically along roads, although some convenient off-road areas may also be used for this purpose. Others, such as magneto-telluric (MT) surveys, involve setting up equipment repeatedly in small areas (i.e., a maximum of 20 or 30 square feet at each measurement site) and taking many measurements across the prospect. An MT survey is sometimes preferred because it evaluates conditions at greater depths than other resistivity methods (i.e., at depths where the resource is likely to exist, rather than the overlying zone); therefore, it is quite possible that this method would be used within the WCMREEA. In an MT survey, electrodes are buried just beneath the ground surface at each site, and measuring equipment is set up nearby. Each site is monitored for several hours, and the equipment is then moved to the next site. The only disturbance is associated with access to the area and with minor, temporary disturbance of the ground surface to bury the sensors. Each site is restored as closely as possible to its original condition before the next site is monitored.

Shallow Temperature Measurements

Shallow temperature measurements are another geophysical exploration method. These can be made with a long thermal probe, which is inserted into the ground to a specified depth, allowed to stabilize, and removed after the temperature has been recorded. Alternatively, a hand auger may be used to drill short (i.e., less than 6 feet deep), narrow-diameter (i.e., a few inches at most) holes, into which the probe is temporarily placed. This type of survey is likely to be undertaken on foot in a prospective area.

Drilling

The results of geologic mapping, geophysical surveys, and geochemical surveys are likely to define an area considered to be most prospective for drilling. The developer may choose to use temperature-gradient wells (TG wells) first and then use full-diameter (FD) wells, or may move directly to drilling FD wells. TG wells are smaller in diameter and usually shallower than FD wells and cannot be used for either production or injection.

Temperature-Gradient Wells

TG wells enable the investigation of temperatures at shallow depths in and around a geothermal system. These wells are drilled during the exploration phase to define the distribution of temperatures in the subsurface, and to extrapolate temperatures to different depths. TG wells investigate conditions above the geothermal reservoir and are not used for either production or injection. Their depth may range from perhaps 100 feet to 3,000 feet or more, depending on the potential characteristics of the geothermal resource, local hydrologic conditions, and other factors. After sampling is complete, the wells are typically completed with sealed, water-filled tubing from surface to bottom, often with cement around the tubing. Later in the project, the tubing may be perforated to allow monitoring of groundwater pressure.

Most gradient wells are drilled with a small rotary rig, often truck-mounted, similar to that used for drilling water wells, or a diamond-coring rig, similar to that used for geologic sampling in civil works projects and mineral exploration. Neither requires much site preparation, but some auxiliary equipment is needed, including water trucks, tanks for mixing and holding drilling fluids, vehicles to transport supplies and personnel, and in some cases a backhoe to make minor excavations at the drilling site.

TG drilling requires road access; therefore, some construction of new roads or improvement of existing ones (e.g., grading) may be required. At the well site itself, a small cellar (i.e., typically less than 3 feet square and less than 3 feet deep) may be excavated to allow the conductor casing to be set beneath the rig. In most cases, little or no leveling or grading is needed.

Because only limited geothermal drilling has been conducted within the WCMREEA, it is assumed that some level of exploration would occur prior to full-field development. Exploration may include one or more of the geophysical exploration methods above, and drilling of TG holes. The number of TG holes can vary considerably from project to project, but it is reasonable to expect that for a single project, between 10 and 30 TG holes would be drilled. It is assumed that the total surface disturbance for each TG hole would be 3 acres, including the drilling location and the access road. It is likely that some of the drilling locations used for the TG holes would also be used for production wells. However, for the purpose of this reasonably development scenario, it is assumed that they would remain separate disturbances. The total surface disturbance anticipated for exploration using TG wells is 95 acres (see Table 2).

Table 2. Exploration surface disturbance for one 50-MW power plant.

Description	Unit Surface Disturbance (acres)	Number for One Project	Total Surface Disturbance for One Project (acres)	Number for Three Projects	Total Surface Disturbance for Three Projects (acres)
Drilling TG holes	3	30	90	90	270
Seismic testing	5	1	5	3	15
Total			**95**		**285**

Since the TG wells produce no geothermal fluids and generally do not directly contact the geothermal reservoir, no impact from discharge of geothermal fluids would be likely to occur. Artesian pressures may exist within the WCMREEA, so any TG well drilled to a depth below the groundwater table would be drilled with blow-out prevention equipment. If a gradient well did penetrate a geothermal zone, a significant release of geothermal fluids at the surface would be unlikely because of the use of blow-out prevention equipment and because of the relatively small diameter of the wells. If zones with artesian pressure are encountered during TG drilling, the well would be completed with cemented tubing to prevent cross-flow to shallower zones.

Full-Diameter Wells

FD Wells will be needed to support each 50-MW increment of net geothermal generation, it is estimated that up to 40 FD wells (i.e., 16 production wells, 16 injection wells, and 8 dry holes) would need to be drilled. All wells on BLM-managed land would be permitted by BLM using standard review methods that ensure protection of ground water, public safety, and the environment. Typically, two to three FD wells are drilled during the early stages of the project. These wells discover and confirm the resource, and data from drilling, logging and testing areas used as a basis for making the decision about proceeding with the development (i.e., determining project feasibility).

Surface Disturbance with Well Construction

Each well is anticipated to be from 4,000 to 9,000 feet deep. The difference in impacts is covered by the high-development bias of this reasonably foreseeable development scenario. The use of multi-well drill pads would depend on the depth of the resource that is encountered. Resource depths of less than 4,000 feet would make directional drilling difficult and require fewer wells per pad, whereas depths of 9,000 feet would allow five or more wells to be directionally drilled from a single pad. If there were more wells per pad, fewer pads would be required to achieve the same number of MWs, which would result in less overall surface disturbance. However, because little is known about the depth of potential resources within the WCMREEA, rather than risk underestimating the potential surface disturbance, it is assumed that only one well would be drilled from each pad.

The potential impacts associated with drilling FD wells are similar to those for TG wells, although at a larger scale. The important differences for FD wells are as follows:

- The access roads need to meet higher standards than must roads needed for a TG-well-drilling rig, as the rig for a FD well is transported to the site by tractor-trailer trucks. It is highly likely that new roads would be needed for this activity in the WCMREEA; and

- The number of trips for both heavy and light vehicles would be significantly greater. Getting the rig and ancillary equipment to the site may require 15 to 20 trips by full-sized tractor-trailers; the same number would be required to demobilize the rig. The size of the material-supply trucks and water trucks would necessarily be larger than for a TG well, and the number of trips would be proportionally greater, given the greater well depth.

Well pads for a single well are typically on the order of 200 feet wide and 250 feet long. Thus, each FD well would require a well pad of approximately 2 acres, including cut and fill. The well pad also includes a reserve pit (or "sump") for collection of drill cuttings and drilling fluids. Typically, the reserve pit is approximately 100 feet long by 60 feet wide. The depth varies according to the volume required and local soil conditions, but a typical depth is about 10 to 12 feet, with side slopes at approximately 45 degrees. A partition is typically constructed within the reserve pit to separate the drill cuttings and drilling fluids. The exact shape of the reserve pit at a specific drilling site will depend on the topography, and its holding capacity will vary with the requirements of the job, but a minimum capacity of a few hundred thousand gallons is typical. The base and sides of the pit are typically lined with an impermeable layer to prevent any infiltration of fluids into the subsurface. This can be a membrane material such as hypalon, or a clay liner may be used. The reserve pit is used to receive fluids that come out of the well during the drilling process.

Each well location is assumed to need 1 mile of 30-foot-wide access road and 1 mile of pipeline. It is assumed that the pipelines would follow the access roads, thereby adding 10 feet to the total width for a total disturbance of approximately 4.85 acres. It is also assumed that all drilling locations would remain open for the life of the project.

While a temperature-gradient drilling operation can be run by about 3 onsite personnel and others traveling to the site periodically with materials and supplies, a FD drilling operation typically has from 10 to 15 people on site at all times, with more people coming and going periodically with equipment and supplies.

Rigs for FD wells typically operate around the clock. Noise control measures (e.g., the positioning of tanks and the use of baffling) may be employed to meet applicable noise limits. The total foreseeable surface disturbance for new wells is summarized in Table 3.

Table 3. Well site surface disturbance for three 50-MW power plants.

Description	Unit Surface Disturbance	Number for One Project	Total Surface Disturbance for One Project (acres)	Number for Three Projects	Total Surface Disturbance for Three Projects (acres)
Well pads	2 acres per well pad	40 well pads	80	120 well pads	240
Access roads	3.6 acres/mile	40 miles	144	120 miles	432
Pipelines	1.2 acres/mile	40 miles	48	120 miles	144
Total			**272**[1]		**816**

[1]The total surface disturbance would be interspersed throughout the WCMREEA not concentrated in one area.

Construction of Geothermal Power Plants

Power plant construction requires access via good-quality roads (i.e., those capable of accommodating large tractor-trailer trucks). Roads constructed to reach sites for FD wells could also be used to access the power plant site, if the plant were located near one or more of the wells.

The amount of geothermal plant capacity to be installed within the WCMREEA would depend on the resource capacity that is proven by drilling. Regardless of the total size of the resource, it is likely that power plants would be developed in increments of 20 to 50 MW of plant capacity, with separations of a mile or more between plants. A typical plant size of 30 MW would use a site area of up to 15 acres to accommodate all the needed equipment, which would include (in addition to the power plant itself) space for pipelines supplying the brine from the production wells and distributing the cooled brine back to the injection wells, a switch yard, space for moving and storing equipment, and buildings needed for various purposes (e.g., power plant control, fire control, maintenance shop, and so forth). The power plant itself would occupy approximately 25 percent of this area for a water-cooled plant, or about 50 percent for an air-cooled binary plant (more area is required for the cooling tower fans in an air-cooled plant). A 50-MW plant would require a larger footprint, on the order of 20 to 25 acres, depending on the conversion technology used.

A geothermal power plant is typically supported by pipeline systems in the vicinity of the plant. These pipeline systems include a gathering system for produced geothermal fluids and an injection system for disposal of geothermal fluids after heat extraction by the plant. The pipeline routes are highly site-specific, but typically are located along access roads where possible. Pipelines are usually less than 24 inches in diameter and their lengths are minimized to the extent possible to reduce cost and heat loss.

Since the pipelines are typically constructed on supports above ground, there is little if any impact to the surrounding area once construction and re-vegetation of the pipeline corridors are complete. Small animals can easily pass beneath the pipelines. The pipeline height is typically less than 5 feet above the ground surface.

After construction is complete, the area around the power plant that is no longer needed for access and maintenance would be regraded and revegetated with native species according to the methods of the Restoration, Revegetation and Reclamation Plan.

Geothermal Operations and Maintenance

In a binary-cycle geothermal power plant, which is the most likely type to be constructed within the WCMREEA, the heat from the produced geothermal fluid is transferred to a working fluid that boils at a lower temperature than water. It is the working fluid (e.g., isobutane or n-pentane) that expands through a turbine to generate electricity, rather than the geothermal fluid itself. The geothermal fluid and the working fluid are maintained in separate, sealed loops to prevent them from mixing and/or escaping to the environment.

If a well has a major problem, a drilling rig needs to be mobilized to the site. Depending on the nature of the problem, it may be possible to have a smaller rig than was used to originally drill the well. The impact of remediation operations is a function of the size of the rig, the duration of the operation, and the nature of the problem.

Anticipated Surface Disturbance

It is anticipated that up to three power plants would be built to use the resource from the WCMREEA. Each power plant would be capable of generating 50 MW (net) of electricity. Given what is currently known about the resource, the power plants would likely use binary power generation to produce electricity. It is possible, however, that a flash generation system, in which the geothermal fluid goes from a liquid to a vapor instantly when the pressure is dropped, could be used, possibly in conjunction with the binary plants, to maximize the amount of energy produced. Until more information is gathered during the exploratory phase, the precise technology that would be used is unknown.

Regardless of whether the plant uses binary or flash technology, each plant location would require about 25 acres, which would be 30 acres of total surface disturbance including cut and fill. Each plant would also require 1 mile of access road and 3 miles of new transmission line to intertie with an existing transmission line that runs through the middle of the WCMREEA. It is assumed that the width of the access road would require 30 feet of surface disturbance including cut and fill. Transmission intertie lines require 100 feet of temporary surface disturbance; however, once the lines are constructed, all but a 20-foot access road would be reclaimed with native vegetation. The total surface disturbance for power plants is summarized in Table 4.

Table 4. Site disturbance for three 50-MW power plants.

Description	Unit Surface Disturbance	Number	Total Surface Disturbance (acres)
Power plant location	30 acres/50 MW	3 50-MW	90
Access Roads	3.6 acres/mile	3 miles	10.8
Transmission lines (temporary)	12.1 acres/mile	9 miles	108.9
Transmission lines (permanent)	2.4 acres/mile	9 miles	21.6
Total			**209.7 (temporary) 122.4 (permanent)**

Solar Development Reasonably Foreseeable Development Scenario

The CDCA Plan would also be amended to identify sites within the WCMREEA as suitable for solar photovoltaic, dish engine or solar trough energy development. Solar development would not be allowed in:

- Areas with an annual average resource less than 6.00 kWh/m2/ day;
- For solar trough, areas where the slope is greater than 1 percent;
- For photovoltaic, areas where the slope is greater than 5 percent;
- Major urban areas;
- A 0.25-mile distance of water features and riparian vegetation;
- Remaining BLM parcels less than 1 kilometer square in size;
- Imperial Irrigation District ROWs; and
- Lands where structures would result in airspace conflicts.

In addition, solar thermal facilities that would require high water usage in the desert would not be allowed due to the amount of water required. Like geothermal development, solar energy projects would be subject to standard stipulations and would also be subject to a stipulation related to groundwater usage to require preparation of a Water Supply Assessment under SB-610. If the constraints discussed in Section 2.1 of the FEIS are discovered during project planning or following further future studies as determined necessary by an authorized officer, portions of the WCMREEA may be determined to be unsuitable for solar energy development

unless modifications are made to the project that would avoid such constraints. Solar energy right of way applications would be considered through a competitive interest program. In addition, the CDCA Plan would also be amended to identify the WCMREEA as unsuitable for wind energy development.

Due to the wide range of solar development that could occur in the project area, the activities that could occur during solar development have been based on the development of a 50-MW photovoltaic project and a 500-MW solar trough project. These sizes were selected because of the availability of data related to development of these types of projects. Photovoltaic and solar trough are two technologies that have been fielded most widely in the United States and throughout the world. The total surface disturbance for the types of power plants is summarized in Table 5.

Table 5. Anticipated surface disturbance for various types of solar power plants in WCMREEA.

Technology Type	BLM Disturbance (acres)	Total Disturbance (acres)
Solar Trough	4,583	13,480
Photovoltaic	16,954	49,864

Exploration for Solar Technology

Because no development of solar projects has occurred in the area, some level of exploration would need to occur prior to full-field development. This exploration is typically limited to the placement of solar meters in the vicinity of a proposed solar project area. These meters are typically small, less than 10 square feet and can be installed using OHVs. They are commonly secured to a piece of concrete or other heavy object so they cannot be easily stolen. Ground disturbance is typically limited to 10 to 20 square feet.

Concentrated Solar Power Plant Construction

Construction of a 500-MW solar trough project generally follows the sequence of site prep, grading, and road construction; installation of piers, solar field prep; assembly of solar collector elements; installation of the power block; and installation of buildings, evaporation ponds. Approximately 2,100 people would be required during all phases of construction, although not all would be on site at any one time.

Site work and solar field foundation preparation would include the following tasks:

- Earthwork for main entrance and construction personnel entrance roads, preparation of the solar collector assembly area, storage area, parking area and construction office area and installation of temporary and permanent site utilities;

- Construction of flood bypass channels; and

- Installation of solar and piping drilled piers, sequenced with earthwork. Installation of underground piping and electrical systems would be sequenced consistent with orderly evacuation and placement of concrete foundations. Concrete foundations are required throughout the solar field, for mirror mounting pedestals, for the control and maintenance buildings and for the cooling tower basins.

For construction of the solar collector element an assembly line would be erected in the site fabrication and storage area. For field assembly the solar collector element assembly would be transported to the field by truck and trailer and lifted with a spreader bar and crane and set on end, middle, shared or drive pylons, and then aligned. The heat collector elements are installed (i.e., three preassembled welded sections) in the field and the ends are welded to an adjacent solar collector element.

For solar field commissioning, the solar collector assembly loops would be commissioned on an ongoing basis as they are completed during the installation of the solar collection field. Power block foundations would start shortly after the start of solar field drilled piers. The power blocks would be erected and commissioned in parallel with the solar collection field (Solar Millennium, LLC 2008).

During construction, any necessary storage of diesel fuel, gasoline, motor oil, hydraulic fluid, and coolant are kept on site in above-ground tanks in a location with secondary containment and spill prevention countermeasures in place. These tanks are removed upon completion of construction and no permanent storage of these petroleum products occurs after construction is completed. A spill prevention control and countermeasure plan would be prepared, in accordance with all applicable BLM and California regulations.

Supporting Facilities

Construction of the evaporation pond, storm water retention pond, high voltage transmission line, warehouse and gatehouse would run concurrent with construction of the power plants and would be commissioned to support the startup of the plants.

During construction of the transmission line there would be temporary pulling and tensioning sites, material staging sites, and concrete batch plants. No grading would occur at the pole site work areas or the pull and splicing site.

All temporary work areas would be cleaned up, reclaimed and revegetated. A site-specific restoration and reclamation plan will be submitted to and approved by BLM prior to approval of any future proposed solar development project within the WCMREEA.

Operation and Maintenance

Skilled personnel would be assigned to conduct expedient maintenance and mirror washing. The operation and maintenance (O&M) workforce for a solar trough field is about 90 people. Equipment includes water trucks for cleaning mirrors and standard pickup trucks. Maintenance personnel are typically trained in the procedures of spill prevention and countermeasures, and keep spill kits on their service vehicles for immediate use in the event of a spill.

Oil-filled transformers will have secondary containment structures if they are located outdoors. Lube oil tanks, heat transfer fluid overflow and expansion vessels, and any other oil containing tanks over 55 gallons will be double walled or have a vendor supplied secondary containment. The containment would be sized to contain 125 percent of the fluid in the transformer or vessels with appropriate freeboard required per code. Additional equipment (e.g., heat transfer pumps, feedwater pumps) would be provided with 6 inch tall curbs as appropriate. Containment designs would be based on manual cleanup, with a portable sump pump.

Anticipated Surface Disturbance

A typical ratio of land required for development of a solar trough project (i.e., solar arrays and ancillary facilities) is about 5 acres for every MW. Thus, a 500-MW solar trough project would require approximately 2,500 acres of land. In an average solar trough energy project, approximately 90 percent of the project area is occupied by the parabolic trough solar field, and 10 percent is occupied by ancillary facilities, such as O & M buildings, substations, access roads, and parking/laydown areas (Solar Millennium, LLC 2008). Each 500-MW solar trough development would need one or more 20-foot-wide interior access road, the placement of which would be determined by the solar field configuration.

Using this land use scenario as a model for the WCMREEA, solar arrays for the development of one, 500-MW solar trough project would occupy approximately 2,000 acres, and development of related facilities would occupy 500 acres (see Table 6).

Photovoltaic Power Plant Construction

Construction of a 50-MW solar photovoltaic project generally follows the sequence of planning, surveying/staking/flagging the perimeter of the project area; constructing security fencing and access roads; clearing, grading, excavating, and installing temporary fencing and parking and stormwater systems; assembling and installing project facilities, cleaning up, and reclaiming any temporary work areas. In addition, some facilities are constructed outside the solar field boundary, and transmission lines would be installed. Approximately 400 personnel would be required during all phases of construction although not all would be on site at any one time.

Pre-construction survey work would consist of staking or flagging the site area boundaries, work areas (i.e., permanent and short term), cut and fill areas, access roads, transmission pole locations, and concrete pad and foundation areas. Initial construction activities would include

Table 6. Surface disturbance for one 500-MV solar trough project.

Description	Unit Surface Disturbance (acres unless otherwise noted)	Number	Total Surface Disturbance (acres)
Solar trough	2,000	1	2,000
Access roads within site area	70	1	7
Substation switchyard	0.03	1	0.03
O&M building	0.06	1	0.06
Parking laydown area	50	1	50
230-kV transmission line	5 acres/mile	40	200
33-kV collector line	5 acres/mile	20	100
Fencing and other discretionary facilities	125	1	125
Total			**2,482.09**

installation of security fencing and construction of access and maintenance roads. Desert tortoise exclusion fencing is erected around areas of permanent disturbance. Temporary fencing would enclose material lay down and storage areas, and temporary parking areas are created to accommodate the construction workforce.

Site preparation consists of clearing, earthwork, and grading as required to construct the facility and achieve finished site grades. Typically, the solar panels would be mounted in a manner that follows the existing topography and, as a result, does not change the natural flow of water across the site. Grading is done to promote proper drainage and remove major scarring from previous drainage through the site. Cut and fill materials are typically in balance so that no material is either exported or imported to the site to achieve final grade. Rough site grading, excavation, and backfilling are performed using heavy-duty earth moving equipment. If necessary, hydraulic modeling would be completed during the design stage. Erosion control and storm drainage systems would be designed to promote sheet drainage, evenly distributing the flow of storm water across the site. A Site Grading and Erosion Control Plan would be developed and silt fences and fiber rolls would be used as necessary for drainage and to control erosion. A stormwater pollution and prevention plan will be developed and approved for any future proposed solar development project within the WCMREEA.

For a photovoltaic plant, electrical power is produced directly by solar arrays, each comprised of several panels. After a site is graded, underground conduit, overhead transmission lines, an inverter, and transformer pads are installed. Next, the panel supports and frames are installed. The support members are typically driven steel piles consisting of H beams or round pipe that are driven to a depth of 3 to 5 feet, depending on soil condition. The panels are then set onto and secured to the frame tables.

Supporting Facilities

Construction of an electrical switchyard, communications, and a control/maintenance building would run concurrent with construction of the solar field. Even though some facilities are outside the solar field boundary, if they are located on public lands they would be authorized as part of the project ROW or authorized to the facility owner. Facilities such as power lines and switch/sub-stations are often within or near the solar field but not owned by the solar developer.

A switchyard typically consists of a 10-foot by 12-foot concrete pad that accommodates the utility metering, the switchgear, and a protection breaker. Since the power is stepped up to utility line voltage at the solar field collector system, the switchyard does not require additional step-up transformers. From the step up transformers, the 33-kilovolt (kV) collector system comprised of underground or overhead lines collects the output of the solar field and delivers it to the onsite switchyard, where it is metered and delivered to the 33-kV distribution system.

A 33-kV collector system would aggregate power produced in the solar field and deliver it to an electrical switchyard. The electrical collector system operates at the same voltage at the transmission line, only a small switchyard meeting interconnection control and metering requirements is typically required. This equipment is located on a concrete pad approximately 10 feet by 12 feet.

All temporary work areas would be cleaned up, reclaimed and revegetated. A site-specific restoration and reclamation plan will be submitted to and approved by BLM prior to approval of any future proposed solar development project within the WCMREEA.

Operations and Maintenance

The O&M of a photovoltaic power plant is primarily automated. Scheduled and unscheduled maintenance activities require some staffing throughout the life of the power plant. The main O&M needs are panel washing and inverter inspection, as well as vegetation control and routine inspection of switchgear. Plants typically have a staff of only five full time staff during regular operations, including a security officer during non-business hours. The power components of photovoltaic solar power plants are turned on in the morning and off at night automatically. Maintenance equipment includes all-terrain vehicles capable of going inside the array for physical inspection and parts replacement. Panels are typically washed on a quarterly to semi-annual basis, depending on the long-term needs of the project owners.

Stockpiles of petroleum products, coolants, antifreeze, diesel fuel, gasoline, cleaning solvents, and used petroleum products would be housed and stored at the O&M facilities. Maintenance personnel are typically trained in the procedures of spill prevention and countermeasures, and keep spill kits on their service vehicles for immediate use in the event of a spill. The transformer foundations are placed on grade and designed to provide containment of 125 percent of the volume of cooling oil in the transformer in case of a leak. No petroleum products containing polychlorinated biphenyls would be used.

Anticipated Surface Disturbance

A typical ratio of land required for development of a solar photovoltaic project (i.e., solar arrays and ancillary facilities) is about 9 acres for every MW. Thus, a 50-MW solar photovoltaic project would require approximately 450 acres of land. In an average solar photovoltaic energy project, approximately 90 percent of the project area is occupied by arrays, and 10 percent is occupied by ancillary facilities, such as O&M buildings, substations, access roads, and parking/laydown areas (Chevron Energy Solutions 2009). Each 50-MW photovoltaic development would need one or more 20-foot-wide interior access road, the placement of which would be determined by the array configuration.

Using this land use scenario as a model for the WCMREEA, solar arrays for the development of one 50-MW photovoltaic project would occupy approximately 400 acres, and development of related facilities would occupy 50 acres (see Table 7).

Table 7. Surface disturbance for one 50-MV photovoltaic project.

Description	Unit Surface Disturbance (acres unless otherwise noted)	Number	Total Surface Disturbance (acres)
Photovoltaic arrays	400	1	400
Access roads within site area	7	1	7
Substation switchyard	0.003	1	0.003
O & M building	0.006	1	0.006
Parking laydown area	0.5	1	0.5
230-kV transmission line	5 acres/mile	4	20
33-kV collector line	5 acres/mile	2	10
Fencing and other discretionary facilities	12.5	1	12.5
Total	500	1	**450**

Total Amount of Solar Development

The solar energy reasonably foreseeable development scenario generally identifies surface disturbance that either photovoltaic or solar trough technology would cause if all land within the WCMREEA is developed for solar energy, consistent with the Solar Programmatic EIS assumptions (BLM 2012a). In addition, this document generally describes the construction, maintenance and operations activities for both technologies.

While the WCMREEA has significant solar energy potential, several factors may limit its full exploitation. Therefore, to accurately describe likely (i.e., reasonably foreseeable) development and associated impacts, this reasonably foreseeable development scenario has been written to reflect real world activities. Because solar power in the WCMREEA could be developed in a virtually unlimited number of ways, assumptions need to be made to allow for analysis.

Either solar trough or photovoltaic technologies may be proposed, so the land requirements and construction and operational activities of each must be accurately described. Proposals may be located only on BLM land, or may include participation of adjacent, non-BLM land to create larger or more logically arranged projects. If a project is proposed on both non-public and public lands, the project would be considered as being under a Federal nexus and an environmental review including the private lands may be required. Typical solar thermal projects proposed in the region have historically been less that 50 MW in size (i.e., to avoid CEC involvement). While photovoltaic projects on Federal land do not have a similar CEC nexus, these projects have tended to also be less than 50 MW in size.

Transmission would constrain future energy development, including solar, geothermal, and wind. Large projects that have not entered the California Independent System Operator queue may not be built until new transmission capacity is built. Smaller projects may be able to fit within existing capacity. Project specific environmental analysis must include a thorough discussion of existing and currently planned transmission capacity to estimate when new or upgraded transmission would be needed to off-take additional power from the WCMREEA.

Development would be constrained by buffers around sensitive resources, including hydrologic features, which have been incorporated into the existing reasonably development scenarios. Development would be constrained by slope. The reasonably foreseeable development scenario now includes lands that have slopes of 5 percent or less for photovoltaic and 1 percent for solar trough. The number and size of solar trough projects may be limited by higher operational water requirements than photovoltaic.

The scenarios identify the maximum amount of land that could be developed for solar energy (i.e., solar trough and/or photovoltaic) within the WCMREEA. These scenarios do not take into account market factors and resource specific constraints that would likely result in a much smaller footprint in actual development. Actual development may vary depending on future conditions. The following assumptions are used for the purpose of analyzing potential impacts associated with the lands use change.

The reasonably foreseeable development scenario identifies an approximate range of total disturbance from 13,473 acres to 49,864 acres for photovoltaic energy development. There could be approximately 13,480 acres within the WCMREEA of surface disturbance for solar trough technology (see Table 6). This scenario includes use of adjacent, non-BLM lands for project development; BLM land usage would be considerably smaller. Using 9 acres per MW for photovoltaic or 5 acres per MW for solar trough, as much as 5,540 MW (photovoltaic), or up to 2,696 MW (solar trough) energy could be produced on BLM-managed land within the WCMREEA, assuming full build out solely for solar energy. This scenario would result in between 30 to 111 photovoltaic projects of 50 MW each and 3 to 5 solar trough 500-MW projects could be constructed. Thus, under the reasonably foreseeable development scenario a minimum of 3 photovoltaic 500-MW projects to a maximum of 111, 50-MW photovoltaic projects or a combination thereof could be developed.

Decommissioning

The expected project life is 30 years. Given the unique and extreme levels of solar radiation at this site, a highly plausible is that new and improved solar power generating technology would be deployed at the site to continue clean and renewable power generation. However, should the site be removed from power generation service, the site would be made suitable for reclamation. All equipment, buildings, concrete foundations, and driven piles would be removed from the site. Consistent with BLM requirements, a detailed decommissioning plan would be developed in a manner that both protects public health and safety and is environmentally acceptable.

Conservation Measures

The proposed action includes the adoption of practices from the *Best Management Practices and Guidance Manual: Desert Renewable Energy Projects* and *Best Management Practices from the 2010 BLM Geothermal, Solar, and Wind Programmatic Environmental Impact Statements* (BLM 2012c). The following best management practices will be used to avoid, minimize, and offset potential adverse effects to the desert tortoise and will be adopted for all future projects authorized in desert tortoise habitat within the WCMREEA. Protocol-level surveys will be conducted for individual proposed projects in potentially suitable habitat within the WCMREEA and additional resource site-specific conservation measures may be included as determined by the project-specific environmental analysis. For a comprehensive list of the best management practices that may be used, refer to WCMREEA Final EIS Volume 2: Appendix I (BLM 2012c).

Conservation Measure (CM) 1: Authorized Biologists and Biological Monitors

Project proponents will retain an Authorized Biologist approved by the agencies that will be responsible for ensuring compliance with desert tortoise conservation measures prior to the initiation of and during ground-disturbing activities. The Authorized Biologist is responsible for knowledge of the latest information on the Service protocols and guidelines for the desert tortoise. An Authorized Biologist must have thorough and current knowledge of desert tortoise behavior, natural history, ecology, and physiology, and demonstrate substantial field experience and training to safely and successfully conduct their required duties.

The Authorized Biologist is approved to monitor project activities within desert tortoise habitat and is responsible for locating desert tortoises and their sign (i.e., conduct clearance surveys). The Authorized Biologist must ensure proper implementation of protective measures, and make certain that the effects of the project on the desert tortoise and its habitat are minimized. Authorized Biologists will meet or exceed the Service's most recent qualification requirements listed on our website: http://www.fws.gov/ventura/species_information/protocols_guidelines/. The Authorized Biologist will conduct clearance surveys, tortoise handling, artificial burrow construction, egg handling and other procedures in accordance with the *Guidelines for Handling Desert Tortoise during Construction Projects* (Desert Tortoise Council 1994) or the most current guidance provided by the Service.

Proponents will submit the names and qualifications of the proposed Authorized Biologists to the Service and BLM for review no less than 30 days prior to the beginning of any ground-disturbing activities. All replacement biologists will also require agency approval.

Authority of the Authorized Biologist and Biological Monitors

An Authorized Biologist and/or Biological Monitors will be on site during all construction and ground disturbance activities or in areas that have not been enclosed with tortoise exclusion fencing, such as linear facilities. Authorized Biologists will have the authority to halt all site mobilization, ground disturbance, grading, boring, trenching, and operation activities that are in violation of conservation measures, or if a desert tortoise is found on site. Work will proceed only after hazards to desert tortoise are removed, the species is no longer at risk, or the Authorized Biologist has moved the animal out of harm's way. If an Authorized Biologist is unavailable for direct consultation, the Biological Monitor will act on his/her behalf.

Identification and Duties of the Biological Monitors

Authorized Biologists will submit a résumé with, at least, three references and contact information of the proposed Biological Monitors to the BLM. The résumé will demonstrate, to the satisfaction of the BLM, the appropriate education and experience to accomplish the assigned biological resource tasks.

Biological Monitor(s) must be familiar with the conservation measures of the biological opinion, any project-specific conservation measures, and Service guidelines on desert tortoise surveys and handling procedures. Biological Monitors will assist Authorized Biologists in conducting surveys and in monitoring site mobilization activities, construction related ground disturbance, grading, boring, or trenching.

CM2: Desert Tortoise Exclusion Fencing

Prior to the onset of ground disturbing activities desert tortoise exclusion fencing would be attached to any permanent fencing surrounding the proposed geothermal or solar facility to avoid potential harm to desert tortoise in the project area. Tortoise exclusion fencing will be constructed in accordance with the desert tortoise exclusion fence specifications found within the *Desert Tortoise (Mojave Population) Field Manual* (Service 2009) or the most current guidance provided by the Service and CDFW. Fencing around the project site will include a desert tortoise exclusion gate. This gate will remain closed at all times, except when vehicles are entering or leaving the project site. If it is deemed necessary to leave the gate open for extended periods of time (e.g., during high traffic periods), the gate may be left open as long as an Authorized Biologist is present to monitor for tortoise activity in the vicinity.

Desert tortoise exclusion fencing will be installed around temporary project areas like staging areas, storage yards, and excavations. To the extent possible, fences will be constructed in late winter or early spring to minimize impacts to tortoises and accommodate tortoise surveys.

Within 24 hours prior to the initiation of construction of tortoise exclusion fence, the Authorized Biologist will survey the fence alignment to ensure it is cleared of desert tortoises. Following construction of the tortoise-exclusion fence, the Authorized Biologist will conduct clearance surveys within the fenced area to ensure as many desert tortoises as possible have been removed from the site.

CM3: Pre-Construction Clearance Surveys

Heavy equipment will only be allowed to enter the project site following the completion of desert tortoise clearance surveys of the project area by the Authorized Biologist. The Authorized Biologist will monitor initial clearing and grading activities to ensure if any tortoise(s) was missed during the initial clearance survey that they are moved out of harm's way.

CM4: Desert Tortoise Translocation Plan

If desert tortoise presence is documented within the project area, then proponents will consult with the CDFW and Service to determine the need for and/or feasibility of conducting translocation as a conservation measure. If translocation is determined to be an appropriate conservation measure, then proponents will develop and implement a Desert Tortoise Translocation Plan for approval by permitting agencies. A translocation plan will be developed in cooperation with BLM, Service and CDFW using the *Draft revised translocation of desert tortoise (Mojave population) from project sites: Plan development guidance* (Service 2011b) or the Service's most recent translocation guidance. The plan will address all desert tortoise life stages including the potential removal of adults, sub adults, juveniles, and eggs.

The Desert Tortoise Translocation Plan will designate a translocation site as close as possible to the disturbance site that provides suitable conditions for long term survival of the relocated desert tortoise and outline a method for monitoring the relocated tortoise. This area would be set aside in perpetuity for desert tortoise relocation. Development and implementation of a translocation plan may require, but not be limited to, additional surveys of potential recipient sites; disease testing and health assessments of translocated and resident tortoises; and consideration of climatic conditions at the time of translocation.

CM5: Dead, Injured, and Sick Desert Tortoises

Upon locating a dead or injured tortoise, the project proponent or agent must immediately notify the PSFWO by telephone at 760-322-2070. Written notification must occur within 5 days of the finding to the PSFWO and Service's Division of Law Enforcement. The information provided must include the date and time of the finding or incident (if known), location of the carcass or injured animal, a photograph, cause of death, if known, and other pertinent information.

All tortoises injured by project activities receive prompt veterinary care at the expense the project proponent. If an injured animal recovers, then the BLM and Service will be contacted to

determine final disposition of the animal. If efforts to keep the injured animal separate from other tortoises and turtles are successful during the tortoise's treatment, the Service generally recommends that it be released at or near its capture point to continue to contribute to the persistence of the local tortoise population.

Tortoises 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 expense of project proponents. Care will be taken by Authorized Biologist in handling dead specimens to preserve biological material in the best possible state.

PM6: Conservation Measure and Ecological Monitoring Plan

The Conservation Measure and Ecological Monitoring Plan will be submitted to the Service and BLM for approval prior to the start of ground disturbance. This plan will outline monitoring during all project phases, including periods prior to construction to establish baseline conditions and during construction, operations and decommissioning.

CM7: Reporting

As part of implementing conservation measures, regular reports will be submitted to the relevant resource agencies to document the project activities, conservation measures implemented and effectiveness, and provide additional protective measures recommendations as needed. A schedule of reporting will be specific to individual projects.

CM8: Worker Environmental Awareness Training

Project proponents will develop a project-specific Worker Environmental Awareness Program (WEAP) that meets the approval of the permitting agencies and would be implemented during all phases of the project (e.g., site mobilization, ground disturbance, grading, construction, operation, closure/decommissioning or project abandonment and restoration/reclamation activities). The purpose of the WEAP would be to identify sensitive biological resources and best management practices for minimizing impacts to resources. Interpretation will be provided for non-English speaking workers, and the same instruction will be provided for any new workers prior to their performing work on site. The names of all onsite personnel (e.g., surveyors, construction engineers, employees, contractors, contractor's employees, subcontractors) who have participated in the education program will be kept on file at the project field construction office. The program will include but not be limited to the following:

1. Photos and habitat descriptions for all special status species that may occur on the project site and information on their distribution, general behavior and ecology.

2. The sensitivity of these species to human activities.

3. Legal protections afforded these species.

4. Project best management practices for protecting species.

5. Penalties for violation of State and Federal laws.

6. Worker responsibilities for trash disposal and safe/humane treatment of any special status species found on the project site, associated reporting requirements, and any specific measures required of workers to prevent take of threatened or endangered species.

7. Handout materials summarizing all the contractual obligations and protective requirements specified in project permits and approvals.

8. Requirements and penalties regarding adherence to speed limits on the project site.

CM 9: Construction-related Activities

Project activities should be conducted when desert tortoises are inactive (i.e., typically November to April), to minimize impacts to roaming individuals. Existing roads will be used wherever possible to avoid unnecessary disturbance. 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. Dust abatement techniques will be used to minimize airborne dust and reduce air emissions. If possible, onsite construction access routes should be rolled and compacted to allow trucks and equipment to access construction locations. The Restoration, Revegetation and Reclamation Plan will address how on and offsite access routes will be decompacted and restored. Employees and contractors will look under vehicles and equipment for the presence of desert tortoises prior to movement. If a tortoise is present, no equipment will be moved until the animal has left voluntarily or an Authorized Biologist moves it out of harm's way, or in accordance with the approved Desert Tortoise Translocation Plan.

Projects will maintain native vegetation cover and soils to the extent possible and minimize grading to reduce flooding, maintain natural infiltration rates, maintain wildlife habitat, maintain soil health, and reduce erosion potential. All short (i.e., less than 7-inches tall) native vegetation should be retained to the maximum extent possible. Blading within the project site will be minimized to the maximum extent possible. Where necessary and feasible, shrub cover may be mowed and/or raked to smooth out the surface. Retention of native root structure and seeds within a project area would help retain soil stability, minimize soil erosion, and minimize fugitive dust pollution. Retention of native seed and roots within the project site will also facilitate recovery of vegetative cover.

Evaporation ponds must be fenced, where feasible netted, to prevent use by wildlife; netting will be of a mesh that will not entrap avian species, as recommended by the CDFW, BLM or Service. Open water sources in the desert provide subsidies to ravens (*Corvus corax*) and other predators that feed on desert tortoise or other special status species. In addition, these water sources may

have elevated levels of harmful contaminants (e.g., TDS, selenium) and could attract wildlife into an industrialized area where they are more likely to be killed. The lower 18 inches of the fencing will be a solid barrier that would exclude entrance by lizards and other small animals.

For geothermal construction related activities, pipelines that are constructed above ground due to thermal gradient induced expansion and contraction will rest on cradles above ground level, allowing small animals to pass underneath. Projects will be analyzed to ensure adequate passage for all wildlife species. The pipeline will be raised higher to allow wildlife passage where needed. Because pipeline corridors through certain habitat types can alter local predator-prey dynamics by providing predators with lines of sight and travel corridors, large projects will be analyzed to ensure the project will not cause any significant changes to predator-prey balance.

Geothermal facility ponds, tanks and impoundments (including but not limited to drill pits) may contain liquids that present hazards to wildlife. Any ponds containing liquids contaminated by substances which may be harmful due to toxicity will be fenced, netted or covered at all times when not in active use to exclude access to wildlife. Liquids at excessive temperature will likewise be treated in the same fashion. If aerial exclusion is not feasible, such as on a large pond, a hazing program based on radar or visual detection, in conjunction with formal monitoring, will be implemented. Clean water impoundments can also present a trapping hazard if they are steep-sided or lined with smooth material. All pits, ponds and tanks will have escape ramps functional at any reasonably anticipated water level, down to almost empty. Escape ramps can take various forms depending on the configuration of the impoundment. Earthen pits may be constructed with one side sloped 3:1 or greater lined ponds can use textured material.

Underground utilities will be installed to minimize the amount of open trenches at any given time, keeping trenching and backfilling crews close together. Avoid leaving trenches open overnight. Where trenches cannot be back-filled immediately, escape ramps will be constructed at least every 100 feet. All open trenches that are outside desert tortoise exclusion fencing will be monitored by an Authorized Biologist and/or Biological Monitor to ensure that open trenches are not an entrapment hazard.

CM10: 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 within the delineated project areas or on access roads in desert tortoise habitat. Signs will be posted at appropriate locations to remind drivers to be aware of the potential for desert tortoise and other wildlife occurring on the roadways. On unpaved roads the speed limit will be 10 miles per hour to suppress dust and protect air quality.

CM11: Ground Excavations

Topsoil from all excavations and construction activities will be salvaged and reapplied during reclamation or, where feasible, used for interim reclamation by reapplying to construction areas

not needed for facility operation as soon as activities in that area have ceased. Topsoil storage piles will be shallow and steep and kept dry to preserve microorganisms and seed banks and traffic will be avoided over stockpiles to prevent compaction. The retention of topsoil will be addressed in the Restoration, Revegetation and Reclamation Plan.

CM12: Construction Material Storage and Inspection

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, before the material is moved, buried or capped will be inspected by an Authorized Biologist. 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 desert tortoise clearance surveys have been completed.

CM13: Hazardous Materials

Proponents will maintain all vehicles and equipment in proper working condition to minimize fugitive emissions and accidental spills from motor oil, antifreeze, hydraulic fluid, grease, or other fluids or hazardous materials. All fuel or hazardous waste leaks, spills, or releases will be stopped or repaired immediately and cleaned up at the time of occurrence. Project developers will be responsible for spill material removal and disposal to an approved offsite landfill and spill reporting to the permitting agencies. Construction equipment must be stored at designated areas only. Maintenance vehicles will carry appropriate equipment and materials to isolate and remediate leaks or spills. A spill containment kit will be available on site for all fueling, maintenance, and construction activities.

CM14: Trash Abatement

Trash and food items will be contained in self-closing, sealable containers with lids that latch to prevent wind and wildlife from opening thereby reducing the attractiveness of the site to opportunistic tortoise predators such as common ravens and coyotes (*Canis latrans*). Trash containers will be emptied daily and removed from the project site when construction activities are complete.

CM15: Wildlife Collisions and Removal

Any vehicle-wildlife collisions must be immediately reported to the Authorized Biologist. Observations of potential wildlife problems, including wildlife mortality, will also be reported to the BLM authorized officer. Special-status species will be removed and reported according to their specific protocols and procedures for removal of wildlife carcasses on site and along access roads will be addressed in the Raven Management Plan (referred to as the Nuisance Animal and Pest Control Plan in the Final EIS, BLM 2012c).

CM16: Minimize Lighting Impacts

Proponents will design and install efficient facility lighting so that the minimum amount of lighting required for safety and security is provided but not exceeded and upward light scattering (light pollution) is minimized. This may include, for example, installing shrouds to minimize light from straying off site, properly directing light to only illuminate necessary areas, and installing motion sensors to only illuminate areas when necessary.

CM17: Pets

Project proponents will prohibit workers and any visitors from bringing domestic pets to the project site.

CM 18: Plant and Wildlife Collection

Proponents will prohibit the collection of all native plant or native wildlife species, including, but not limited to desert tortoise. Workers will not feed or harass wildlife and will not disturb, capture, handle, or move desert tortoise, other animals, or their nests/burrows. Violations will be immediately reported to the Authorized Biologist and included in the monthly and annual reports.

CM 19: Raven Management Plan

Proponents will develop a raven control plan that identifies management practices to minimize increases in desert tortoise predators (e.g., common raven, coyotes) in the project area. The plan would specifically address establishing a baseline and monitoring strategy to understand if there is an increase of ravens and other species that are attracted to developed areas or opportunistically use tall structures to spot vulnerable prey. In addition to ravens, the plan would identify nuisance and pest species that are likely to occur in the area, risks associated with these species, species specific control measures, and monitoring requirements.

Project proponents will also provide funds to the Services' rangewide raven monitoring and control program to its support comprehensive goals. Per the comprehensive program guidance (Service 2010b) the amount paid by proponents will be a one-time payment per based on $105 per acre prior to the disturbance. Proponents will provide documentation to the agencies that this fee has been deposited into the sub-account of the Renewable Energy Action Team Account held by the National Fish and Wildlife Foundation. The payment provided by this project will support program activities within the Colorado Desert Recovery Unit.

CM20: Integrated Weed Management Plan

The project proponent will develop and implement a project-specific integrated vegetation management plan that meets the approval of the permitting agencies. This plan would be implemented during all phases of the project (e.g., site mobilization, ground disturbance,

grading, construction, operation, modification or expansion, closure/decommissioning or project abandonment, and restoration/reclamation activities). Principles of integrated weed management, including biological controls, will be used to prevent the spread of invasive species, per the *Vegetation Treatments Using Herbicides on BLM* Lan*ds in 17 Western States, and the National Invasive Species Management Plan* (BLM 2007). If invasive plant species are present, project proponents will work with the local BLM field office to develop a control strategy.

The plan will include, but not be limited to, the following measures to prevent the establishment, spread and propagation of invasive weeds:

1. Limit the size of any vegetation and/or ground disturbance to the absolute minimum, and limit motorized ingress and egress to defined routes.

2. Ensure that fill materials and road surfacing materials will be free of invasive species. Fill sources will not be used if they originate from area with known invasive plant species problems.

3. Store project vehicles on site in designated areas to minimize the need for multiple washings of vehicles that re-enter the project site.

4. Maintain vehicle wash and inspection stations and closely monitor the types of materials brought onto the site.

5. Thoroughly clean the tires and undercarriage of all vehicles entering or reentering the project site.

6. Reestablish native vegetation quickly on disturbed sites.

7. Monitor and quickly implement control measures to ensure early detection and eradication for weed invasions.

8. Use certified weed-free straw or hay bales for sediment barrier installations.

<u>CM21: Water Resources Monitoring and Mitigation Plan</u>

Project proponents who plan to use groundwater sources will develop and implement a groundwater Water Resources Monitoring and Mitigation Plan, which includes monitoring the effects of groundwater withdrawal for project uses, of vegetation restoration and dust control uses during decommissioning and of aquifer recovery after project decommissioning. Monitoring frequency will be decided on a site-specific basis and in coordination with

Federal, State, and local agencies that manage the groundwater resources of the region. If the project will be using surface water then the Water Resources Monitoring and Mitigation Plan will include monitoring that focuses on changes in flows, volumes, and water quality during construction and operations as well as their recovery after decommissioning. Monitoring frequency will be decided on a site-specific basis and in coordination with Federal, State, and local agencies that manage the surface water resources of the region.

CM22: Restoration, Revegetation and Reclamation Plan

The project proponent will prepare a project-specific Restoration, Revegetation and Reclamation Plan that meets the approval of the permitting agencies. The restoration, revegetation and reclamation will be implemented during all phases of the project. WCREAA Final EIS Volume 2 has objectives, performance standards, and recommended reclamation best management practices (BLM 2012c). The plan will consider using all applicable best management practices and address, at a minimum:

1. Minimizing natural vegetation removal and considering cutting or mowing vegetation rather than total removal whenever possible.

2. Identification of protocols to be used for vegetation salvage.

3. Salvage and relocation of cactus and yucca from the site prior to the initiation of construction activities.

4. Identify erosion control materials that will be used on site to prevent wind and water erosion, such as straw or coir mats, and wattles or check dams.

5. Restoration and reclamation of all temporarily disturbed areas, including pipelines, transmission lines, staging areas, and temporary construction-related roads will occur as soon as possible after completion of construction activities to reduce the amount of habitat converted at any one time and to facilitate the recovery to natural habitats.

6. Reclamation of all temporarily disturbed areas will use appropriate techniques to encourage native seed germination and plant establishment, like vertical mulching, sheet mulching, saving and re-spreading brush and woody debris, or use of certified weed free native vegetation and topsoil salvaged from all excavations and construction activities.

7. Plants to be used in restoring temporary or permanent disturbance areas will be collected on site and banked prior to disturbance or derived from local seed sources. The term “local” in this context means seed sources with a genetic makeup that do not vary substantially from seeds or plant found at the disturbed location.

8. Include a post-restoration monitoring component with performance standards and criteria to evaluate if restoration goals are being met.

CM23: O&M Conservation Measures Activities

Road, transmission line, and pipeline maintenance activities are expected to occur during the life of the project. To the extent possible, all maintenance activities will be scheduled outside of desert tortoise activity periods, unless accompanied by an Authorized Biologist.

CM24: Desert Tortoise Habitat Acquisition

According to the general stipulations for WCMREEA, desert tortoise habitat east of the Coachella Canal will be compensated at a 3:1 compensation ratio. Due to the loss of function of habitat and the lag time associated with desert restoration, all impacts to tortoise habitat, including temporary impacts, will be considered permanent impacts. The following qualitative criteria will be used to select desert tortoise habitat:

1. Parcels will be part of a larger block of lands that are either now protected or planned for protection, or feasibly could be protected by a public resource agency or a private third party organization supportive of desert habitat conservation.

2. Parcels will provide habitat that is of the same or higher quality for desert tortoise than the habitat being impacted by the Project. Preferably, the lands will consist of sufficiently good habitat such that they are occupied or could be occupied by the desert tortoise once they are protected from anthropogenic impacts and/or otherwise enhanced.

3. Parcels will not be subject to 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.

4. The parcels will 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 will represent populations that are stable, recovering, or likely to recover.

5. The parcels shall be consistent with the goals, objectives, and recovery actions described in the Service's revised recovery plan (Service 2011a) for the desert tortoise, if possible.

CM25: Project Decommissioning

Proponent will prepare a project-specific closure/decommissioning that meets the approval of the permitting agencies. The plan will also be implemented in the event of project abandonment. The plan will include, but not be limited to, the following:

1. Removal of transmission conductors, power lines, fencing when they are no longer used and useful.

2. Removal of all above ground power plant site facilities and related facilities when they are no longer being used or useful.

3. If the site has been terraced or otherwise substantially altered from its natural contour, recontouring may be necessary.

4. If the plan anticipates removal of topsoil, the plan will address storing and revegetation of the soil. Soil profiles will be restored so that topsoils will establish and maintain pre-construction native plant communities to the extent possible.

5. Methods for restoring wildlife habitat and promoting the re-establishment of native plant and wildlife species.

6. Methods for restoring vegetation cover, composition, and diversity to values commensurate with the natural ecological setting.

7. The plan will identify and use local seed sources, where possible, and call for the revegetating the project site and other disturbed areas with appropriate native seed mix.

8. The criteria that would trigger implementation of the plan (e.g., nonoperational for 1 year or more).

9. The plan will include a cost estimate to complete closure/decommissioning-related activities and a funding mechanism to ensure sufficient funds are available for decommissioning.

Action Area

The implementing regulations to section 7(a)(2) of the Act describe the action area to be all areas affected directly or indirectly by the Federal action and not merely the immediate area affected by the proposed project (50 CFR § 402.02). The action area is the area of potential direct or indirect effects of the proposed action and any interrelated or interdependent human activities; the direct and indirect effects of these activities include associated physical, chemical, and/or biological effects of considerable likelihood (Service and NMFS 1998). Indirect effects are those that are caused by the proposed action and are later in time but are still reasonably certain to occur (50 CFR § 402.02, Service and NMFS 1986). Analyses of the environmental baseline, effects of the action on the species and designated critical habitat, cumulative effects, and the levels of incidental take, are based upon the action area as determined by the Service (Service and NMFS 1998).

The action area includes all areas within the boundaries of the WCMREEA, including potential desert tortoise translocation areas and habitat compensation areas. We recognize that only 19,570 acres of BLM lands may be developed but specific needs for access roads and transmission lines are not fully known and will be determined and evaluated during planning for

future projects. Since these needs are undetermined, we included all lands within the WCMREEA boundary and a 0.77-mile buffer; therefore, the total acreage of the action area is about 128,735 acres. We chose to include a 0.77-mile surrounding the WCMREEA to address adverse or indirect effects to desert tortoises whose home ranges overlap the proposed plan area. We based the buffer area on the assumption that the average male home range is approximately 0.77 mile^2 (O'Conner et al. 1994, Duda et al. 1999, Harless et al. 2009), and adding this area is likely to capture a tortoise's home range that may overlap the proposed planning area. However, we recognize that the size of desert tortoise home ranges varies with respect to location and year (Berry 1986) and the size serves as an indicator of resource availability, opportunity for reproduction, and social interactions (O'Connor et al. 1994). Over the course of their lifetime, tortoises may use more than 1.5 mile^2 of habitat and make forays of several miles at a time (Service 2010c).

STATUS OF THE SPECIES RANGEWIDE

The following section summarizes information about the desert tortoise on the legal/listing status, distribution and population trends, current threats, and status of critical habitat as discussed in the Service's revised recovery plan (Service 2011a), the current 5-year review (Service 2010a) and the Service's biological opinion and conservation review for the Solar Energy Program in six western States (Service 2012a). Please see these documents for additional detailed biological information about these topics and the species' description, life history, and habitat affinities.

Legal/Listing Status

The Mojave population of desert tortoise was proposed for listing by the Service on October 13, 1989, and listed as a threatened species on April 2, 1990 (Service 1989, 1990). The tortoise is also listed as a threatened species under the California Endangered Species Act. The Service designated about 6.5 million acres of critical habitat for the Mojave desert tortoise in portions of California, Nevada, Arizona, and Utah on February 8, 1994 (Service 1994b). The recovery plan was approved in 1994 (Service 1994a) and the revised recovery plan was published in 2011 (Service 2011a).

Since listing the desert tortoise has been split into two species, *Gopherus agassizii* and *G. morafkai*. The newer taxon *G. agassizii*, or Mojave desert tortoise, is analogous to the listed entity, and thus the taxonomic revision does not affect its listing status. For more information on the revision and the listed species, please see Murphy et al. (2011), and Averill-Murray (2011).

Distribution and Population Trends

Typical desert tortoise habitat is characterized as creosote bush scrub below 5,500 feet in which precipitation ranges from 2 to 8 inches, where a diversity of perennial plants is relatively high, and production of annual plants is high. In the Colorado Desert Recovery Unit, desert tortoises are found in the valleys, on bajadas, desert pavements, rocky slopes, and in the broad, well-

developed washes (especially to the south). The Mojave desert tortoise range is north and west of the Colorado River in the Mojave Desert of California, Nevada, Arizona, and southwestern Utah, and in the Sonoran/Colorado Desert of California.

Since 2001, line distance sampling has been used as part of a long-term monitoring strategy to detect population trends. Density estimates of adult tortoises vary among recovery units and years. Detecting population trends is expected to be a gradual process and surveys conducted over short periods of time, such as the time since program initiation, will only be expected to reveal catastrophic declines or significant changes. In general, over the first 6 years of rangewide monitoring (2001-2005, 2007), tortoises were least abundant in the Northeast Mojave Desert Recovery Unit, the highest reported densities occurred in the Upper Virgin River Recovery Unit, and considerable decreases in density were reported in 2003 in the Eastern Colorado and Western Mojave recovery units (Service 2011a).

The planning area partially overlaps the former Eastern Colorado Recovery Unit (Service 1994a), which was consolidated with the Northern Colorado Unit to form the Colorado Desert Recovery Unit in the revised recovery plan (Service 2011a). The WCREAA is adjacent to the Chocolate Mountains AGR, which has some of the highest estimated densities from the rangewide monitoring program (Service 2010c, 2012b). Recent estimated densities from the Chocolate Mountain AGR include: 2012: 15.86 mile^2; 2011: not sampled; and 2010: 35.9 mile^2 (Service 2010c, 2012b).

Current Threats

The majority of threats to the tortoise and its habitat are associated with human land use changes. Threats include urbanization, upper respiratory tract disease and possibly other diseases, predation (i.e., common ravens, and domestic and feral dogs), unauthorized and authorized OHV activity, illegal collecting, mortality on paved roads, vandalism, drought, livestock grazing, feral burros, nonnative plants, changes to natural fire regimes, and environmental contaminants. For further discussion of individual threats, please see the revised recovery plan (Service 2011a), and the most recent 5-year review (Service 2010a). Since release of the 5-year review, utility-scale renewable energy development has become a greater threat to the desert tortoise. These threats include habitat loss and fragmentation, raven predation and transmission line construction, collision with vehicles using new roads, and disturbance associated with renewable energy development.

ENVIRONMENTAL BASELINE OF THE SPECIES

Regulations implementing the Act (50 CFR §402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions and other human activities in the action area. Also included in the environmental baseline are the anticipated impacts of all proposed Federal projects in the action area that have undergone section 7 consultation, and the impacts of State and private actions which are contemporaneous with the consultation in progress.

Past Consultations in the Action Area

The Service has issued the following biological opinions for actions that have occurred within the action area for this consultation. In all cases, the Service determined that the proposed actions were not likely to jeopardize the continued existence of the desert tortoise or destroy or adversely modify its critical habitat.

Northern and Eastern Colorado Desert Coordinated Management Plan CDCA Plan Amendment

To provide for management of recreational use, and to resolve other resource and public land use conflicts, section 602(d) of Federal Land Policy and Management Act of 1976 directed the Secretary of the Interior to "prepare and implement a comprehensive, long-range plan for management use, development, and protection of the public lands within the CDCA." The CDCA Plan is an over-arching or programmatic plan from which activity-level or more site-specific plans are tiered. The Northern and Eastern Colorado Desert Coordinated Management Plan (NECO), an amendment to the 1980 CDCA Plan, focuses on several aspects of BLM's multiple use mandate including biological considerations. Under NECO a Multi-species Conservation Zone was defined which included existing restricted lands: BLM Wilderness Areas, Joshua Tree National Park, and Chocolate Mountain AGR lands, Desert Wildlife Management Areas (DWMAs), and Wildlife Habitat Management Areas.

The Service issued a programmatic biological opinion evaluating the effects of BLM's CDCA Plan Amendment for BLM's NECO Plan (BLM 2002a) on desert tortoise and its critical habitat on June 17, 2002 (1-8-01-F-16), and as amended, on March 31, 2005, and November 30, 2007 (1-8-04-F-43R). We found the BLM's plan guidance was not likely to jeopardize the continued existence of desert tortoise or adversely modify critical habitat. The programmatic biological opinion exempted take of desert tortoise for casual uses (e.g., recreation, mining, OHV use), livestock grazing, and burro removal that BLM authorizes through approval of the CDCA Plan. Projects outside of these activity categories require separate consultation.

Coachella Valley Multiple Species Habitat Conservation Plan

The Coachella Valley Multiple Species Habitat Conservation Plan/Natural Community Conservation Plan (CVMSHCP) is a regional multi-agency conservation plan that provides for the long-term conservation of ecological diversity in the Coachella Valley region of Riverside County. An incidental take permit for the CVMSHCP authorized the loss of 68,453 acres (29 percent) of desert tortoise habitat on non-Federal lands in the Coachella Valley; the plan also conserved 97 percent of designated critical habitat on non-Federal lands in the plan area.

Coachella Valley Amendment to the CDCA Plan

The Coachella Valley Plan amendment to the CDCA Plan was designed to complement the CVMSHCP (BLM 2002b). Within the Coachella Valley Plan area, approximately 227,531 acres

of tortoise habitat occur on BLM lands. A series of biological opinions have been completed on the effects of the amendment for the Coachella Valley for ten listed species. The Service consulted on desert tortoise (#1-8-01-F-16), dated June 17, 2002, and incorporated the biological opinion by reference to the proposed Coachella Valley Plan amendment for managing BLM lands in the Coachella Valley (FWS-ERIV-3066.2).

The biological opinion on the plan amendment was reinitiated on June 30, 2010, (FWS-ERIV-10B0278-10F0649) to revise our incidental take statement and incorporate new information available since our previous biological opinion on several species, including desert tortoise. Our incidental take statement was updated to address casual uses, sand and gravel mining, fire management, dust control, and administrative activities associated with implementing the Coachella Valley Amendment to the CDCA plan. We anticipated that no more than one desert tortoise would likely be reported per year, and that any such report of incidental taking was likely to represent the actual death or injury of up to five individual tortoises per year. Therefore, the Service established a requirement for BLM to reinitiate formal consultation if two desert tortoises are found dead or injured in any calendar year as a result of casual uses and administrative activities, as described in the biological opinion and this Incidental Take Statement.

Imperial Sand Dunes Recreation Area Management Plan

The Service issued a biological opinion to the BLM on November 02, 2012, (FWS-IMP-09BO172-11F031) for the implementation of the Imperial Sand Dunes Recreation Area Management Plan (RAMP), which guides management of the Imperial Sand Dunes for 15 to 20 years. The RAMP updated and revised the 1987 plan and amended the CDCA Plan. The planning area encompasses 214,930 acres, which includes the designated 138,111-acre Imperial Sand Dunes Special Recreation Management Area (SRMA) and the 26,098-acre North Algodones Dunes Wilderness (located within the SRMA). The remainder of the planning area (50,722 acres) is within a 1-mile limited use area around the entire SRMA that is part of the existing El Centro Extensive Recreation Management Area and is managed under the Northern and Eastern Colorado Desert Coordinated Management Plan (NECO) and the Western Colorado OHV Routes of Travel Designation Plan.

The Service anticipated that the actions associated with the Imperial Sand Dunes RAMP management plan and use and maintenance of designated routes of travel will result in incidental take of relatively few tortoises, on the order of one or two adults or juveniles, and a small but unquantifiable number of eggs per year. If more than one adult or juvenile tortoise per year is found injured or dead due to recreational activities, or use and maintenance of designated routes of travel managed by BLM, the anticipated level of incidental take will be exceeded. At this time the Service has not received any reports from the BLM indicating that an adult or juvenile has been injured or killed due to recreation activities or on designated routes within the management area.

Military use of Chocolate Mountain Aerial Gunnery Range

The Service issued a biological opinion to the U.S. Marine Corps on April 19, 1995 (1-6-95-F-40), regarding the effects to desert tortoise by increasing ordnance (e.g., bombing) from 16 hours per day to 24 hours per day. The action included increasing bomb size, redeveloping target sites, and relocating ground support and drop zone areas over a 32-square mile area. Based on the analysis of impacts, we anticipated that 11 desert tortoises may be incidentally injured or killed by ordnance or vehicles during training activities. We authorized take in the form of harassment for up to 112 desert tortoises each year and authorized that tortoises be moved out of harm's way from target impact zones or roads during military activities.

Minor Construction Activities within the CDCA

The Service issued a biological opinion for effects to desert tortoises from minor construction activities within the BLM's California Desert District in 1997. For the purposes of the biological opinion, minor construction activities constitute land disturbance of less than 2 acres per activity, cannot exceed 10 acres of impacts to designated critical habitat in any one year, and cannot exceed 40 acres within the Colorado Desert Recovery Unit over the life of the opinion. Some of these thresholds have been met and the Service is working with the BLM on reinitiation.

A variety of activities were addressed under this biological opinion, including construction of communications facilities, location of temporary helicopter staging sites, construction of guzzlers or spring development for wildlife, or location of apiary sites. Disturbance from these actions and other minor construction activities could require cross-country travel by vehicles, construction of access roads or fencing, and staging areas for construction equipment. The biological opinion exempts take, in the form of direct mortality or injury, of up to 2 desert tortoises per year from construction activities, and take, in the form or harassment, of up to 10 desert tortoises per year for the purposes of moving individuals out of harm's way. Conservation measures are required as part of the proposed action to avoid, minimize, and offset adverse effects to the species.

In sum, the biological opinions listed above have authorized a relatively small amount of take within the large areas that they cover. Implementation of conservation measures similar to those included in this programmatic biological opinion minimizes the associated adverse effects and impacts of the taking of desert tortoise and impacts to critical habitat. Because the action areas defined for these projects narrowly intersect that which is analyzed for the proposed land use change in this biological opinion, only a relatively small portion of the total take associated with these projects would coincide geographically with the proposed WCMREEA.

Species Abundance and Habitat Characteristics within the Action Area

The WCMREEA occurs in the Colorado subdivision of the Sonoran Desert, and lies along the southwestern edge of the species' range, partially overlapping the Colorado Desert Recovery Unit (Service 2011a). The plan area lies between the Salton Sea and Chocolate Mountains AGR

(Figure 1). The plan area is bisected by the Coachella Canal, which generally separates a relatively small area of undisturbed desert lands and tortoise habitat in the southeast, from the much larger complex of generally degraded lands west of the canal (Figure 1). The entire area east of the canal consists of largely undisturbed alluvial habitat that supports desert scrub vegetation, braided networks of alluvial washes, and associated microphyll woodlands. West of the canal, most BLM and checker-boarded private lands are typically disturbed by a variety of historical land uses, with relatively small fragments of undisturbed native vegetation isolated by roads, canals, berms, and active/abandoned agricultural fields. Within the area east of the canal, 2,863 acres of lands donated/acquired for conservation will be managed for resource conservation and unavailable for future project development (BLM 2012a).

The U.S. Geological Survey (USGS) developed a quantitative habitat model for the Mojave desert tortoise, which includes portions of the Colorado/Sonoran Desert in California (Nussear et al. 2009). Based on field collected presence/absence data and a number of environmental variables, the model provides a measure of the statistical probability of habitat potential for desert tortoise. Date upon which the model is based mainly have been collected within critical habitat units, DWMAs, and other lands allocated for conservation, but areas outside tortoise conservation areas, like the WCMREEA, historically have been under sampled. To date, the USGS model is viewed as the best available data for predicting desert tortoise habitat on a landscape scale, though it does not account for site-specific and anthropogenic conditions that affect habitat potential at a local scale.

The USGS Desert Tortoise Habitat Model for the WCMREEA and some of the surrounding area indicates that habitat values are modeled as low habitat potential with the area in the southeast shaded in pink at a value of 0.1; areas in white are classified with a value of zero (0) (Figure 2). Though rated as low potential habitat by the USGS model, we expect that low densities occur in the plan area, based on the low numbers of tortoises found in comparable nearby areas and other records in the Colorado/Sonoran Desert in USGS-modeled habitat with low potential suitability.

Though desert tortoise surveys have not be conducted in the plan amendment area, desert tortoise densities are considered to be relatively low, based on available data from nearby areas. The California Natural Diversity Database (2010) reports a single occurrence record in the plan area along the eastern edge near Dos Palmas, and few records are known from the Imperial Sand Dunes RAMP bordering the south end of the plan area. In addition, systematic surveys conducted on a portion of the Chocolate Mountain AGR near the eastern edge of the plan area, found four, Class 3; and one, Class 4 burrows[1], indicating past occupation (USDN/USMC 2011). The BLM has determined that it is highly unlikely that tortoises are present west of the canal,

[1] Desert Tortoise Burrow Condition Class (Service 2009) :

1.currently active, with desert tortoise or recent desert tortoise sign
2.good condition, definitely desert tortoise; no evidence of recent use
3.deteriorated condition; this includes collapsed burrows; definitely desert tortoise
4.good condition; possibly desert tortoise
5.deteriorated condition; this includes collapsed burrows; possibly desert tortoise

given that (1) the desert tortoise habitat model indicates the area west of the Coachella Canal has a value of zero (0) in the USGS tortoise habitat model; (2) the Coachella Canal, which bisects the plan area, poses a partial barrier to east/west desert tortoise movement; (3) there is a high degree of habitat fragmentation and degradation west of the canal; and (4) the length of time the area west of the canal has been heavily disturbed and habitats degraded.

EFFECTS OF THE ACTION

Effects of the action refer to the direct and indirect effects of an action on the species or critical habitat that would be added to the environmental baseline, along with the effects of other activities that are interrelated or interdependent with that action. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification.

Interdependent actions are those that have no independent utility apart from the action under consideration. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur. In contrast to direct effects, indirect effects can often be more subtle, and may affect species and habitat quality over an extended period of time, long after project activities have been completed. Indirect effects are of particular concern for long-lived species such as the tortoise, because project-related effects may not become evident in individuals or populations until years later.

As described above under the conservation measures of the project description, BLM has developed numerous stipulations to minimize adverse effects to various natural resources, including desert tortoise, in the plan area. These resource protections will be applied to all renewable energy projects proposed in the plan area and are addressed below in impact-specific analyses.

Direct Effects

Direct effects associated with construction and O&M of future projects within the WCMREEA may result in death or injury to desert tortoises. Direct effects associated with the reasonably foreseeable development scenarios include (1) loss of habitat used to support life history requirements; (2) direct mortality from project equipment and construction activities; (3) direct mortality due to increased traffic and road access; and (4) translocation of tortoises from proposed projects. Included in our direct effects analysis is a discussion of decommissioning.

Habitat Loss

Temporary Impacts

Based on numerous studies cataloguing restoration rates of desert vegetation, all ground-disturbing impacts associated with the future development of in the WCMREEA effectively are permanent. Vasek et al. (1975) found that the Mojave Desert transmission line construction and O&M activities resulted in a permanently devegetated maintenance road, enhanced vegetation

along the road edge and between tower sites (often dominated by nonnative species), and reduced vegetation cover under the towers, which recovered significantly but not completely in about 33 years. Webb (2002) determined that absent active restoration following extensive disturbance and compaction in the Mojave Desert, soils in this environment could take between 92 and 124 years to recover. Other studies have shown that recovery of plant cover and biomass in the Mojave Desert could require 50 to 300 years in the absence of restoration efforts (Lovich and Bainbridge 1999). For these reasons, the BLM and Service consider temporary impacts to be functionally permanent relative to the lifetime of construction projects, and therefore, subject to habitat loss calculations for determining permanent impacts and commensurate offsetting measures. These calculations will be determined on a project-specific basis and applied to all renewable energy development proposed in the planning area.

Permanent Impacts

The habitat area east of the Coachella Canal is in relatively good condition, with little surface disturbance or many of the threats identified in the revised recovery. These threats include: extensive road networks, OHV use, other intensive recreation, energy or mineral development, utility corridors, predator subsidies, and invasive nonnative species. As a result, the BLM proposes to protect most of this area for continued use by desert tortoise by establishing a 10 percent cap on potential renewable energy development, thereby protecting 90 percent of the habitat east of the canal.

Based on the stipulations for proposed renewable energy development in the WCMREEA, we expect that up to 700 acres of the 7,006 acres of tortoise habitat east of the canal may be directly impacted by construction and O&M activities associated with the proposed plan amendment. West of the canal, most BLM lands are degraded, as described in the "Environmental Baseline" section above, patches of potentially suitable habitat are small and isolated, and human disturbance on intervening private lands fairly intense. Therefore, we anticipate few if any desert tortoises are likely to be present, as outlined in the biological assessment (BLM 2012a). Regardless, the BLM will require project-specific habitat assessments and project proponents will conduct pre-project surveys for all proposed solar or geothermal projects in potentially suitable habitat areas. Therefore, we expect an unquantified, but small amount of potentially suitable habitat west of the canal may be lost, with few if any tortoises expected to be affected.

<u>Construction and O&M</u>

Death and injury of desert tortoises could result from collisions with or crushing by vehicles or heavy equipment, including individuals that take shelter under parked vehicles and are killed or injured when vehicles are moved. Desert tortoises could also be injured or killed during vegetation removal and clearing, trenching and drilling activities, and entrapment in open trenches and pipes. Individual tortoises or their eggs could be crushed or buried in burrows during construction and O&M-related activities. Because of increased human presence in the area, desert tortoises may be killed or injured due to collection or vandalism associated with increased encounters with workers, visitors, and unauthorized pets. Desert tortoises may also be

attracted to the construction area by application of water to control dust, placing them at higher risk of death or injury.
To minimize incidental death and injury of desert tortoises residing in or entering the construction or O&M disturbance areas the BLM would ensure that project proponents implement the general and desert tortoise species-specific actions specified in the "Conservation Measures" section. The lethal take of tortoises would be minimized during construction activities by having an Authorized Biologist or Biological Monitor, as necessary. Authorized Biologists must meet the Service's Authorized Biologist qualifications and be approved by the Service and BLM prior to the initiation of ground-disturbing construction activities (CM1). These biologists would be present during all ground-disturbing construction activities and for all maintenance activities that are scheduled during tortoise active season (CM1, CM24). All Authorized Biologists will have authority to halt all activities in any area where there would be an unauthorized adverse impact.

Permanent tortoise exclusion fencing will ensure that tortoises do not enter the project sites during construction phases and O&M. Following construction of the tortoise-exclusion fence, the Authorized Biologist will conduct clearance surveys within the fenced area to ensure as many desert tortoises as possible have been removed from the site. If necessary, any desert tortoises located would be either moved out of harm's way or translocated to the approved Recipient Site as outlined in the Service-approved Desert Tortoise Translocation Plan (CM3, CM4).

We expect all life stages of desert tortoise to occur on suitable habitat within the WCMREEA. Our estimate of the numbers of desert tortoises and eggs that are likely to occur within the action area for future projects will be derived from pre-project survey data. We acknowledge that not all individuals killed or injured during construction and O&M activities will be detected. The inability to detect all tortoises is largely due to the cryptic nature of desert tortoises and their fossorial habits, and limited abundance; and in the case of juveniles and eggs, their small size and location underground that reduce detection probabilities of these life stages. Another confounding factor is that scavengers may locate, consume, or remove carcasses before monitors can locate them.

Any desert tortoises undetected during the initial clearance surveys may be located during construction activities by routine site inspections by an Authorized Biologist, Biological Monitors, or incidental observations by construction workers. The WEAP would be administered to all onsite personnel to familiarize the workers with tortoise occurrence on site and legal protections and (CM8). This training would enhance the effectiveness of onsite personnel to improve detection and avoidance of desert tortoises, and ensure proper translocation procedures are adhered to during construction and O&M activities. Additional actions to avoid and minimize incidental death and injury of desert tortoises include filling any open trenches, pits or excavated areas outside the fenced areas to prevent entrapment (CM12), storing construction materials and piping inside the perimeter security fence, and minimizing the access to water sources such as evaporation ponds or geothermal facility ponds, which acts as an attractant to desert tortoises and their predators (CM9).

Overall, we expect that death and injury of most subadult and adult tortoises would be avoided during construction and O&M activities through compliance with the proposed conservation measures. Additional proposed measures to minimize impacts not mentioned above include (1) the timing of construction and O&M activities during the inactive season and when temperatures are above or below desert tortoise activity thresholds; (2) enforceable speed limits; and (3) minimizing the risk of entrapment by constructing escape ramps in open excavations and having Biological Monitors or Authorized Biologists frequently monitor these areas.

Desert Tortoise Translocation

Capture and translocation of desert tortoises may result in accidental death and injury from stress or disease transmission associated with handling tortoises, stress associated with moving individuals outside of their established home range, stress associated with artificially increasing the density of tortoises in an area and thereby increasing competition for resources, and disease transmission between and among translocated and resident desert tortoises. Capture and handling of translocated and resident desert tortoises for the purposes of attaching transmitters, conducting health assessments, which include visual inspection relative to body condition, clinical signs of disease, and collection of biological samples for disease screening (i.e., blood samples to test for antibodies to pathogens), also may result in accidental death or injury.

Capturing, handling, and moving tortoises for the purposes of translocating them out of a proposed project area or moving them out of harm's way may result in accidental death or injury if these methods are performed improperly, such as during extreme temperatures, or if individuals void their bladders and are not rehydrated. Averill-Murray (2002) determined desert tortoises that voided their bladders during handling had lower overall survival rates (0.81 to 0.88) than those that did not void (0.96). If multiple desert tortoises are handled by biologists without the use of appropriate protective measures and procedures, such as reused latex gloves, pathogens may be spread among individuals. Because BLM would ensure that project proponents adhere to the most recent Service guidance, in addition to implementing the conservation measures outlined in the proposed action, we anticipate any mortality or injury to desert tortoises from activities associated with removing individuals from the proposed geothermal or solar project is unlikely.

Because of the difficulty in locating juvenile desert tortoises and eggs, some but not all are likely to be translocated from the project areas. Effects to juvenile desert tortoises and eggs that are undetected on the project sites are discussed later in this section. Translocation may increase the prevalence of diseases, like upper respiratory tract disease, in translocated and resident desert tortoises. Physiological stresses associated with handling and movement or from density-dependent effects could exacerbate this risk if translocated individuals with subclinical upper respiratory tract disease or other diseases present symptoms subsequent to translocation. This potential conversion of translocated desert tortoises from a non-contagious to contagious state may increase the potential for infection in the resident population above pre-translocation levels. To minimize this risk, health assessments would be required on all desert tortoises prior to being translocated in accordance with the most recent Service guidance.

Apart from disease, translocation may also affect resident desert tortoises within the area due to local increases in population densities. Desert tortoises from future project sites would be moved to areas now supporting a resident population, which may result in increased inter-specific encounters, and thereby, an increased potential for spread of disease, potentially reducing the health of the overall population; increased competition for shelter sites and other limited resources; increased competition for forage, especially during drought years; or increased incidence of aggressive interactions between individuals (Saethre et al. 2003). To minimize potential density-dependent effects, recipient sites must be sufficiently large to accommodate and maintain the resident and translocated desert tortoises (Service 2010d). The BLM and project proponent will implement the most recent Service guidance and develop a translocation plan to minimize the spread of disease or density dependent factors. The following mitigating circumstances are likely to reduce the magnitude of this risk:

- Project proponents would use experienced biologists and approved handling techniques that are unlikely to result in substantially elevated stress levels in translocated animals;

- Health assessments would be performed on all desert tortoises prior to translocation thus decreasing the potential for introduction of infectious diseases to future recipient sites;

- Desert tortoise surveys would be conducted on future recipient sites to determine density;

- Tortoises with clinical signs of disease would not be translocated; and

- Long-term monitoring, if required, of translocated individuals would be implemented to determine the prevalence of disease transmission.

Desert tortoises are expected to disperse following release, though we cannot predict the movement patterns of all translocated individuals. Dispersal distances following translocation appear to be influenced by the distance individuals are moved from their home range and the availability of resources in the area to which they are moved. Desert tortoises translocated relatively short distances from their home ranges tend to move shorter distances from their release points than desert tortoises translocated more than 1,640 feet. Nussear (2004) reported that for adult desert tortoises translocated greater than 1,640 feet, the mean straight-line dispersal distance for both males and females ranged from 0.6 to 3.7 miles. Walde et al. (2008) reported that the mean straight-line dispersal distances for adult desert tortoises using two experimental treatments was approximately 1.6 miles and 2.6 miles for males and 0.9 mile and 1.4 miles for females. Maximum straight-line dispersal distances for translocated adult males ranged from 3.9 miles (Field et al. 2007) to 7.8 miles in the first year following translocation (Walde et al. 2008).

The degree to which translocated desert tortoises expand the area they use depends on whether tortoises are released into typical or atypical habitat; that is, if the recipient area supports habitat that is similar to that of the source area, desert tortoises are likely to move less (Nussear 2004). Translocated desert tortoises appear to reduce movement distances following their first post-

translocation hibernation to a level that is not significantly different from resident populations (Nussear 2004, Field et al. 2007). As time increases from the date of translocation, most desert tortoises alter their movement patterns from dispersed, random patterns to more constrained patterns, which may indicate establishment of a new home range (Nussear 2004).

Just as we cannot predict the distances translocated desert tortoises will move, we also cannot predict the direction these individuals are likely to move. Berry (1986) observed that translocated desert tortoises have exhibited a tendency to orient toward the location of their capture and attempt to move in that direction, but other research showed no discernible homing tendency in translocated individuals (Field et al. 2007). Data specific to short-distance translocations indicate that at least some individuals will attempt to return to their former home ranges after release (Rakestraw 1997, Stitt et al. 2003).

Based on previous translocation studies, straight-line dispersal distances from release points generally vary during the first year following translocation. While the mean straight-line distances reported for several studies are close to or less than 1.6 miles, some translocated desert tortoises move much farther (Nussear 2004, Field et al. 2007, Drake et al. 2009). Based on our analysis of the available data, we expect the movements of most tortoises translocated more than 1,640 feet to remain within 4 miles of their release points. This distance was derived by examining the upper limits of the 95 percent confidence intervals for available data. However, as mentioned above, translocated individuals can also significantly expand the area they occupy in the first year following translocation (e.g., 3.9 to 6.9 per mile^2 at a Nevada site and from 0.2 to 10.3 per mile^2 at a Utah site) (Nussear 2004, Field et al. 2007, Drake et al. 2009). Based on movement of tortoises after translocation, the Service (2011b) recommends that a proposed translocation site is at least 6 miles from major unfenced roads or highways.

In one study, the majority of dispersal movement away from the release site occurred during the first 2 weeks after translocation (Field et al. 2007). During this time and over the period prior to establishment of a new home range, translocated desert tortoises may experience higher potential for mortality because they are moving through unfamiliar habitats and are less likely to have established cover sites that provide protection. Studies have documented various sources of mortality for translocated individuals, including predation, exposure, fire, disease, and flooding (Berry 1986; Field et al. 2007; Nussear 2004; U.S. Army 2009, 2010). Of these, predation appeared to be the primary mortality mechanism in most translocation studies (Nussear 2004; Field et al. 2007; U.S. Army 2009, 2010). These studies indicate that desert tortoise mortality is most likely to occur during the first year after release. After the first year, translocated individuals are likely to establish new home ranges and mortality is likely to decrease.

Various studies have documented mortality rates of translocated desert tortoises ranging from 0 to 21.4 percent (Nussear 2004, Field et al. 2007). Nussear (2004) found that mortality rates among translocated desert tortoises were not statistically different from that observed in resident populations. However, because this study did not compare mortality rates in resident populations to those in control groups, we cannot determine if the translocation caused increased mortality rates in the resident population. Recent studies in support of the Fort Irwin expansion

(U.S. Army 2009, 2010) compared mortality rates associated with resident and translocated desert tortoise populations with that of control populations; preliminary results indicated translocation did not increase mortality above natural levels (Esque et al. 2010).

Following release of desert tortoises translocated outside of their home range, a small number may die due to exposure, stress, dehydration, inadequate food resources, and increased predation. We anticipate that any mortality associated with these factors is likely to occur in the first year after release, during the period that translocated animals are attempting to establish new home ranges. We anticipate only small number of resident desert tortoises at future recipient sites may die from natural causes due to these same vulnerabilities. However, we cannot determine if mortality rates in the translocated or resident populations would be above natural mortality levels for the recipient site. But the potential impacts of capturing, handling, and moving tortoises for the purposes of translocation would be avoided or reduced through implementation of the actions specified in the "Conservation Measures" section and through any project-specific Desert Tortoise Translocation Plan.

Juvenile desert tortoises will make up a portion of the overall mortality predicted within resident and translocated populations. In general, this life stage experiences higher mortality rates than subadult and adults under natural circumstances and are more susceptible to predation. Because of the difficulty in locating juvenile desert tortoises, individuals that are not translocated are likely to die during construction. However, as stated above in the "Direct Effects" from construction and "O&M" sections, our estimate for the numbers of desert tortoises and eggs that are likely to occur for future projects will be derived from pre-project survey data. Accordingly, the translocation of juvenile desert tortoises and eggs will be addressed in project-specific Desert Tortoise Translocation Plan.

We do not anticipate that moving desert tortoises out of harm's way of construction of linear features (i.e., transmission lines, access roads) would result in death or injury because these individuals would remain near or within their existing home range, which is not likely to result in significant social or competitive impacts to resident desert tortoises in the area. Any desert tortoises moved from linear features would continue to occupy familiar territory and use known shelter sites and are unlikely to suffer post-translocation mortality associated with temporary removal from the disturbance areas.

Decommissioning

Decommissioning will include actions to remediate impacts, such as decompacting soils, seeding, and nonnative species control. But desert habitat restoration studies indicate that disturbed areas may be permanently lost or ecologically unsuitable for decades to come. Abella (2010) conducted a quantitative review of over 46 studies evaluating post-disturbance plant recovery and success in the Mojave and Sonoran deserts and found that the reestablishment of perennial shrub cover (to amounts found on undisturbed areas) generally occurs within 100 years but in fewer than 40 years in some situations. He also found that a number of variables likely affect vegetation recovery times, including but not limited to, climate (e.g., precipitation and

temperatures), invasion by nonnative plant species, and the magnitude and extent of ongoing disturbance. Therefore, when and if successful restoration of these areas would reclaim habitat suitable for desert tortoises in the future cannot be determined at this time, and potential effects of decommissioning would be reassessed prior to the beginning of that process.

Indirect Effects

Indirect or edge effects from solar development may include increased noise levels, light pollution, impacts from roads, and increased dust. For our analysis, we assessed edge effects that may be associated with future projects and included a buffered area around the plan area, even though these effects are poorly understood (Lovich and Ennen 2011). Indirect effects associated with construction and O&M of future projects within the WCMREEA may result in death or injury to desert tortoises. Indirect effects associated with the reasonably foreseeable development scenarios include an increase in (1) trash and predator subsides, (2) raven perching and nesting structures, (3) noise and light associated with construction and O&M, (4) impacts to groundwater, and (5) weeds within the WCMREEA.

Human activities may provide food in the form of trash and litter or water that attracts tortoise predators such as the common raven. Ravens capitalize on human encroachment and expand into areas where they were previously absent or in low abundance. Ravens habituate to human activities and are subsidized by the food and water, as well as roosting and nesting resources that are introduced or augmented by human encroachment. Small mammal, fox, coyote, rabbit, lizard, snake, and tortoise road kill along roads provide additional attractants and subsidies for opportunistic predators/scavengers. Road-killed wildlife would likely increase during project construction and O&M traffic, further exacerbating the raven/predator attractions and increasing tortoise predation levels.

Facility infrastructure, such as power poles, fencelines, pipelines, buildings, and other structures for future projects, also may provide perching, roosting, and nesting opportunities for ravens. Natural predation rates may be altered or increased when natural habitats are disturbed or modified. Common raven populations in some areas of the Mojave Desert have increased 1,500 percent from 1968 to 1988 in response to expanding human use of the desert (Boarman 2002). Since ravens were scarce in the Mojave Desert prior to 1940, the existing level of raven predation on juvenile tortoises is considered an unnatural occurrence (BLM 1990).

To minimize the generation of food subsidies due to construction and O&M-related activities, all trash materials would be disposed of in self-closing containers and removed to prevent the attraction of tortoise predators and road-killed animals would be immediately removed and disposed (CM14, CM15). The BLM would minimize water subsidies by monitoring ponds, or utilizing netting to prevent use by ravens and other predators (CM9). Also, increases in raven abundance in the would be minimized by measures outlined in the Raven Management Plan, which would establish a baseline and monitoring strategy to understand if there is an increase of ravens monitor raven presence at project sites (CM19). To further minimize indirect and cumulative impacts of raven predation on tortoises associated with future projects, the BLM

would ensure that project proponents contribute to the Service's Regional Raven Management Program (CM19), which was developed to address raven predation on tortoises at a population scale in the California Desert region as a conservation action for the species.

Desert tortoise behavior may be impacted by increased noise levels of a geothermal or solar facilities and the presence of full-time facility lighting during construction and O&M. Bowles et al. (1999) demonstrated that the species has relatively sensitive hearing (i.e., mean = 34 dB SPL), but few physiological effects were observed with short-term exposures to jet air craft noise and sonic booms. These results cannot be extrapolated to chronic exposures over the lifetime of an individual or a population. Based on the ability of other species to adapt to noise disturbance, noise attenuation as distance from the project increases, and the fact that desert tortoises do not appear to primarily rely on auditory cues for their survival, we do not expect any desert tortoises to be injured or killed as a result of project-related noise impacts. While we do not have data demonstrating the effect of increased noise levels and the presence of artificial lighting to desert tortoise behavior, several measures proposed to minimize these potential impacts of noise and lighting (CM16) for other sensitive species. For geothermal facilities, noise control measures such as the positioning of tanks and the use of baffling may be employed to meet applicable noise limits for other listed species, and these measures would potentially benefit tortoises by reducing noise impacts.

Withdrawals from groundwater or surface water sources may alter hydrological regimes and reduce the amount of surface water available to native species, therefore, potentially impacting tortoise forage or cover. To address water withdrawal, any geothermal development and solar energy projects must demonstrate an adequate water supply and prepare a water supply assessment (under SB-610). BLM would also require proponents who plan to use groundwater or surface water sources to develop and implement a Water Resources Monitoring and Mitigation Plan, which includes monitoring the effects of groundwater or surface withdrawal for project uses and during decommissioning. This plan would include a monitoring component decided on a site-specific basis and in coordination the agencies that manage the groundwater or surface water resources. The plan would also address vegetation restoration, dust control uses, and aquifer recovery after project decommissioning (CM21).

Dust and dust suppressants used during the construction of roads, facility construction, and infrastructure may also indirectly impact resident tortoises. Arid environments have the potential for natural dust emissions and construction activities increase dust emissions. Wind erosion can alter soil fertility and water-retention capabilities. Physiological and physical damage to plants could reduce primary productivity of forage species, thereby indirectly affecting wildlife food plants (Lovich and Ennen 2011). The proposed action includes measures to minimize dust during project construction and decommission; therefore, we do not expect desert tortoises to be adversely impacted by fugitive dust (CM9, CM21).

Native shrubs and annual plants used by tortoises for sheltering and feeding adjacent to facilities also may be adversely affected by introduced or previously naturalized invasive nonnative plants

that respond positively to ground disturbing activities. Project equipment may transport invasive nonnative plants into areas where they may become established. The potential introduction of noxious weeds may lead to increased wildfire risk (Brooks et al. 2003). However, potential degradation of habitat due to spread of invasive nonnative plants would be minimized or avoided by measures outlined in the Integrated Weed Management Plan designed to prevent the introduction of new weeds and spread of existing weeds from construction and O&M (CM20). Overall, we anticipate that the numerous measures required to minimize indirect impacts would generally be effective and avoid significant adverse effects on desert tortoise.

Summary

The Colorado Desert Recovery Unit is about 7,635,463 acres (11,930 square miles) and the WCMREEA action area overlaps about 133 square miles of this recovery unit. To reduce and minimize impacts to the best desert tortoise habitat, the BLM will cap development on BLM lands east of the Coachella Canal and exclude from development the lands previously donated/acquired for conservation (BLM 2012a). To offset permanent losses of tortoise habitat east of the canal, equivalent or better quality habitat would be acquired at a 3:1 ratio to benefit the tortoise; these lands will connect occupied habitat adjacent to critical habitat, and/or other core habitats in the Colorado Desert Recovery Unit identified in the BLM's NECO bioregional planning unit (CM24). These future conservation lands will be permanently conserved and managed for tortoises. In addition to habitat compensation, the BLM proposes additional measures for future projects that will minimize habitat loss within the project footprint; these measures include maintaining native vegetation cover and soils to the extent possible, limiting ground disturbance, restricting motorized vehicles to designated routes-of-travel, and numerous other conservation measures.

Effect on Recovery

Per section 2(b), the primary purposes of the Act are to provide a means whereby the ecosystems upon which listed species depend may be conserved, and to provide a program for the recovery of listed species. Per section 2(c), Congress established a policy requiring all Federal agencies to use their authorities in seeking to recover listed species in furtherance of the purposes of the Act. Consistent with these purposes and Congressional policy, sections 3(5), 4(f), and 7(a)(1) of the Act, and the implementing regulations (50 CFR § 402.02) to section 7(a)(2) of the Act, and related preamble (51 FR 19926) generally mandate Federal agencies to further the survival and recovery of listed species in the use of their authorities. Our analysis below assesses (1) whether the proposed action adequately offsets its adverse effects to the environmental baseline to the desert tortoise, and (2) the extent to which the proposed action would cause "significant impairment of recovery efforts" or adversely affect the "species' chances for survival to the point that recovery is not attainable" (51 FR 19934).

We do not expect the plan amendment would impair recovery efforts because the BLM proposes to protect 90 percent of the highest quality habitat in the planning area east of the Coachella Canal from renewable energy development. Of the limited amount of development that may be

allowed in this area, the BLM will require that future projects implement numerous measures to avoid, minimize, reduce, and offset the adverse effects to tortoises and any future projects will undergo site-specific environmental analyses. The limited amount of potential development in low density habitat also would affect very few individual desert tortoises relative to the rangewide population of the species. Overall, maximum potential development would result in loss of a small percentage loss (less than 0.01 percent) of the habitat in the Colorado Desert Recovery Unit, which does not constitute a substantial reduction in the range or distribution of the recovery unit or species.

The loss of habitat would not substantially reduce the ability of the tortoise to recover in the wild given that the revised recovery plan (Service 2011a) and final rule designating critical habitat (Service 1994b) primarily focus long-term conservation priorities in higher value habitat areas. The proposed acquisition of tortoise habitat would benefit known populations of tortoises, and/or or other preserve lands in the Colorado Desert Recovery Unit in the BLM's NECO plan area.

Finally, by conserving about 90 percent of the best habitat in the WCMREEA, the plan also protects an area with perhaps the harshest environmental conditions and hottest, driest climate along the edge of the tortoise's distributional range. The individual tortoises surviving in this area may play an important genetic and geographic role in the survival and recovery of the species in the face of environmental fluctuations, such as that caused by climate change. Geographically peripheral populations can be subject to stronger selection pressures than core populations, which can result in behavioral and physiological adaptations that facilitate survival in harsher climes (Lesica and Allendorf 1995). These adaptations can confer genetic benefits that contribute to greater survivability of individuals, and ultimately fitness of the species, in response to long-term, wide-scale environmental changes. In addition, peripheral populations typically have lower population densities, and consequently are more resistant to density-dependent sources of mortality, such as disease. Thus, protecting this and other geographically peripheral populations of desert tortoise, can function in providing refugia against environmental catastrophes and as a source for recolonization of depleted/extirpated core populations (Flannery 2001, Nielsen et al. 2001), and can be important to the long-term survival of the species.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, local, private, or certain Tribal actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. The Service is not aware of any future State, local, private, or certain Tribal actions that are reasonably certain to occur in the action area.

CONCLUSION

After reviewing the current status of the desert tortoise, environmental baseline for the action area, and effects of the proposed action and cumulative effects on the desert tortoise, it is the

Service's biological opinion that the proposed action is not likely to jeopardize the continued existence of the desert tortoise. We base this decision on the following:

1. Site-specific projects (geothermal, solar projects) will not be authorized by this land use amendment change and any projects that have the potential to impact desert tortoise will be subject to future consultations with the Service. Future projects with the potential to impact tortoises will be tiered off this programmatic consultation and include the proposed conservation measures.

2. The BLM will require numerous measures intended to ensure that all tortoises are moved out of the harm's way to avoid the injury and death of tortoises (i.e., authorized tortoise biologists, clearance surveys, exclusion fencing, and translocation).

3. The BLM will require conservation measures to reduce the potential for increased predation by common ravens and other predators, in the vicinity of proposed future projects and regionally, and to reduce the spread of invasive nonnative plants.

4. Based on the location of the WCMREEA planning area and the proposed development cap on the highest quality habitat, we expect that the impacts to tortoise numbers, reproduction, and distribution would be relatively minor.

5. Desert tortoise habitat acquisition required through BLM will result in an increase in the quantity or quality of habitat managed for the conservation of the tortoise.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation prohibit the take of endangered wildlife species without a permit or exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of an agency action is not considered to be prohibited taking under the Act provided the taking is in compliance with the terms and conditions of an Incidental Take Statement.

The Service is not exempting take of endangered or threatened species incidental to the CDCA plan amendment from the prohibitions of section 9 of the Act in this opinion. Establishment of the WCMREEA, by itself, would not result in the take of endangered or threatened species because the plan amendment does not authorize individual projects that cause incidental take of

any listed species. Take of endangered or threatened species could occur only when a site-specific action or project is undertaken in compliance with requirements of the program. Each approval document for site-specific actions goes through further review, including as appropriate, consultation pursuant to section 7 of the Act. That review creates an opportunity to cancel, delay, or modify an action before that action might result in the take of endangered or threatened species.

Although we have evaluated the general nature of the effects of the proposed plan amendment on listed species, we cannot fully assess the potential effects of specific future actions under the WCMREEA because information on the location, timing, design, and other aspects of the actions is not available at this time. Consequently, we cannot provide an exemption from the prohibitions against take, as described in section 9 of the Act, for the incidental take that may result from these future actions that require separate review and authorization by BLM. We will review the effects of those actions, and through section 7(a)(2) consultation, issue incidental take statements in the future, if appropriate, when BLM requests formal consultation on specific discretionary actions. Based on our interpretation of section 7(b)(4) and section 7(o)(2) of the Act, deferring incidental take exemptions until subsequent consultations fulfills the letter and spirit of the obligations the Act places on Service. It is also appropriate in the context of a consultation that evaluates a broad program that sets bounds on future site-specific activities.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

The Service recommends the following conservation measures which should be considered for future solar or geothermal energy projects within the WCMREEA:

- Coordinate with the Center for Arid Lands Restoration at Joshua Tree National Park when developing the Restoration, Revegetation and Reclamation Plan. The Center for Arid Lands works cooperatively with agencies and private entities to assist with seed banking or plant salvaging for desert restoration.

REINITIATION NOTICE

This concludes formal consultation on the proposed action outlined in the request. Reinitiation of formal consultation is ordinarily required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if (1) the authorized amount or extent of incidental take is exceeded; (2) new information reveals effects of the proposed action on listed species or critical habitat in a manner or to an extent not considered in an opinion; (3) the agency action is subsequently modified in a manner that causes an effect to

listed species or critical habitat that was not considered in the opinion; or (4) a new species is listed or critical habitat is designated that may be affected by the proposed action. However, exemption of incidental take has been deferred until site-specific actions or individual projects are proposed within the WCMREEA. Consequently, we believe only reinitiation triggers (2), (3), and (4) to be applicable in this instance.

If you have any questions regarding this document, please contact Tera Baird of the PSFWO at 777 East Tahquitz Canyon Way, Suite 208, Palm Springs, California 92262, at 760-322-2070, extension 217.

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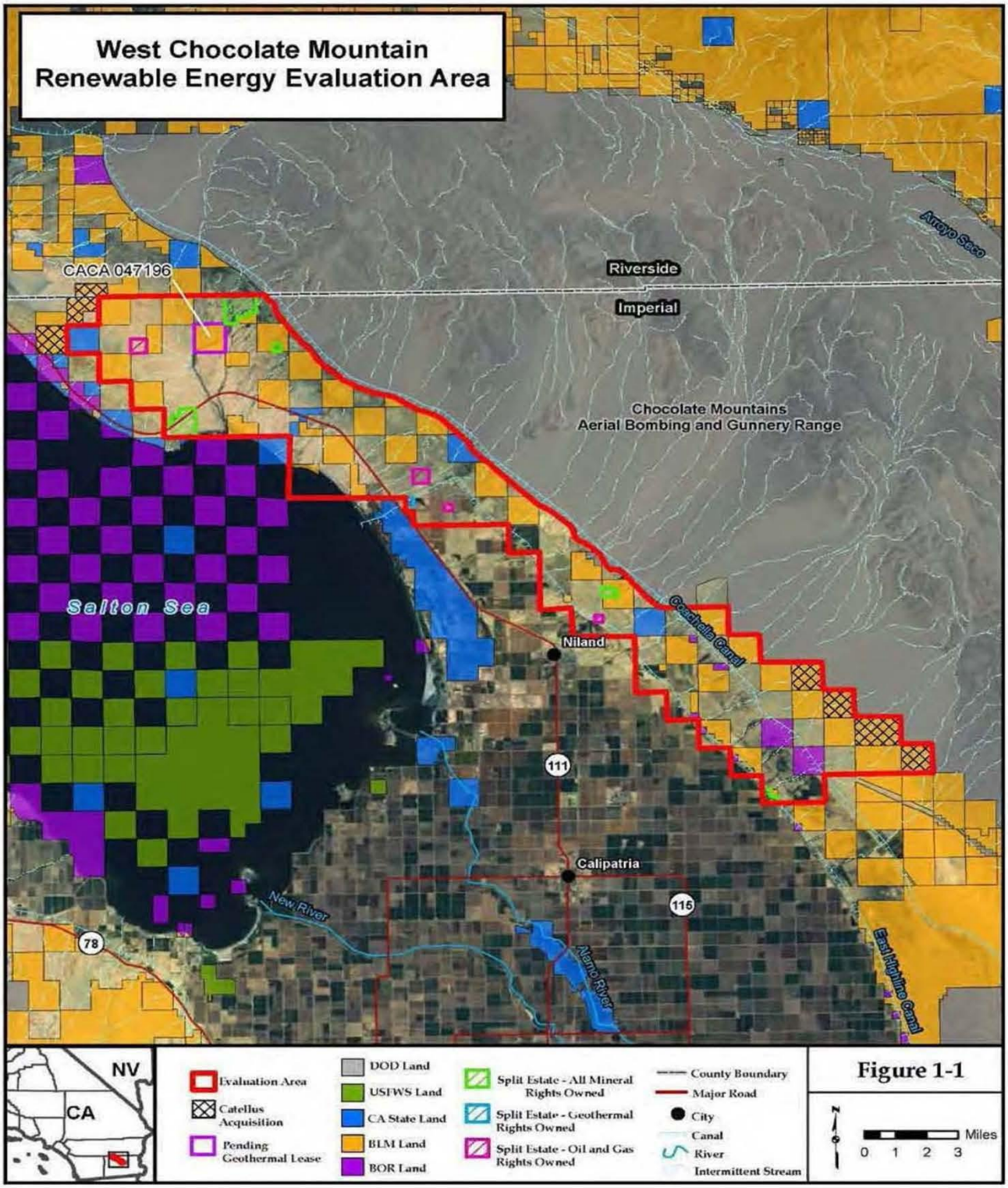

Figure 1. West Chocolate Mountains Renewable Energy Evaluation Area.

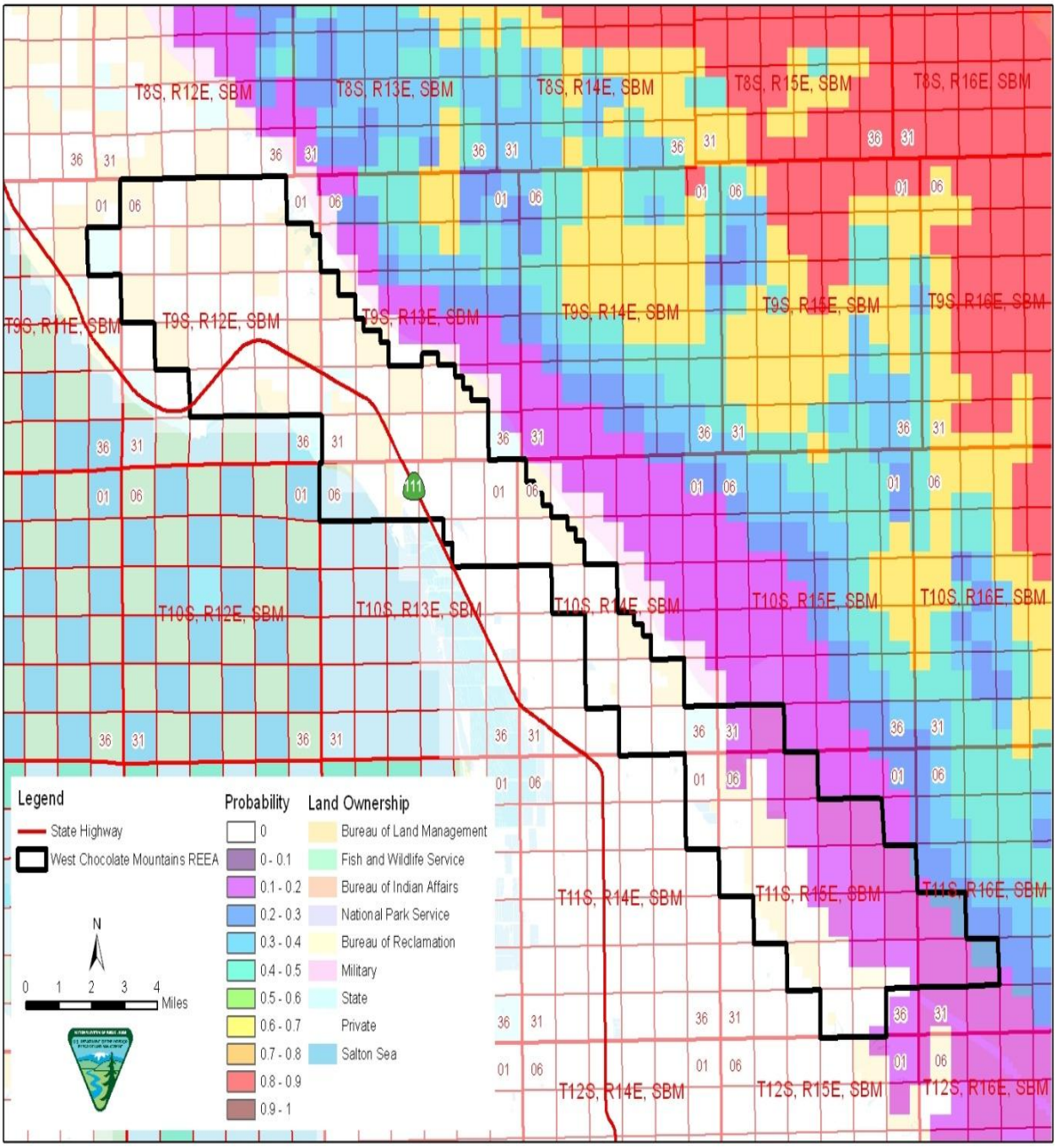

Figure 2. USGS Desert tortoise habitat prediction model (all of the WCMREEA is within the 0.0 to 0.1 probability for desert tortoise habitat suitablity [Nussear 2009]).

Appendix B

Stipulations, Waivers, Exceptions, and Modifications

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Appendix B

Stipulations, Waivers, Exceptions, and Modifications

Stipulations, Waivers, Exceptions, and Modifications Common to Alternatives 3 Through 6

A number of comments were received on the Draft EIS related to a variety of resources including biological resources, water resources, and soil resources. As a result, additional stipulations and WEMs were added to the standards stipulations found in Appendix G. The resources found in this section would apply to geothermal, solar, and wind authorizations. For all geothermal, solar, and wind authorizations that would be considered, any or all of these stipulations may be determined to be applicable following a multidisciplinary review of applications.

Stipulations Applying to Alternatives 3 through 6 East of the Coachella Canal

Resource: High Quality Habitat, Minimal Human Incursions.

Stipulation: Development Cap (Controlled Surface Use [CSU]) - Surface modification shall be limited to less than 10 percent of the total acreage east of the Coachella Canal based upon an estimated 7,006 total acres east of the Coachella Canal. No Surface Occupancy (NSO) will be authorized after the 10 percent limit of surface disturbance has been exceeded (700 acres).

WEMs are not available for this stipulation.

Resource: Riparian/Wetlands.

Riparian areas are lands adjacent to creeks, streams, lakes, and rivers that support vegetation dependent upon free water in the soil. They are sometimes called "Ribbon-of-Green" because the vegetation on waterway banks forms a ribbon-like pattern when seen from the air. These areas, containing water and vegetation in the otherwise arid Western United States, are important to fish and wildlife species, as well as to livestock. Since they dissipate water energy and filter the water flowing through them, riparian-wetland areas can affect the health of entire watersheds. Wetlands are generally defined as areas inundated or saturated by surface or ground water at a frequency and duration sufficient to support vegetation that is typically adapted for life in saturated soil. Wetlands include bogs, marshes, shallows, muskegs, wet meadows, estuaries, and riparian areas.

All riparian and wetland features such as lakes, reservoirs, ponds, and intermittent ephemeral or small perennial streams, drainage features, larger perennial streams, rivers, and domestic water supplies within the West Chocolate Mountains REEA as identified in the USFWS National Wetlands Inventory (NWI) and the USGS National Hydrography Dataset (NHD) are subject to the stipulations and WEMs described below.

Stipulation: CSU. "Surface occupancy and use is prohibited within 300 feet of riparian features as measured from the ordinary high water mark (OHWM, as defined by the U.S. Army Corps of Engineers), if present, of all perennial or ephemeral drainage features identified in the U.S. Fish and Wildlife Service National Wetlands Inventory and the U.S. Geological Survey

Hydrography Dataset. Additional areas may be identified through subsequent project and site specific analysis. No new permanent road crossings will be authorized."

Objective: To maintain riparian functions, such as wildlife corridors, wetland functions, and water quality.

Exceptions: An exception may be granted for directional drilling for geothermal operations. An exception may be granted for aerial or underground transmission lines by the Authorized Officer, if the proponent submits a plan that demonstrates that design features will adequately mitigate effects on wetland functions, water storage, water quality erosion control and effects on wildlife use of corridors or guzzlers.

Resource: Wildlife Habitat.

Stipulation: Habitat Compensation. To mitigate for loss of desert tortoise habitat and wildlife corridors east of the Coachella Canal, the holder shall provide compensatory mitigation at a compensation ratio of 3:1 acres for permanent impacts and shall compensate at a ratio of 1:1 for temporary disturbance.

WEMs are not available for this stipulation.

Stipulations Applying to Alternatives 3 through 6 All Areas of the REEA

Resource: Vegetation with Economic Value.

Stipulation: Resource Compensation. The holder shall provide compensation for vegetation and cacti species of economic value at established BLM rates.

WEMs are not available for this stipulation.

Resource: Wildlife Enhancement Features.

Stipulation: The lease holder shall replace any existing wildlife guzzlers at a 2:1 ratio in appropriate locations where existing wildlife travel corridors may be affected by development. Guzzlers shall be placed in accordance with California Department of Fish and Game (CDFG) requirements.

Objective: To maintain wildlife corridors leading to seasonal water sources (mitigated by others) and reduce development-related impacts to nongame and game species.

WEMs are not available for this stipulation.

Resource: Riparian/Wetlands.

Stipulation: CSU. Under this stipulation, surface occupancy and use would be controlled or excluded by the BLM for projects within 100 feet of the 25-year floodplain of the riparian or wetland feature.

Waiver: The BLM retains the right to waive this stipulation if the Authorized Officer determines that the entire leasehold can be occupied without adversely affecting (wetland or riparian) functions of the resource.

Exception: An exception to this stipulation may be granted by the Authorized Officer if the operator submits a Plan of Operations or Plan of Development that demonstrates that impacts to wildlife and wetland or riparian functions from the proposed action can be adequately mitigated.

Modification: The BLM may modify, as appropriate, the boundaries of the stipulated area if the Authorized Officer determines that portions of the area can be occupied without adversely affecting wildlife and the functions of the wetlands/riparian resource.

Resource: Endangered Species Habitat.

Stipulation: NSO. A 0.25-mile environmental protection area from potential wetland/riparian endangered species habitats shall be established within the REEA. Establishment of the 0.25-mile environmental protection area would avoid direct or secondary effects to the ESA species (desert pupfish, southwestern willow flycatcher, least Bell's vireo, and Yuma clapper rail) in the REEA.

WEMs are not available for this stipulation unless the ESA, Section 7 consultation is reinitiated.

Resource: Endangered Species

Stipulation: The lease area may now or hereafter contain plants, animals, or their habitats determined to be threatened, endangered, or other special status species. BLM may recommend modifications to exploration and development proposals to further its conservation and management objective to avoid BLM-approved activity that would contribute to a need to list such a species or their habitat. BLM may require modifications to or disapprove proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened or endangered species or result in the destruction or adverse modification of a designated or proposed critical habitat. BLM will not approve any ground-disturbing activity that may affect any such species or critical habitat until it completes its obligations under applicable requirements of the ESA as amended, 16 USC 1531 et seq., including completion of any required procedure for conference or consultation (BLM 2002).

Objective: This stipulation will be applied to all geothermal leases within the West Chocolate Mountains REEA to ensure compliance with the ESA in accordance with BLM Instruction Memorandum No. 2002-174 (BLM 2002).

WEMs to this stipulation may not be approved unless: (1) the Authorized Officer determines that the factors leading to the stipulation's inclusion in the lease have changed sufficiently to make the protection provided by the stipulation no longer justified; or (2) the proposed operations would not cause unacceptable impacts (43 CFR 3101.1-4).

Resource: Bald and Golden Eagles.

Stipulation: CSU: Surface-disturbing activities or disruptive activities are prohibited within 1,500 feet of bald or golden eagle nest sites that have been active within the past year.

Objective: To protect bald eagle nesting sites and/or breeding habitat on remote public lands and conserve BLM sensitive species.

WEMs are not available for this stipulation.

Resource: Munz's Cholla.

Stipulation: CSU: A 500-foot environmental protection area shall be designated from the centerpoint of each Munz's cholla cluster found on public lands in which surface disturbance and use is prohibited. If clusters of Munz's cholla are found on parcels of private land that are in holdings, similar environmental protection areas will be established on adjacent public lands to allow this species to naturally propagate and expand onto BLM-managed lands.

Waiver: This stipulation may be waived if the Authorized Officer determines that the portions of the leasehold can be occupied without adversely affecting the opportunity for expansion of this population of rare BLM-designated sensitive species.

Resource: Soils with Greater than 3 Percent Slopes or with Extremely Erodible or Slumping Soils.

Stipulation: CSU. Renewable energy activities may be controlled or excluded on slopes of over 3 percent or on extremely erodible or slumping soils.

Objective: To maintain soil productivity and provide necessary protection to prevent excessive soil erosion.

Exceptions: An exception may be granted if the operator can demonstrate in a Plan of Operations that adverse effects can be minimized and activities safely conducted.

Modification: The area affected by this stipulation may be modified by the Authorized Officer if it is determined that portions of area do not include soils with greater than 3 percent slopes or soils with extremely erodible or slumping soils; or the operator can demonstrate in a Plan of Operations that adverse effects can be minimized.

Waiver: This stipulation may be waived by the Authorized Officer if it is determined that none of the leasehold or the right-of-way contain soils with greater than 3 percent slopes or slopes with extremely erodible or slumping soils.

Resource: Soils with a Severe Erosion Hazard, Badlands, Rock Outcrop, or Slopes Susceptible to Mass Failure.

Stipulation: CSU. Use and occupancy on soils with a severe erosion hazard, badlands, rock outcrop, or slopes susceptible to mass failure require an operations plan requiring prior BLM approval.

Objective: To maintain soil productivity and provide necessary protection to prevent excessive soil erosion.

Exceptions: An exception may be granted if the operator can demonstrate in a Plan of Operations that adverse effects can be minimized and activities safely conducted.

Modification: The area affected by this stipulation may be modified by the Authorized Officer if it is determined that portions of area do not include soils with a severe erosion hazard, badlands, rock outcrop, or slopes susceptible to mass failure; or the operator can demonstrate in a Plan of Operations that adverse effects can be minimized.

Waiver: This stipulation may be waived by the Authorized Officer if it is determined that none of the leasehold contains soils with a severe erosion hazard, badlands, rock outcrop, or slopes susceptible to mass failure.

Resource: Water.

Stipulation: The following items shall be conformed to:

1. Water used for the construction, operation, maintenance, or remediation of the project shall be solely for the beneficial use of the renewable energy project or its biological mitigation measures, as specified in the approved Plan of Development.

2. The siting, construction, operation, maintenance, and remediation of all wells shall conform to specifications contained in California Department of Water Resources Bulletins #74-81 and #74-90.

3. A water supply assessment shall be prepared and must be approved by the Authorized Officer prior to the development or use of any water resources.

4. A Monitoring, Management, and Mitigation Plan shall be prepared and must be approved by the Authorizing Officer prior to the development or use of any water resources. The quality and quantity of all surface water and groundwater used for the project shall be monitored using this plan. The plan shall detail the management and use of all project-related water resources. The plan shall also detail any mitigation measures that may be required as a result of the project.

5. For well sites located within or near an adjudicated basin, or an area that is subject to specific water regulation, the proponent shall demonstrate and document its entitlement to the use of any groundwater produced prior to development of the resource. This shall include the identification and ongoing monitoring of the static water level at each well site. Required documentation shall include either:

    a) A determination letter, issued by the court-appointed Water Master or regulating entity for the basin in question, that groundwater to be produced is not within the Water Master's or the regulating entity's jurisdiction, OR

    b) A contract with the Water Master, or an entitled water provider, that represents an entitlement to groundwater from that basin or area, in the amount of water to be produced and used.

Objective: To maintain a sustainable water supply and protect water quality.

Exceptions: An exception to one or more of the items listed may be granted on a case-by-case basis if the operator can demonstrate in a Plan of Operations that adverse effects can be sufficiently minimized and activities safely conducted.

Modification: A modification to one or more of the items listed may be granted on a case-by-case basis if the operator can demonstrate in a Plan of Operations that adverse effects can be sufficiently minimized and activities safely conducted.

Waiver: A waiver to one or more of the items listed may be granted on a case-by-case basis if the operator can demonstrate in a Plan of Operations that adverse effects can be sufficiently minimized and activities safely conducted.

Resource: Endangered Species - Desert Pupfish.

Stipulation 1: Avoid hydrologic impacts through BLM requirements for buffers to riparian features, artificial surface waters, or wetlands to aid in recovery of the species. An exception may be granted for this stipulation; however, waivers and modifications are not available.

Exception: An exception to this stipulation may be granted by the Authorized Officer. If impacts are unavoidable through facility design, maintain respective drainage features that eventually reach the Salton Sea to ensure genetic interchange among the pupfish populations. (Extremely sensitive habitat is located within the north-south drainages in the northern part of the planning area, between the Riverside County boundary and the Salton Sea east of Bombay Beach.)

Stipulation 2: Ensure that an appropriate level of hydrologic connectivity is maintained for desert pupfish populations downstream. WEMs are not available for this stipulation.

Stipulation 3: Water for washing solar panels shall not be drawn from a source that would compromise water levels required for pupfish habitat. WEMs are not available for this stipulation.

Stipulation 4: Provide water flow monitoring and develop an adaptive management plan to detect any potential changes, which would trigger predetermined contingency measures. WEMs are not available for this stipulation.

Stipulation 5: Projects shall be required to have erosion control plans in areas that drain to potential or occupied pupfish habitat, in order to minimize runoff, siltation, or other adverse water quality impacts. WEMs are not available for this stipulation.

Resource: Endangered Species - Desert Tortoise.

Stipulation: CSU. All or a portion of this geothermal lease is within the range of a species that is either listed as threatened or endangered, or is proposed for such listing by the USFWS. Timeframes for processing applications may be delayed to allow for species surveys and consultation or conferencing with the USFWS. Surface-disturbing activities may be moved or modified, and some activities may be prohibited during seasonal time periods.

Protocol-level surveys should be conducted for individual proposed projects in potentially suitable habitat within the plan area. Surface-disturbing activities would only be prohibited on the lease where the proposed action is likely to jeopardize the continued existence of listed or proposed species, or the proposed action is inconsistent with the recovery needs of the listed species as identified in an approved USFWS Recovery Plan.

Objective: Protection of the desert tortoise, a species listed as threatened by the USFWS, and/or for the protection of its critical habitat.

WEMs are not available for this stipulation.

Resource: Endangered Species - Southwest Willow Flycatcher.

Stipulation: CSU. Transmission lines shall be located away from riparian areas to the maximum extent practicable. Transmission lines shall not run adjacent or parallel to the Salton Sea shoreline. All existing transmission lines within 1 mile of the Salton Sea shall be updated to have standard bird flight diverters installed, regardless of the results of flyover surveys.

Stipulation: NSO. Habitat at the two ditches running from northwest to southeast, from Highway 111 to the Salton Sea near Bombay Beach, has been evaluated as potentially suitable breeding habitat for southwest willow flycatcher (Olson 2008).

WEMs are not available for these stipulations.

Resource: Endangered Species – Yuma Clapper Rail.

Stipulation: CSU. To ensure that an appropriate level of hydrologic connectivity is maintained for Yuma clapper rail populations, preparation of a Bird and Bat Conservation Strategy Plan may be required.

Stipulation: Locate transmission lines away from riparian areas; lines should not run adjacent or parallel to the Salton Sea shoreline. All transmission lines within 1 mile of the Salton Sea shall have standard bird flight diverters installed, regardless of the results of flyover surveys.

Stipulation: Seasonal Timing Limitation (TL). “Construction shall be restricted between February 15 through August 31 in any Yuma clapper rail habitat to avoid potential impacts to breeding birds.”

Objective: Protection of the Yuma Clapper Rail, a species listed as threatened by the USFWS, and/or for the protection of its critical habitat.

WEMS are not available for these stipulations.

Resource: Sensitive Species - Nelson’s Big Horn Sheep.

Stipulation: TL. All or a portion of this REEA is within the range of a sensitive species, as designated by the CDFG. Timeframes for processing applications may be delayed beyond established standards to allow for species surveys and consultation or conferencing with the CDFG. Surface-disturbing activities may be moved or modified, and some activities may be prohibited during seasonal time periods. Surface-disturbing activities will be prohibited on the

lease only where (a) the proposed action is likely to jeopardize the continued existence of listed or proposed species; or (b) The proposed action is inconsistent with the recovery needs of a listed species as identified in an approved CDFG Recovery Plan.

Prior to the authorization of any surface-disturbing activities, a preliminary environmental review will be conducted to identify the potential presence of habitat for these species. Authorizations may be delayed until completion of the necessary surveys during the appropriate time period for these species. The lessee should be aware that the timing of the surveys is critical, in that some species can only be surveyed during a brief period each year. The BLM may need to initiate consultation or conference with the CDFG if the site inspection concludes that a listed or proposed species may be affected by the proposed activity. The CDFG has up to 135 days to render their biological opinion, and there are provisions for an additional 60-day extension. Offsite habitat protection or enhancement for wildlife or vegetation (compensation) may be required by the CDFG when habitat is disturbed. The consultation may also result in some restrictions to the lessee's plan of development, including movement or modification of activities, and seasonal restrictions. Surface-disturbing activities will be prohibited on the lease if the consultation or conference concludes that either of the conditions identified in (a) or (b) above exists.

Objective: Protection of the Nelsons' big horn sheep, a species listed as threatened by the CDFG.

WEMs to this stipulation may not be approved unless: (1) the Authorized Officer determines that the factors leading to the stipulation's inclusion in the lease have changed sufficiently to make the protection provided by the stipulation no longer justified; or (2) the proposed operations would not cause unacceptable impacts (43 CFR 3101.1-4).

APPENDIX G

STIPULATIONS AND LEASE NOTICES EXCEPTION, MODIFICATION, AND WAIVER CRITERIA

The purpose of this appendix is to provide the stipulations and conditions of approval that apply to geothermal leases, or renewable energy rights of way, that would be applied within the West Chocolate Mountains Renewable Energy Evaluation Area under each proposed alternative. Any requests for exceptions, modifications, and waivers from the stipulations would be processed by the appropriate BLM office. The requests for exceptions must be initiated in writing by the operator near the time that the work is proposed to be initiated. This requirement is in place due to the unpredictability of weather, animal movement and condition, etc. The analysis of a request will typically include the review of potential mitigation measures and alternatives (traffic restrictions, alternative scheduling, staged activity, etc.). The request is considered as a unique action and is analyzed and documented individually for CDCA Plan and NEPA compliance.

The definitions for waivers, exceptions and modifications are as follows:

Exception - A one-time exemption for a particular site within the leasehold or right of way; exceptions are determined on a case-by-case basis; the stipulation continues to apply to all other sites within the leasehold or right of way. An exception is a limited type of waiver.

Modification - A change to the provisions of a lease or right of way stipulation, either temporarily or for the term of the lease. Depending on the specific modification, the stipulation may or may not apply to all sites within the leasehold, or right of way, to which the restrictive criteria are applied.

Waiver - A permanent exemption from a lease or right of way stipulation. The stipulation no longer applies anywhere within the leasehold or right of way.

SPECIAL ADMINISTRATION (SA) STIPULATIONS
Please see the table below:

STANDARD STIPULATIONS

Resource: Cultural Resources

Stipulation: "This geothermal lease may be found to contain historic properties and/or resources protected under the National Historic Preservation Act (NHPA), American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, E.O. 13007, or other statutes and executive orders. The BLM will not approve any ground disturbing activities that may affect any such properties or resources until it completes its obligations under applicable requirements of the NHPA and other authorities. The BLM may require modification to exploration or development proposals to protect such properties, or disapprove any activity that is likely to result in adverse effects that cannot be successfully avoided, minimized or mitigated."

Objective: This stipulation will be applied to all geothermal leases within the WCM REEA to protect cultural resources in accordance with BLM Instruction Memorandum No. 2005-003.

Exceptions, waivers, or modifications to this stipulation may not be approved unless, (1) the authorized officer determines that the factors leading to the stipulation's inclusion in the lease have changed sufficiently to make the protection provided by the stipulation no longer justified; or (2) the proposed operations would not cause unacceptable impacts. (43 CFR 3101.1-4)

Resource: Geothermal.

Stipulation: Parts of the lands contained in the parcel tract with serial number CACA 047196 may potentially be subject to drainage by offset wells which may be located adjacent to this parcel in sections 2, 12, and 14, T 9 S., R 12 E., SBB&M, Imperial County, California (on Federal Lease CACA 046142.) The lessee shall, within 6 months of the drilling and completion of any productive well on the adjacent federal lease, submit for approval by the authorized officer:

1) Plans for protecting the lease from drainage (43 CFR § 3210.16.) The plan must include either (a) a completed application for Geothermal Drilling Permit (GDP) for the necessary protective wells, or (b) a proposal for inclusion in an agreement for the affected portion of the lease. Any agreement should provide for an appropriate share of the production from the offending well to be allocated to the lease; or

2) Engineering, geologic and economic data to demonstrate to the authorized officer's satisfaction that no drainage has occurred or is occurring and/or that a new protective well(s) would have little or no chance of production sufficient to yield a reasonable rate of return in excess of the costs of drilling, completing and operating the well.

3) If no plan, agreement or data is submitted and drainage is determined to be occurring, compensatory royalty will be assessed. Compensatory royalty will be assessed on the first day following expiration of the 6-month period, and shall continue until a protective well has been drilled and placed into production status, or until the offending well ceases production, whichever occurs first. Failure to comply with this special leasing stipulation also may subject the lease to termination under the provisions of 43 CFR § 3213.17.

Objective: Drainage Protection. To protect the federal geothermal resource from being drained by development on adjacent non-federal lands.

An exception, waiver, or modification to this stipulation may not be approved unless, (1) the authorized officer determines that the factors leading to the stipulation's inclusion in the lease have changed sufficiently to make the

protection provided by the stipulation no longer justified; or (2) the proposed operations would not cause unacceptable impacts. (43 CFR 3101.1-4).

Stipulation: The single non-competitive lease application (CACA 047196) within the REEA was pending on August 8, 2005. Therefore, the lease applicant must make their election and provide written notice to the BLM of their preference for payment of royalties on production before the lease may be issued.

Objective: Royalty Compliance in accordance with the revised geothermal regulations at 43 CFR 3200.8 (b)(1) and (b)(3).

No exception, waiver or modification to this stipulation will be authorized.

Stipulation: Potential geothermal lessees should be aware of the revised due diligence requirements contained in the federal regulations at 43 CFR § 3207. Leases are typically issued for an initial term of 10 years, and may be extended if diligent work requirements have been satisfied, and the BLM believes that the lessee has made satisfactory progress in complying with the lease terms and stipulations.

The BLM may, after giving you 30 days written notice, terminate your lease if we determine that you have violated any of the requirements of 43 CFR § 3200.4, including, but not limited to compliance with the terms and conditions of the lease, including any and all lease stipulations, the nonpayment of required annual rentals or royalties and fees (43 CFR § 3213.17.)

Objective: "Due Diligence" in compliance with the revised geothermal regulations at 43 CFR § 3207.

Exceptions, waivers, or modifications to this stipulation may not be approved unless, (1) the authorized officer determines that the factors leading to the stipulation's inclusion in the lease have changed sufficiently to make the protection provided by the stipulation no longer justified; or (2) the proposed operations would not cause unacceptable impacts. (43 CFR 3101.1-4),

Resource: Geothermal Features.

Stipulation: Requirement to Characterize Thermal Features. Prior to surface disturbing activities, a survey of surface expressions of the geothermal reservoir (hot springs) shall be conducted. Such surveys shall include identification of invertebrate species and water characteristics, as well as all available geologic information regarding their potential source. Monitoring of thermal features may also be required during exploration, development, and production to ensure that there are no impacts to water quality or quantity, or to protect the integrity of geothermal resource features. If it is determined that geothermal operations are reasonably likely to result in adverse effects to such a feature, significant additional restrictions may be imposed.

Objective: Areas within the West Chocolate Mountains REEA are known to contain thermal features (e.g., hot springs or surface expressions). Monitoring of the thermal features shall be required during exploration, development, and production to ensure that there are no impacts to water quality or quantity.

Exceptions, waivers, or modifications to this stipulation may not be approved unless, (1) the authorized officer determines that the factors leading to the stipulation's inclusion in the lease have changed sufficiently to make the protection provided by the stipulation no longer justified; or (2) the proposed operations would not cause unacceptable impacts. (43 CFR 3101.1-4).

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Appendix C

Best Management Practices

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Appendix C

Best Management Practices

C-A BMPs from the REAT Guidance Manual

C-B BMPs from the 2010 BLM Geothermal and Solar PEISs

C-A BMPs from the REAT Guidance Manual

The Renewable Energy Action Team (REAT) agencies (California Energy Commission [CEC], California Department of Fish and Game [CDFG], BLM, and U.S. Fish and Wildlife Service (USFWS) jointly prepared the Best Management Practices and Guidance Manual: Desert Renewable Energy Projects. The manual fulfills agency commitments in the State of California's Executive Order (EO) S-14-08, Secretary of the Interior Secretarial Order (S.O.) No. 3285, and related memoranda between California and the U.S. Department of Interior (DOI), and between the REAT agencies (signed in 2008 and 2009). This appendix presents the best management practices (BMPs) proposed in the guidance manual that have been adopted for the West Chocolate Mountains Renewable Energy Evaluation Area EIS and CDCA Plan Amendment.

The following BMPs will be considered at the time BLM reviews site-specific project development proposals. All relevant mitigation and BMPs will be incorporated in the analyses and those that are appropriate to prevent undue or unnecessary degradation to public lands will be approved in the respective RODs for EIS-level analyses or Decision Records for Environmental Assessment (EA) level analyses.

This appendix presents BMPs by individual resource, and is organized as follows:

C-A1: Air Quality

C-A2: Biological Resources

C-A3: Cultural and Historic Resources

C-A4: Hazardous Materials, Pesticides, and Waste Management

C-A5: Noise and Vibration

C-A6: Paleontological Resources

C-A7: Safety, Health, and Nuisances

C-A8: Soils, Drainage, Erosion, Stormwater, and Flooding

C-A9: Traffic and Transportation Roads

C-A10: Aviation

C-A11: Visual Resources

C-A12: Water Supply and Quality

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C-A1: AIR QUALITY

BEST MANAGEMENT PRACTICES

GENERAL

An applicant will apply for, secure, and comply with all appropriate air quality permits for project construction and operations from the local Air Quality Management District and from the U.S. Environmental Protection Agency (EPA), if appropriate, prior to construction mobilization. The appropriate air quality permits should be valid and remain in force for the life of the project.

1. Use low sulfur and low aromatic fuel meeting California standards for motor vehicle diesel fuel.
2. For combustion emission sources, use emission controls.
3. Prepare a report outlining the sources and amounts of greenhouse gases (GHG) from the project construction, equipment transportation, operation, and maintenance activities and identify measures to reduce or mitigate greenhouse gas emissions, depending on attainment status.
4. Prepare and comply with a dust abatement plan in cooperation with the local air quality management district that addresses emissions of fugitive dust during construction and operation of the project. Provisions for monitoring fugitive dust should be part of the abatement plan and follow protocols established by the California Air Resource Board (CARB). Consider incorporating the following practices in the plan:
    a. Use dust suppressant applications or other suppression techniques to control dust emissions from on-site unpaved roads and unpaved parking areas, as well as to mitigate fugitive dust emissions from wind erosion on areas disturbed by construction activities. When considering use of water or chemical dust suppressants take into account water supply and chemical dust suppressant issues.
    b. Limit traffic speeds on all unpaved site areas to 10 miles per hour.
    c. Cover all trucks hauling soil, sand, and other loose materials or require all such trucks to maintain at least two feet of freeboard.
    d. Post and enforce speed limits on the project site and all project access roads.
    e. Inspect and clean, as necessary construction equipment vehicle tires so they are free of dirt prior to entering paved roadways.
    f. Provide gravel ramps of at least 20 feet in length at tire cleaning stations.
    g. Gravel or treat unpaved exits from construction sites to prevent track-out to public roadways.

h. Direct all construction vehicles to enter the construction site through gravel or treated entrance roadways, unless alternative routes are approved by the air quality management district.

i. Provide sandbags or other measures in areas adjacent to paved roadways, as specified in the Storm Water Pollution Prevention Plan (SWPPP), to prevent run-off to roadways.

j. Sweep paved roads to prevent accumulation of dirt and debris.

5. Ensure wind erosion control techniques (e.g., windbreaks, water, and vegetation) are used on all access and maintenance routes and materials stockpiles that may be disturbed during project maintenance and operation. Use of chemical dust suppressants should be avoided in and around areas occupied by special status species. Any windbreaks used should remain in place until the soil is stabilized or permanently covered with vegetation.
6. Ensure construction and maintenance vehicles and equipment comply with CARB and EPA emissions standards.
7. Use off-road construction diesel equipment that has a rating of 100 horsepower (hp) to 750 hp and that meets the Tier 3 California Emission Standards for Off-Road Compression-Ignition Engines as specified in Title 13, California Code of Regulations (CCR) Section 2423(b)(1). All construction diesel engines, which have a rating of 50 hp or more, should meet, at a minimum, the Tier 2 California Emission Standards for Off-Road Compression-Ignition Engines as specified in Title 13, CCR Section 2423(b)(1). All heavy earth moving equipment and heavy duty construction related trucks with engines meeting the requirements above should be properly maintained and the engines tuned to the engine manufacturer's specifications. No diesel heavy construction equipment should idle for more than five minutes, to the extent practical.
8. When CARB Tier 4 regulations come into effect, where applicable, construction equipment should meet these standards as well.
9. Consider the use of vehicle and equipment exhaust filters and catalysts to reduce air emissions during construction and operation.
10. Consider using ultra low sulfur diesel with a 15 part per million (ppm) sulfur contact, biodiesel or alternative fuels to reduce project criteria and GHG pollutants.

GEOTHERMAL ENERGY DEVELOPMENT

The following air quality BMPs include recommendations to reduce emissions of criteria or hazardous air pollutants and H2S. The EPA does not classify H2S as either a criteria air pollutant or a hazardous air pollutant. The State of California, however, adopted an Ambient Air Quality Standard for H2S to protect public health and decrease odor annoyance. Air pollution control/management districts may have short-term, maximum (for example, hourly) and annual average standards for stationary sources of H2S, including geothermal power plants. For example, the Imperial County Air Pollution Control District requires Best Available Control

Technology be applied to geothermal power plants with the potential to emit more than 55 pounds per day of H_2S (County of Imperial 1999).

Develop an emissions inventory, a list of both long-term (annual) and short-term (generally hourly) emission rates for each relevant pollutant from each emission point source (such as well venting, drill rig diesel engines, fugitive dust, plant silencers, sulfur plant exhaust, cooling towers). Organize emissions inventory by project phase: well-field development (estimate number of wells to be drilled, vented each year); plant operations (estimate number of replacement wells to be drilled each year, and forced and planned outage rates.) Quantify the pollutants contained in the geothermal fluids and steam by testing well venting. Collect fluid and gas samples for every well using independent laboratory and air quality specialist for at least one round of sample collection and chemical analysis.

1. Own both the geothermal production and injection wells as well as the geothermal power plant, so that responsibility for H2S emission control is not lost between the steam producer and electricity generator.
2. As an integral part of an odor control program, implement an ambient monitoring program for H_2S and meteorology. Continue to operate the meteorological station used to collect baseline data. Use an EPA reference sulfur dioxide monitor with an in-line sulfur dioxide (SO_2) scrubber and H_2S to SO_2 oxidizer for real-time collection of less than 1 part per billion H_2S. Store hourly H_2S and wind data for use whenever odor issues arise.
3. Remove H_2S from condensate by directing the condensate to the cooling tower to which chelated iron and sodium sulfite has been added to the cooling-tower water. These chemicals will react with the H2S to form a water soluble chemical, which can be injected into the geothermal formation.
4. Remove H_2S from both the condensate and noncondensible gas (NCG) stream by processing the NCG in a thermal oxidizer.
5. When present in small volumes in the NCG stream, remove H2S with liquid scavengers, rather than solid-based scavengers, so that the spent material can be injected into the geothermal formation for disposal rather than discarded in a landfill.
6. When present in large volumes in the NCG stream, remove H_2S with a liquid redox system.
7. Inject hydrogen peroxide and sodium hydroxide into a well's test line to abate H_2S emissions.

C-A2: BIOLOGICAL RESOURCES

BEST MANAGEMENT PRACTICES

GENERAL

During the environmental review and regulatory decision-making processes, the BLM will be the lead agency consulting with USFWS and CDFG pursuant to the federal and state ESAs, NEPA, and California Environmental Quality Act (CEQA). The consultations and any determinations of effects on protected species will be based on the biological assessments (BAs) prepared for filling of applications to the lead agency. The consultation activities highlight impacts to protected species and mitigation that may or may not be addressed in the BAs or the following BMPs.

General to Any Species of Interest

1. Project-specific biological resource field studies must be conducted after development applications are accepted.
2. Minimize, to the extent practicable, the area disturbed by pre-construction site monitoring and testing activities and installations.
3. Use construction and installation techniques that minimize new site disturbance, soil erosion, and removal of vegetation.
4. Use maps that show the location of sensitive resources and the results of pre permitting studies to establish the layout of facilities, roads, fences, and other infrastructure.
5. Avoid or minimize site/project area disturbance to special status species and unique plant assemblages.
6. Utilize existing roads and utility corridors to the maximum extent feasible to minimize the number and length/size of new roads, lay-down areas, and borrow areas.
7. Install and maintain transmission line towers/poles, access roads, pulling sites and storage and parking areas to avoid special status species or unique plant assemblages adjacent to linear facilities, in consultation with permitting agencies.
8. Install and maintain facility lighting to prevent up and side casting of light towards wildlife habitat.
9. Bury electrical collector lines in a manner that minimizes additional surface disturbance (e.g., along roads or other paths of surface disturbance). Overhead lines can be considered in cases where burying lines would result in disturbance of important habitat, but must be balanced with the concern for creation of additional predatory bird perching opportunities.

10. Delineate the boundaries of all areas to be disturbed using temporary construction fencing and/or flagging prior to beginning construction activities, and confine all disturbances, project vehicles and equipment to the delineated project areas.
11. Ensure that vehicular traffic is confined to existing routes of travel to and from the project site, and prohibit cross country vehicle and equipment use outside of approved designated work areas.
12. Use road surfacing, road sealant, soil bonding, and stabilizing agents, if needed on non-paved surfaces that have been shown to be non-toxic to wildlife and plants.
13. If the application of water is needed to abate dust in construction areas and on dirt roads, use the least amount needed to meet safety and air quality standards and prevent the formation of puddles, which could attract wildlife to construction sites.
14. Minimize construction and operation related noise levels to minimize impacts to wildlife.
15. Use explosives only within agency approved specified times and at specified distances from sensitive wildlife and habitats.
16. Maintain all vehicles and equipment in proper working condition to minimize fugitive emissions and accidental spills from motor oil, antifreeze, hydraulic fluid, grease, or other fluids or hazardous materials. All fuel or hazardous waste leaks, spills, or releases should be stopped or repaired immediately and cleaned up at the time of occurrence. Project developers should be responsible for spill material removal and disposal to an approved offsite landfill and spill reporting to the permitting agencies. Service construction equipment should be stored at designated areas only. Service/maintenance vehicles should carry appropriate equipment and materials to isolate and remediate leaks or spills. A spill containment kit should be available onsite for all fueling, maintenance, and construction activities.
17. Dispose of all trash and food-related items in self-closing, sealable containers with lids that latch to prevent wind and wildlife from opening containers. Trash containers should be emptied daily and removed from the project site when construction activities are complete.
18. Prohibit workers or visitors from (1) feeding wildlife, (2) bringing domestic pets to the project site, (3) collecting native plants, or (4) harassing wildlife.
19. Designate a qualified biologist (approved by BLM, USFWS, and CDFG) who would be responsible for overseeing compliance with all biological resources BMPs during mobilization, ground disturbance, grading, construction, operation, and closure/decommissioning or project abandonment activities, particularly in areas containing or known to have contained sensitive biological resources, such as special status species and unique plant assemblages. The qualified biologist should be responsible for actions including, but not limited to, the following:
    a. Clearly marking sensitive biological resource areas and inspecting these areas at appropriate intervals for compliance with regulatory terms and conditions.
    b. Inspecting active construction areas where animals may have become trapped (e.g., trenches, bores and other excavation sites outside the permanently fenced

area that constitute wildlife pitfalls) 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.

c. Overseeing cactus and yucca salvage operations.

d. Recording and reporting any hazardous spills immediately as directed in the project Hazardous Materials Management Plan.

e. Coordinating directly and regularly with representatives of the permitting agencies regarding any biological resources issues, including implementation of biological resource BMPs.

f. Maintaining written records regarding implementation of biological resource BMPs and providing a summary of these records periodically in a report to the appropriate agencies.

g. Notifying the project owner and appropriate agencies of any non-compliance with any biological resources BMPs.

20. Develop a project-specific Worker Environmental Awareness Program (WEAP) that meets the approval of the permitting agencies and would be implemented during all phases of the project (e.g., site mobilization, ground disturbance, grading, construction, operation, closure/decommissioning or project abandonment and restoration/reclamation activities). The purpose of the WEAP would be to identify sensitive biological resources and BMPs for minimizing impacts to resources. Interpretation should be provided for non-English speaking workers, and the same instruction should be provided for any new workers prior to their performing work onsite. The names of all onsite personnel (e.g., surveyors, construction engineers, employees, contractors, contractor's employees, subcontractors, etc.) who have participated in the education program should be kept on file at the project field construction office. The program should include but not be limited to the following:

    a. Photos and habitat descriptions for all special status species that may occur on the project site and information on their distribution, general behavior and ecology.

    b. The sensitivity of these species to human activities.

    c. Legal protections afforded these species.

    d. Project BMPs for protecting species.

    e. Penalties for violation of state and federal laws.

    f. Worker responsibilities for trash disposal and safe/ humane treatment of any special status species found on the project site, associated reporting requirements, and any specific measures required of workers to prevent take of threatened or endangered species.

    g. Handout materials summarizing all the contractual obligations and protective requirements specified in project permits and approvals.

h. Requirements and penalties regarding adherence to speed limits on the project site.

21. Develop and implement a project specific integrated weed management plan that meets the approval of the permitting agencies that would be implemented during all phases of the project (e.g., site mobilization, ground disturbance, grading, construction, operation, modification or expansion, closure/decommissioning or project abandonment, and restoration/reclamation activities). The plan should include, but not be limited to, the following to prevent the establishment, spread and propagation of noxious weeds:

    a. Limit the size of any vegetation and/or ground disturbance to the absolute minimum, and limit motorized ingress and egress to defined routes.

    b. Store project vehicles onsite in designated areas to minimize the need for multiple washings of vehicles that re-enter the project site.

    c. Maintain vehicle wash and inspection stations and closely monitor the types of materials brought onto the site.

    d. Thoroughly clean the tires and undercarriage of all vehicles entering or reentering the project site.

    e. Reestablish native vegetation quickly on disturbed sites.

    f. Monitor and quickly implement control measures to ensure early detection and eradication for weed invasions.

    g. Use certified weed-free straw or hay bales for sediment barrier installations.

    h. Train employees and contractors to carry out the WEAP and on their role in ensuring the effectiveness of their efforts in implementing the Plan.

22. Prepare a project specific restoration, revegetation and reclamation plan that meets the approval of the permitting agencies that would be implemented during all phases of the project. The plan should address, at a minimum:

    a. Minimizing natural vegetation removal and considering cutting or mowing vegetation rather than total removal whenever possible.

    b. Salvage and relocation of cactus and yucca from the site prior to the initiation of construction activities.

    c. Identification of protocols to be used for vegetation salvage.

    d. Reclamation of all areas of temporarily disturbed soil using certified weed free native vegetation and topsoil salvaged from all excavations and construction activities.

    e. Restoration and reclamation of all temporarily disturbed areas, including pipelines, transmission lines, staging areas, and temporary construction-related roads as soon as possible after completion of construction activities to reduce the amount of habitat converted at any one time and to facilitate the recovery to natural habitats.

f. Specifying proper seasons and timing of restoration and reclamation activities to ensure success.

23. Prepare a vector (such as mosquitoes or rodents) control plan for the facility, as appropriate, that meets the approval of the permitting agencies and would be implemented during all phases of the project.

24. Prepare a project-specific mitigation and monitoring plan in cooperation with and that meets the approval of the permitting agencies. The plan should be carried out during all phases of the project and in general, should identify appropriate levels of mitigation to compensate for significant direct, indirect, and cumulative impacts to, and loss of habitat for, special status plant and animal species and should include, but not be limited to, the following:

    All biological resource mitigation, monitoring, and compliance measures required by CDFG, BLM, USFWS, CEC, and/or other agencies including the 2003 revision of the Flat-Tailed Horned Lizard Range-Wide Management Strategy (USFWS 2003). This strategy provides guidance for the conservation and management of sufficient habitat to maintain existing populations of flat-tailed horned lizards within five management areas.

    a. All sensitive biological resources to be avoided, impacted, and mitigated by project construction, operation, and decommissioning.

    b. A detailed description of measures that should be taken to minimize or mitigate permanent and temporary disturbances from construction activities.

    c. Documentation of sensitive biological resources expected to be affected by all phases of the project.

    d. All locations on a map, at an approved scale, of sensitive biological resource areas subject to disturbance and areas requiring temporary protection and avoidance during construction.

    e. Aerial photographs, at an approved scale, of all areas to be disturbed during project construction activities.

    f. Duration for each type of monitoring and a description of monitoring methodologies and frequency.

    g. Performance standards and criteria to be used to determine if/when proposed mitigation is or is not successful.

    h. All standards and remedial measures to be implemented if performance standards and criteria are not met.

    i. A discussion of biological resources-related facility decommissioning measures including a description of funding mechanism(s).

25. To the greatest extent practicable, existing roads, substations, ancillary facilities and disturbed areas should be re-used in repower layouts.

26. For a repowering or retrofit project, roads and facilities that are no longer needed should be removed or stabilized and re-seeded with native plants appropriate for the

soil conditions and adjacent habitat. Plants should be derived from local seed sources where feasible. The term "local" in this context means seed sources with a genetic makeup that do not vary substantially from seeds or plants found at the disturbed location.

27. Prepare a project specific closure/decommissioning or abandonment plan that meets the approval of the permitting agencies. The plan should also be implemented in the event of project abandonment. The plan should include, but not be limited to, the following:
    a. Removal of transmission conductors, power lines, fencing when they are no longer used and useful.
    b. Removal of all above ground power plant site facilities and related facilities when they are no longer used or useful.
    c. If the site has been terraced or otherwise substantially altered from its natural contour, recontouring may be necessary.
    d. If the plan anticipates removal of topsoils, it should address storing and vegetation of the soils. Soil profiles should be restored so that topsoils will establish and maintain pre-construction native plant communities to the extent possible.
    e. Methods for restoring wildlife habitat and promoting the re-establishment of native plant and wildlife species.
    f. Methods for restoring vegetation cover, composition, and diversity to values commensurate with the natural ecological setting. The plan should call for use of local seed sources and identify those sources, where possible.
    g. Re-vegetation of the project site and other disturbed areas utilizing appropriate native seed mix.
    h. Criteria that would trigger implementation 1 of the plan (e.g., nonoperational for one year or more).
    i. A cost estimate to complete closure/decommissioning-related activities.
    j. A funding mechanism to ensure sufficient funds are available for revegetation, reclamation, and decommissioning.
28. Apply all management plans, BMPs, and stipulations prepared for the construction phase to similar activities during any project modifications or expansions and the closure/ decommissioning phase or upon project abandonment.

Plants

Follow BLM and CDFG guidance and requirements regarding mapping and surveying for presence of protected plants.

Aquatic Species

Identification of aquatic resources using a combination of aerial photo interpretation, Global Positioning System (GPS) field verification, and other methods will be required for all proposed projects.

Wetlands and Riparian Areas

It is assumed that all streams or aquatic resources located onsite within the West Chocolate Mountains REEA are jurisdictional, should be considered provisionally restricted from development, and the BLM would accept USACE mitigation requirements for permitting projects. Some of these streams may flow directly into the Salton Sea, or into canals and drainages prior to entering the Salton Sea; a Section 404 permit is likely required for any type of discharge of dredge or fill material in ephemeral streams within the West Chocolate Mountains REEA. The USACE would restrict from development all jurisdictional waters from high water mark to high water mark and impose strict conditions on the use of any lands within (such as road crossings). All washes identified by the USGS National Hydrography Dataset within the WCM REEA would be expected to have restrictions on development and/or significant stipulations based on Jurisdictional Delineation efforts by the USACE. Jurisdictional Delineation efforts for Section 404 of the CWA (consultation with USACE) would begin prior to publication of an NOI. Preliminary Jurisdictional Determinations have been suggested by the USACE to expedite the determination process. Obtainment of a Jurisdictional Determination by the applicant will establish the USACE's jurisdiction over aquatic resources on site. Washes would be a significant issue to deal with because the USACE Section 404 Permitting Requirements. Avoidance of project development in wetlands and setback stipulations would be strictly enforced.

Avian Species [not applicable to common raven (*Corvus corax*)]

1. Conduct pre-construction nest surveys in accordance with BLM, USFWS, and CDFG guidelines, if construction activities are anticipated to occur from February 1 through August 31. Surveys should be conducted within all potential nesting habitat in the proposed plan site and within 500 feet of the boundaries of the site and linear facilities. Presence of larger bird species may require larger survey areas; check with the appropriate agencies for further information.
2. For active nests detected during the survey, retain an avian-qualified biologist to identify a buffer zone (protected area surrounding the nest) and develop a monitoring plan in coordination with BLM, CDFG, USFWS and/or other appropriate agencies.
3. Retain an avian qualified biologist to monitor the nest until he/she determines that nestlings have fledged and dispersed. Activities that might, in the opinion of an avian qualified biologist, disturb nesting activities should be prohibited within the buffer zone until such a determination is made.
4. Establish non-disturbance buffer zones to protect raptor nests, bat roosts, areas of high bird or bat use, or specials-status species habitat identified in pre-construction studies. Determine the extent of the buffer zone in consultation with the appropriate agencies.
5. Develop Bird and Bat Conservation Plan to protect migratory birds, while improving avian conservation and safety and reliability for utility customers. Consult guidance in the USFWS White Paper providing guidance for the development of Project-Specific Avian and Bat Protection Plans for Renewable Energy Facilities. This

document was published August 3, 2010. Also consult guidance in the California Guidelines and Avian Protection Plan Guidelines published by the Avian Power Line Interaction Committee (APLIC) and USFWS (APLIC and USFWS 2005).

6. Consult guidance in the BLM/USFWS Memorandum of Understanding (MOU) to Promote the Conservation of Migratory Birds signed April 10, 2010.
7. Place acoustic bat detectors on meteorological towers at a height near the theoretical rotor swept zone and also at suspected high-use areas near the ground with the goal of documenting pre-construction activity levels and species composition of bats.
8. Install and maintain transmission lines and all electrical components in accordance with the APLIC Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006 (APLIC 2006) to reduce the likelihood of electrocutions of raptors and other large birds.
9. Install and maintain transmission lines and all electrical components in accordance with the APLIC Mitigating Bird Collisions with power lines: The State of the Art in 1994 (Edison Electric Institute 2004) to reduce the likelihood of bird collisions.
10. If possible and not cost prohibitive, not seismic prohibited, and without causing greater impacts to avian species, wetlands, cultural sites, vegetation, and other area wildlife and flora, place a portion or portions of low voltage connecting power lines underground in to avoid attracting certain aviation prey for raptors and other large birds.
    a. Overhead lines may be acceptable if sited away from high bird crossing locations, such as between roosting and feeding areas or between lakes, rivers and nesting areas.
    b. Overhead lines may be acceptable for areas outside the range of the flat-tailed horned lizard or where populations of BUOW are low.
    c. Overhead lines may be acceptable when they parallel tree lines, or are otherwise screened so that collision risk is reduced.
11. Communication towers and permanent meteorological towers should not be guyed. If guy wires are necessary, bird flight diverters or high visibility marking devices should be used.
12. Install and maintain facility lighting to prevent upward and side casting of light towards wildlife habitat and propose use of motion sensors. If the Federal Aviation Administration (FAA) requires lighting to alert aircraft of turbines or towers, minimize risk of avian collisions by using red or white strobe lights on the structures. The strobes should be on for as brief a period as possible and the time between strobe or flashes should be the longest possible. Strobes should be synchronized so that a strobe effect is achieved and towers are not constantly illuminated.
13. Use lights with sensors and switches to keep lights off when not required.
14. Minimize use of high intensity lighting, steady-burning, or bright lights such as sodium vapor or spotlights.

15. If the use of open evaporation ponds is permitted for the project and especially if the water would be considered toxic to wildlife, design the ponds to discourage their use by birds and other wildlife.

Species Specific: Burrowing Owl (*Athene cunicularia*)

1. Retain a qualified biologist to complete a preconstruction survey for burrowing owls in any areas subject to disturbance from construction no less than 30 days prior to the start of initial ground disturbance activities. Preconstruction surveys should consist of four separate site visits conducted on different dates to maximize detection. If burrowing owls are present within 500 feet of the project site or linear facilities, then the CDFG burrowing owl guidelines (California Burrowing Owl Consortium 1993) should be implemented.
2. If burrowing owl relocation is determined to be an appropriate conservation measure, develop and implement a Burrowing Owl Mitigation and Monitoring Plan for approval by CDFG and other permitting agencies. The plan should outline the number of evictions necessary, new burrows to be created, their locations, and how any created burrows/individuals and compensation foraging habitat would be protected for the life of the project.

Species Specific: Bald Eagle (*Haliaeetus leucocephalus*) and Golden Eagle (*Aquila chrysaetos*)

1. Comply with the new authorization Eagle Permits; Take Necessary to Protect Interests in Particular Localities (Federal Register [FR] Vol. 74, No. 175, September 11, 2009), where proposed projects may result in take of bald or golden eagles. Where applicable, incorporate actions to avoid disturbance of eagles in accordance with the USFWS National Bald Eagle Management Guidelines, May 2007.
2. Consult Guidance in BLM IM 2010-156 Bald and Golden Eagle Protection Act (BGEPA) – Golden Eagle National Environmental Policy Act and Avian Protection Plan Guidance for Renewable Energy published July 13, 2010 on complying with the BGEPA discussed in No. 1 above.

Species Specific: Desert Tortoise (*Gopherus agassizii*)

1. Conduct project activities when desert tortoises are inactive (typically November 1 to March 14), to minimize impacts to roaming individuals.
2. Retain a desert tortoise Authorized Biologist approved by CDFG and USFWS who would be responsible for ensuring compliance with desert tortoise BMPs prior to the initiation of and during ground-disturbing activities. The Authorized Biologist should conduct clearance surveys, tortoise handling, artificial burrow construction, egg handling and other procedures in accordance with the *Guidelines for Handling Desert Tortoise during Construction Projects* (Desert Tortoise Council 1994) or the most current guidance provided by USFWS.
3. The Authorized Biologist should be present on-site from March 15 through October 31 (active season) during ground-disturbing activities in areas that have not been enclosed with tortoise exclusion fencing. The Authorized Biologist should be on-call

from November 1 to March 14 (inactive season) and should check construction areas that have not been enclosed with tortoise exclusion fencing immediately before construction activities begin at all times.

4. Incorporate desert tortoise exclusion fencing, approved by USFWS and CDFG, into any permanent fencing surrounding the proposed facility prior to the initiation of ground disturbing activities to avoid potential harm to desert tortoise in the project area. Tortoise exclusion fencing should be constructed in accordance with the *Desert Tortoise Exclusion Fence Specifications* (USFWS 2005) or the most current guidance provided by USFWS and CDFG.
5. Install desert tortoise exclusion fencing around temporary project areas such as staging areas, storage yards, excavations, and linear facilities during construction. Construct fences in late winter or early spring to minimize impacts to tortoises and accommodate subsequent tortoise surveys.
6. Within 24 hours prior to the initiation of construction of tortoise exclusion fence, the Authorized Biologist should survey the fence alignment to ensure it is cleared of desert tortoises. Following construction of the tortoise-exclusion fence, the Authorized Biologist should conduct clearance surveys within the fenced area to ensure as many desert tortoises as possible have been removed from the site.
7. Install and regularly maintain gates that remain closed, except for the immediate passage of vehicles, to prevent desert tortoise passage into the project area.
8. Heavy equipment should only be allowed to enter the project site following the completion of desert tortoise clearance surveys of the project area by the Authorized Biologist. The Authorized Biologist should monitor initial clearing and grading activities to ensure any tortoises missed during the initial clearance survey are moved from harm's way.
9. Ensure that any damage to the permanent or temporary fencing is immediately blocked to prevent tortoise access and permanently repaired within 72 hours between March 15 and October 31, and within 7 days between November 1 and March 14. Following installation, the permanent fencing should be inspected quarterly and after major rainfall events to ensure fences are intact and there is no ground clearance under the fence that would allow tortoise to pass.
10. The Authorized Biologist should inspect 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, 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 desert tortoise clearance surveys have been completed.
11. Ensure vehicular traffic does not exceed 25 miles per hour within the delineated project areas or on access roads in desert tortoise habitat. On unpaved roads the speed limit should be 10 miles per hour to suppress dust and protect air quality.

12. Any time a vehicle or construction equipment is parked in desert tortoise habitat outside the permanently fenced area, the Authorized Biologist or drivers of the vehicle should inspect the ground under the vehicle for the presence of desert tortoise before it is moved. If a desert tortoise is observed, it should be left to move on its own. If it does not move within 15 minutes, the Authorized Biologist may remove and relocate the animal to a safe location.
13. Design culverts to allow safe passage of tortoises.
14. If desert tortoise relocation is determined to be an appropriate conservation measure, develop and implement a Desert Tortoise Translocation Plan for approval by CDFG, USFWS, BLM and other permitting agencies. The Plan should designate a relocation site as close as possible to the disturbance site that provides suitable conditions for long term survival of the relocated desert tortoise and outline a method for monitoring the relocated tortoise. This area would be set aside in perpetuity for desert tortoise relocation.
15. If desert tortoises are observed within the West Chocolate REEA, consult with CDFG and USFWS to determine the need for and/or feasibility of conducting relocation or translocation as minimization or mitigation for project impacts. Development and implementation of a translocation plan may require, but not be limited to, additional surveys of potential recipient sites; disease testing and health assessments of translocated and resident tortoises; and consideration of climatic conditions at the time of translocation. Because of the potential magnitude of the impacts to desert tortoise from proposed renewable energy projects, CDFG and USFWS must evaluate translocation efforts on a project by project basis in the context of cumulative effects.

Species Specific: American Badger (*Taxidea taxus*)

1. Retain a qualified biologist, approved by the CDFG and other permitting agencies, to conduct preconstruction surveys for badger dens in the project area, including areas within 250 feet of all project facilities, utility corridors, and access roads. If badger dens are found, each den should be classified as inactive, potentially active, or definitely active. Inactive dens should be excavated by hand and backfilled to prevent reuse by badgers. Potentially and definitively active dens should be monitored for three consecutive nights using a tracking medium (such as diatomaceous earth or fire clay) at the entrance. If no tracks are observed in the tracking medium after three nights, the den should be excavated and backfilled by hand. If tracks are observed, the den should 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 from continued use. The den should then be excavated and backfilled by hand to ensure that no badgers are trapped in the den. Any excavation and filling activities should be performed by the qualified biologist and conducted outside of the breeding season to ensure young badgers are not affected.

Species Specific: Flat-Tailed Horned Lizard (*Phrynosoma mcallii*)

1. If appropriate, erect barrier fencing where long-term activities occur. Fencing can be used to exclude flat-tailed horned lizard after clearing the construction area of lizards. Applicants should coordinate with BLM to determine if fencing is appropriate.

2. The Designated Biologist will contact the BLM and the USFWS before ground disturbing activities, document compliance, and be present during operations and maintenance (O&M) activities that take place in flat-tailed horned lizard habitat.. The applicant's Designated Biologist or biological monitors will move any observed flat-tailed horned lizard out of harm's way. They will also map and report how many FTHLs have been encountered.

3. To fully mitigate for habitat loss and potential take of flat-tailed horned lizard, compensation funds will be allocated. These compensation funds will be used to acquire, protect, or restore flat-tailed horned lizard habitat within and contiguous with the flat-tailed horned lizard management areas in accordance with the Flat-Tailed Horned Lizard Rangewide Management Strategy.. The acquisition and management of compensation lands shall include the following elements:

   Selection Criteria for Compensation Lands. The compensation lands selected for acquisition should:

   a. Be within holdings of the nearest management area;

   b. Be in the Colorado Desert;

   c. Provide moderate to good quality habitat for flat-tailed horned lizard with capacity to regenerate naturally when disturbances are removed, though poor quality habitat is acceptable near protected flat-tailed horned lizard habitats;

   d. Be near larger blocks of lands that are either already protected or planned for protection, or which could feasibly be protected by a public resource agency or a non-governmental organization dedicated to habitat preservation; and

   e. Be connected to lands currently occupied by flat-tailed horned lizard, ideally with populations that are stable, recovering, or likely to recover.

   Other approved uses of the compensation funds, should acquisition opportunities be exhausted:

   a. Transfer funds to other management areas to purchase flat-tailed horned lizard habitat, especially habitat within or contiguous with management areas that are threatened with imminent impacts;

   b. Construct and maintain fences and signs around management areas to prevent off-highway vehicles (OHVs) from entering and degrading flat-tailed horned lizard habitat. In addition, these fences could be designed to physically prevent flat-tailed horned lizards from leaving the management areas and encountering nearby roads; and

   c. Restore degraded flat-tailed horned lizard habitat within or contiguous with management areas.

   The project owner shall implement a Raven Monitoring, Management, and Control Plan that is consistent with the most current USFWS-approved raven management guidelines, and which meets the approval of the USFWS, CDFG, and BLM, and CEC staff. The draft Raven Monitoring, Management, and Control Plan submitted by the

applicant shall provide the basis for the final plan, subject to review and revisions from the BLM, USFWS, and CDFG, and the CEC staff.

Verification. At least 60 days prior to start of any project-related ground disturbance activities, the project owner shall provide the BLM's Authorized Officer, the CPM, USFWS, and CDFG with the final version of the Raven Monitoring, Management, and Control Plan that has been reviewed and approved by USFWS, CDFG, and BLM's Authorized Officer . The BLM would determine the plan's acceptability within 15 days of receipt of the final plan. All modifications to the approved Raven Monitoring, Management, and Control Plan must be made only after consultation with the BLM, CEC staff, USFWS, and CDFG. The project owner shall notify BLM's Authorized Officer and the CPM no less than five working days before implementing any BLM- and CPM-approved modifications to the Raven Monitoring, Management, and Control Plan. Within 30 days after completion of project construction, the project owner shall provide to BLM's Authorized Officer and the CPM for review and approval, a written report identifying which items of the Raven Monitoring, Management, and Control Plan have been completed, a summary of all modifications to BMPs made during the project's construction phase, and which items are still outstanding.

The Designated Biologist will verify for the BLM that all flat-tailed horned lizard impact avoidance, minimization, and compensatory measures have been implemented (Flat-Tailed Horned Lizard Interagency Coordinating Committee 2008).

Species Specific: Nelson's Big Horn Sheep (*Ovis Canadensis nelsoni)*

1. Erect fences and gates to preclude large mammal access to the site and to contain construction equipment. Obtain CDFG approval of fence design plan before installation.
2. Cover excavated areas, slope trenches, or install wildlife escape ramps in the excavated areas to facilitate the escape of any sheep that wander on site.
3. Avoid or minimize impacts to drainage features in known bighorn sheep territory.
4. Avoid impacts to water sources identified as those utilized by bighorn sheep.
5. Avoid and minimize disturbance to wildlife corridors present in the REEA.

C-A3: CULTURAL AND HISTORIC RESOURCES

BEST MANAGEMENT PRACTICES

GENERAL

General Stipulations

1. Avoid and protect potentially significant cultural resources in the APE.
2. Construction and operations monitoring by an archaeologist listed on a BLM California Cultural Resources Use Permit (CRUP) at locations with known sensitivity for cultural resources.
3. Train construction personnel to identify, avoid, and report the presence of cultural resources.
4. Construction and operations monitoring by an archaeologist listed on a BLM California CRUP in areas of high sensitivity for buried cultural resources.
5. Construction and operations monitoring by an archaeologist listed on a BLM CRUP for properties eligible for listing in the NRHP.
6. Reduce adverse visual intrusions to historic built environment properties.
7. Properly treat human remains.

Stipulations Specific to Geothermal and Solar Energy Leases

1. Complete Consultation with Native American and other Traditional Groups.

   The BLM will consult with Native American tribal governments to identify tribal interests and traditional cultural resources or properties that may be affected by federal land leases and potential for geothermal or solar energy development. Tribal interests include economic rights such as Indian trust assets and resource uses and access guaranteed by treaty rights. Traditional cultural resources or properties include areas of cultural importance to contemporary communities, such as sacred sites or resource gathering areas. There may be issues related to the presence of cultural properties, access rights, disruption to traditional cultural practices, cultural use of hot springs and water sources and impacts to visual resources important to tribes. Areas proposed for leasing may include lands where there are tribal interests and traditional cultural resources that are not currently identified. Consultations on leases should include a full disclosure of the lease as a commitment of the land that may eventually involve future development that could preclude other tribal uses. Consideration and research should be directed to determine if there are other ethnic and social groups that may have traditional uses or ties to the lands proposed for leases.

   One of the defining characteristics of most proposed energy projects is their size and scale. Because of the large land areas involved, it is essential to effect the early

identification and analysis of landscape level resources and issues that might normally not be identified in conventional cultural resources survey. As part of this analysis, it is extremely important to identify and contact Native American tribes and other interested parties that may have information on historic properties, sacred sites, traditional cultural properties, or other cultural resources that may be located within the APE or may be affected by the proposed undertaking. It is essential that rigorous and meaningful tribal consultation be carried out early in the application process to identify issues and concerns that may rise above and beyond specific archaeological or historic properties, which may involve sacred sites, traditional cultural landscapes or other issues that would not normally be identified.

Tribal consultation/contact should be focused on working with tribes at the earliest stages of the proposed undertaking to gather ethnographic information, property information, and other resource information to help identify significant properties or issues, especially information about traditional cultural properties, sacred sites, and cultural landscapes. This will assist in identifying significant issues and resources that are not identified through the course of normal cultural resources survey. The objective of consultation is to identify any potentially significant properties or issues that may pose difficulties for the proposed undertaking and future management decision-making. As this consultation will be conducted on a landscape level scale, it is imperative to provide information and maps that are easily understood by tribal members in the consultation process. Because of the number, size and scale of proposed energy projects in any given area, BLM offices should consider additional strategies for tribal consultation beyond consultation on project specific basis. BLM Field Offices should consider combining consultations on multiple projects or inviting tribes to meetings where multiple projects may be discussed and coordinated in order to facilitate coordination and information exchange, minimize confusion about the large number of projects, and provide for a more effective and productive process of tribal consultation.

2. Cultural Resources Literature Review and Records Search.

A records search and literature review is required with the objective of developing sufficient information and contexts for the purpose of identifying significant resources and issues that may be relevant to the assessment of effects for the undertaking. However, the records search and literature review may not necessarily require a full BLM Class I cultural overview and documentation as defined in the BLM 8100 Manual. Documentation sufficient for a records search and literature review may include records provided by information centers or other repositories, such as historical societies, museums, and BLM land records, and may include copies of site records, maps, historic maps, lists of reports, surveys, previous cultural resources overviews. The purpose of the records search and literature review is to identify any potentially significant properties or issues that may pose difficulties for the proposed undertaking and future management decision-making.

3. Inventory and Evaluate all Cultural Resources in Final APE.

Before any ROW or Lease Authorizations are issued, treatment of cultural resources will follow the procedures established by the Advisory Council on Historic Preservation for

compliance with Section 106 of the National Historic Preservation Act. A pedestrian inventory will be undertaken of all portions that have not been previously surveyed or are identified by BLM as requiring inventory to identify properties that are eligible for the National Register of Historic Places (NRHP). Those sites not already evaluated for NRHP eligibility will be evaluated based on surface remains, subsurface testing, archival, and/or ethnographic sources. Subsurface testing will be kept to a minimum whenever possible if sufficient information is available to evaluate the site or if avoidance is an expected mitigation outcome. Recommendations regarding the eligibility of sites will be submitted to the BLM, and a treatment plan will be prepared to detail methods for avoidance of impacts or mitigation of effects.

4. Eligibility Determinations.

   The BLM will make determinations of eligibility and effect and consult with SHPO as necessary based on each proposed lease application and project plans. The BLM may require modification to exploration or development proposals to protect such properties, or disapprove any activity that is likely to result in adverse effects that cannot be successfully avoided, minimized or mitigated. Avoidance of impacts through project design will be given priority over data recovery as the preferred mitigation measure. Avoidance measures include moving project elements away from site locations or to areas of previous impacts, restricting travel to existing roads, and maintaining barriers and signs in areas of cultural sensitivity. Any data recovery will be preceded by approval of a detailed research design, Native American Consultation, and other requirements for BLM issuance of a permit under the Archaeological Resources Protection Act.

5. Develop and Implement Plan(s) for the Treatment, Management, and Protection of Cultural Resources.

   If cultural resources are present at the site, or if areas with a high potential to contain cultural material have been identified, a cultural resources management plan (CRMP) will be developed. This plan will address mitigation activities to be taken for cultural resources found at the site. Avoidance of the area is always the preferred mitigation option. Other mitigation options include archaeological survey and excavation (as warranted) and monitoring. If an area exhibits a high potential, but no artifacts were observed during an archaeological survey, monitoring by a qualified archaeologist could be required during all excavation and earthmoving in the high-potential area. A report will be prepared documenting these activities. The CRMP also will (1) establish a monitoring program, (2) identify measures to prevent potential looting/vandalism or erosion impacts, and (3) address the education of workers and the public to make them aware of the consequences of unauthorized collection of artifacts and destruction of property on public land.

   In addition to a CRMP, one or more of the following documents may be required by the BLM, in consultation with the SHPO and, possibly, the Advisory Council on Historic Preservation: Historic Properties Treatment Plan, Historic Properties Management Plan, Inadvertent Discoveries Plan, Tribal Participation Plan, Long Term Management Plan, Memorandum of Agreement, Memorandum of Understanding, or other document or agreement addressing the treatment and management of cultural resources.

GEOTHERMAL ENERGY DEVELOPMENT

For geothermal leases, the BLM will apply the following stipulation to protect cultural resources, in accordance with BLM Instruction Memorandum No. 2005-003:

> "This lease may be found to contain historic properties and/or resources protected under the NHPA, American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, Executive Order 13007, or other statutes and executive orders. The BLM will not approve any ground-disturbing activities that may affect any such properties or resources until it completes its obligations under applicable requirements of the NHPA and other authorities. The BLM may require modification to exploration or development proposals to protect such properties, or disapprove any activity that is likely to result in adverse effects that cannot be successfully avoided, minimized or mitigated."

C-A4: HAZARDOUS MATERIALS, PESTICIDES, AND WASTE MANAGEMENT

BEST MANAGEMENT PRACTICES

GENERAL

1. Ensure that on-site workers are fully trained to properly handle and are informed about each of the hazardous materials that will be used on site.
2. Prepare a hazardous materials management plan addressing storage, use, transportation, and disposal of each hazardous material anticipated to be used, stored, or transported at the site. The plan should establish inspection procedures, storage requirements, storage quantity limits, inventory control, nonhazardous product substitutes, and disposition of excess materials and be implemented during all phases of the project. The plan should also identify requirements for notices to federal and local emergency response authorities and include emergency response plans. Project developers should contact the local certified unified program agency (CUPA) for requirements and enrollment in the CUPA's hazardous waste generator program. If the plan calls for treating hazardous waste onsite, consult with the CUPA on and obtain the required authorizations for the treatment activity from the state or local permitting agency.
3. If Environmental Site Assessments determine that remediation is necessary, ensure the remediation activities are conducted in accordance with the appropriate regulatory agency requirements and oversight. Demonstrate that the site has been cleaned up in accordance with all applicable laws, ordinances, regulations and standards.
4. Prepare a construction and operation waste management plan identifying the waste streams that are expected to be generated at the site and addressing hazardous waste determination procedures, waste storage locations, waste-specific management, recycling and disposal requirements, inspection procedures, inventory selection and control, and waste minimization procedures. The plan should be implemented during all phases of the project and address all solid and liquid wastes that may be generated at the site in compliance with the Clean Water Act requirements to obtain the project's NPDES permit. Consider, for example, the following in the plan:
    a. Identifying and controlling practices that produce wastes and wastewater, such as: metal fabrication, zero liquid discharge residue, grinding and finishing; storing and disposing of solid and liquid waste; vehicle and equipment refueling, maintenance service, washing, engine cleaning, and parking.
5. Prepare and implement a spill prevention and response plan identifying where hazardous materials and wastes are stored on site, spill prevention measures to be implemented, training requirements, appropriate spill response actions for each material or waste, the locations of spill response kits on site, a procedure for ensuring

that the spill response kits are adequately stocked at all times, and procedures for making timely notifications to authorities. Consider including the following practices, at a minimum, in the plan:

a. Place equipment and vehicle maintenance and repair areas under a roof.

b. Work on engines, transmissions, miscellaneous repairs, and changing automotive fluids (brake fluid, transmission fluid, gear oil, radiator fluids, and air conditioner Freon or refrigerant) should be conducted in a covered area using drip pans when there is a likelihood of leaks or spills. Use absorbent materials for spill prevention and cleanup.

c. Promptly cleaning up vehicle leaks, using a rag or absorbent material; properly disposing of used rags or spent sorbents.

d. Fueling vehicles should be done where spills or leaks will be contained and cleaned up quickly.

e. No vehicle refueling would occur within 100 feet of a perennial or mapped ephemeral watercourse.

6. Ensure secondary containment is provided for all on-site hazardous and extremely hazardous materials and waste storage, including fuel. In particular, fuel storage (for construction vehicles and equipment) should be a temporary activity occurring only for as long as is needed to support construction activities.

7. Ensure wastes are properly containerized, covered and removed periodically for disposal at appropriate off-site permitted disposal facilities.

8. In the event of an accidental hazardous waste release to the environment, document the event, including a root cause analysis, appropriate corrective actions taken, and a characterization of the resulting environmental or health and safety impacts. Documentation of the event should be provided to the permitting agencies and other federal and state agencies within 30 days, as required.

9. If pesticides are used on the site, prepare an integrated pest management plan to ensure that pesticide applications would be conducted within the framework of state and federal policies and entail only the use of EPA registered and state approved pesticides that permitting agencies have authorized. Pesticide use should be limited to non-persistent, immobile pesticides. Pesticides should only be applied in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications. All pesticides should be used, stored, and disposed of in accordance with their label. A pesticide use permit would be required from BLM before any pesticide can be applied.

10. If potentially contaminated soil (as evidenced by discoloration, odor, detection by handheld instruments, or other signs) is identified during site excavation grading, or construction at either the proposed site or linear facilities, a qualified Professional Civil Engineer, Professional Geologist or Registered Environmental Assessor should inspect the site. The inspection should determine the need for sampling to confirm the nature and extent of contamination, before continuing activities in the area of the suspected contamination. Project construction activities should not be allowed to

continue in the area until the suspected contamination is assessed and remediated as necessary to comply with applicable environmental and worker health and safety laws, ordinances, regulations, and standards.

11. Rinsing of herbicide/pesticide spray tanks should not occur in or near water bodies.
12. Minimize herbicide/pesticide treatment in areas that have a high risk for groundwater contamination.
13. Determine the risk of herbicide/pesticide contamination when such substances are used to control vegetation. Consider the weather, soil type, slope, and vegetation type.
14. Use appropriate herbicide-free/pesticide-free buffer zones for herbicides not labeled for aquatic use, based on BLM/U.S. Forest Service (USFS) risk assessment guidance. The guidance suggests minimum widths of 100 feet for aerial applications, 25 feet for applications dispersed by vehicle and 10 feet for hand-spray applications.
15. Project developers should provide a Debris Management Plan and a Performance Guarantee per the applicable county's Construction and Demolition Recycling Program and should ensure compliance with all of the county's diversion program requirements.
16. Hazardous product leaks and chemical releases that constitute a Recognized Environmental Condition should be remediated prior to completion of decommissioning.
17. Project developers should contact the USACE, as any streams or other aquatic resources located within the REEA, particularly those that are connected to the Salton Sea, are likely USACE jurisdictional waters of the U.S.
18. Section 404 permits are likely required for any type of discharge of dredge or fill material in ephemeral streams within the West Chocolate REEA because some of these streams may flow directly into the Salton Sea, or into canals and drainages prior to entering the Salton Sea.
19. Additional measures have been added that require a 300-foot buffer around riparian and wetlands features (distance from the edge of the water body) for renewable energy projects that would be developed in the West Chocolate REEA, east of the Coachella Canal. The 100-foot buffer should remain for lands west (and south) of the Coachella Canal. Any exclusion area or "buffer" for a water feature would use the "ordinary high water mark" as defined by the USACE. Project specific surveys will also be required to identify constraints to development (i.e., wetlands and riparian habitat) and to ensure protection of valuable aquatic resources in the REEA.
20. Establish setbacks or consider acquiring buffer lands to separate nearby residences and occupied buildings from the proposed facility to minimize impacts from sun reflection, low-frequency sound, electromagnetic fields (EMF), construction and operation noise, air pollution, and facility-related hazards and wastes. Design the project to reduce electromagnetic interference (EMI) (e.g., impacts to radar, microwave, television, and radio transmissions) and to comply with Federal Communications Commission (FCC) regulations. Conduct signal strength studies when proposed locations have the potential to affect FCC licensed transmissions. Reduce to nil potential or real interference with public safety communication systems (e.g., radio traffic related to emergency activities) or the amateur radio bands.

GEOTHERMAL ENERGY DEVELOPMENT

1. Increase the pH of spent geothermal brine to keep silica in solution prior to reinjection.
2. Return spent geothermal brines, steam condensate, and cooling system blow-down to the geothermal resource via reinjection wells.
3. Assure that hazardous substances and wastes removed from surface impoundments are not leaked, spilled, or otherwise improperly released outside the surface impoundments and into the environment.
4. Remediate any contamination near and around surface impoundments, including the tops of berms and areas downwind from the impoundments, filter cake bay storage areas, hydroblast pads and adjacent areas, pipes containing hazardous waste scale and areas adjacent, and other areas where hazardous waste releases or disposals have occurred.
5. Minimize releases of filter cake into the environment by enclosing filter cake bays with doors or replace filter cake bays with containers or trailers capable of holding the waste material.
6. Prevent filter cake from being released or disposed of into the environment during the transfer to, from, or while stored at the filter cake bays or in end-dump trailers.
7. Ensure that all employees and contractors staff operating at any facility receive appropriate hazardous waste management and high pressure high temperature (HPHT) training prior to conducting any work involving hazardous waste, including hazardous waste treatment, storage, and disposal at the facility, or HPHT environments, including wellsite, pipeline, and power plant operations.
8. Conduct annual environmental audits to identify all hazardous waste streams and determine compliance with all applicable statutory and regulatory provisions of California's Hazardous Waste Control Law and the Unified Hazardous Waste and Hazardous Materials Management Regulatory Program.
9. Maintain a minimum freeboard of two feet at all times within the geothermal brine surface impoundment. Ensure the fluids and brine precipitates discharged to and contained in the surface impoundment never overflow.
10. Install a leak detection system beneath the membrane liner of the geothermal brine surface impoundment. Inspect the system quarterly to ensure brine is not collecting due a membrane-liner breach.
11. Monitor groundwater wells to determine whether the geothermal brine surface impoundment is releasing hazardous waste into groundwater.
12. Clean conveyance systems regularly to prevent buildup of silica scale and the potential for release of solid materials from conveyance systems.
13. Perform pipe maintenance and de-scaling only in areas designated for these activities.
14. Construct hydro blasting areas so that the base is impermeable base and no wastewater can spray or run onto adjacent soil. For example, the hydro blasting area

should have 12-foot-high walls on three sides. Convey wastewater from the hydro blasting process to the brine surface impoundment for reinjection to the geothermal resource.

15. Containerize drilling mud and cuttings, when possible. Placing muds and cuttings in containers, such as Baker tanks, may not always be practical, but is a practice that avoids discharging such wastes to land.

C-A5: NOISE AND VIBRATION

BEST MANAGEMENT PRACTICES

GENERAL

1. Ensure noisy construction activities (including truck and rail deliveries, pile driving and blasting) are limited to the least noise-sensitive times of day (i.e., weekdays only between 7 a.m. and 7 p.m.) for projects near residential or recreational areas.
2. Consider use of noise barriers such as berms and vegetation to limit ambient noise at plant property lines, especially where sensitive noise receptors may be present.
3. Ensure all project equipment has sound-control devices no less effective than those provided on the original equipment. All construction equipment used should be adequately muffled and maintained. Consider use of battery powered forklifts and other facility vehicles.
4. Ensure all stationary construction equipment (i.e., compressors and generators) is located as far as practicable from nearby residences.
5. If blasting or other noisy activities are required during the construction period, notify nearby residents and the permitting agencies 24 hours in advance.
6. Properly maintain mufflers, brakes and all loose items on construction and operation related vehicles to minimize noise and ensure safe operations. Keep truck operations to the quietest operating speeds. Advise about downshifting and vehicle operations in residential communities to keep truck noise to a minimum.
7. Use noise controls on standard construction equipment; shield impact tools. Consider use of flashing lights instead of audible back-up alarms on mobile equipment.
8. Install mufflers on air coolers and exhaust stacks of all diesel and gas-driven engines. Equip all emergency pressure relief valves and steam blow-down lines with silencers to limit noise levels.
9. Contain facilities within buildings or other types of effective noise enclosures.
10. Employ engineering controls, including sound-insulated equipment and control rooms, to reduce the average noise level in normal work areas.

GEOTHERMAL ENERGY DEVELOPMENT

BLM regulations seek to "minimize noise," but set no measurable standard. BLM relies on noise criteria published in 1975 by the USGS in "Geothermal Resources Operational Order No. 4." The order is applicable to people occupying nearby homes, hospitals, schools, and libraries and wildlife, according to the 2008 PEIS and states that federal land lessees may:

> *"not exceed a noise level of 65 dB(A) for all geothermal-related activity including but not limited to, exploration, development, or production operations as*

measured at the lease boundary line or 0.8 km (one-half mile) from the source, whichever is greater, using the A-weighted network of a standard Sound Level Meter. However, the permissible noise level of 65 dB(A) may be exceeded under emergency conditions or with [regulatory] approval if written permission is first obtained by the lessee from all residents within 0.8 km (one-half mile).”

Geothermal resource exploration/testing involves well drilling and less invasive approaches such as geophysical remote sensing. Remote sensing can refine well targeting and reduce the number of wells drilled. The exploration/testing approach is generally identified in a reservoir management plan.

1. Use as few drill sites as is feasible so that fewer people are noise-impacted.
2. Locate the sites as far from residences as possible. In addition, use terrain, such as ridges, and plan the drill site so that noise is projected away from residences, to shield noise impacts to the greatest extent possible. Within two miles of existing, occupied residences, consider restricting geothermal well drilling or major facility construction activities to non-sleeping hours (7 a.m. to 10 p.m.).
3. To dampen drilling rig noise, install acoustical windows in structures occupied by affected parties.
4. Install adequate noise abatement equipment during construction and operation, and maintain it in good condition to reduce noise from any drilling or producing geothermal well located within 1,500 feet of a habitation, school or church. Examples of such equipment include temporary noise shields, cyclone silencers, rock wall mufflers, and sound insulation in pipes. Silencers slow the velocity of steam in the steam processing facility.

C-A6: PALEONTOLOGICAL RESOURCES

BEST MANAGEMENT PRACTICES

GENERAL

1. Develop a protocol for unexpected paleontological discoveries. Unexpected discovery of paleontological resources during construction should be brought to the immediate attention of the appropriate permitting agencies. Work should be halted near the discovery to avoid further disturbance to the resources while they are being evaluated and appropriate BMPs are being developed.
2. Operators will determine whether paleontological resources exist in a project area on the basis of the sedimentary context of the area, a records search for past paleontological finds in the area, and/or, depending on the extent of existing information, a paleontological survey.
3. If paleontological resources are present at the site, or if areas with a high potential to contain paleontological material have been identified, a paleontological resources management plan (PRMP) will be developed. This plan will include a mitigation plan for avoidance, removal of fossils, or monitoring. If an area exhibits a high potential but no fossils were observed during survey, monitoring by a qualified paleontologist may be required during excavation and earthmoving in the sensitive area. The operator will submit a report to the agency documenting these activities. The paleontological resources management plan also will (1) establish a monitoring program, (2) identify measures to prevent potential looting/vandalism or erosion impacts, and (3) address the education of workers and the public to make them aware of the consequences of unauthorized collection of fossils on public land.

C-A7: SAFETY, HEALTH, AND NUISANCES

BEST MANAGEMENT PRACTICES

GENERAL

1. All developers will comply with all state and federal occupational health and safety regulations.

C-A8: SOILS, DRAINAGE, EROSION, STORMWATER, AND FLOODING

BEST MANAGEMENT PRACTICES

GENERAL

1. Prepare and implement a Drainage, Erosion, and Sedimentation Control Plan that ensures proper protection of water quality and soil resources, demonstrates no increase in off-site flooding potential, and includes provisions for stormwater and sediment retention for the project site. The plan should also identify site surface water runoff patterns and develop BMPs that prevent excessive and unnatural soil deposition and erosion throughout, including areas downslope of the project site and related construction sites. The plan should be designed to minimize disturbance of the site during construction, operation, repowering/retrofit and decommissioning, and achieve the following:
    a. Stabilize disturbed areas that will not be covered with structures or pavement following grading and/or cut and fill operations by means such as moisturizing and compacting.
    b. Save removed topsoil for reuse, when possible, by segregating and stockpiling the material. Cover material to prevent erosion.
    c. Runoff from parking lots, roof, or other impervious surfaces should be directed to the immediate landscape or directed to retention basins prior to entering the storm drain.
    d. Minimize stormwater runoff contamination from vehicle refueling and repair areas by containing such activities to work areas where runoff is collected or controlled.
    e. Landscaping that requires little or no irrigation should be used and be recessed to create retention basins/areas to capture runoff.
    f. The amount of area covered by impervious surfaces should be reduced through use of permeable pavement or other pervious surfaces.
    g. Natural drainages and pre-project hydrographs for the area should be maintained.
    h. The expectation of an acceptable surface hydrology report, and roads, structures and other project accoutrements will be designed to withstand a 100year storm event.
2. Prepare a SWPPP for the site prior to construction mobilization to ensure compliance with applicable regulations and prevent off-site migration of contaminated storm water or increased soil erosion.

3. Topsoil that is removed and stored should be spread in windrows to maximize viability of seedbank and soil biota.
4. Avoid using invasive species for seeding or planting for erosion control and soil stabilization purposes.
5. Conduct post-construction monitoring of areas that were disturbed during the construction phase, and apply appropriate mitigation as necessary in a timely manner.
6. Conduct regular inspections of permanent erosion control measures to ensure proper working order.
7. After decommissioning, erosion control measures should be installed in all disturbance areas where potential for erosion exists.

GEOTHERMAL ENERGY DEVELOPMENT

1. Do not use geothermal fluids or exploratory well drilling muds for dust control on access roads, well pads, or within the facility area.

C-A9: TRAFFIC AND TRANSPORTATION ROADS

BEST MANAGEMENT PRACTICES

GENERAL

1. Comply with the Circulation Element of the Imperial County General Plan.
2. Road construction and maintenance on BLM lands should follow established policy and guidelines within BLM Manual 9113 – Roads, state, local and/or other appropriate transportation agencies.
3. Roads that are no longer needed should be abandoned, recontoured and restored using weed-free native grasses, forbs, and shrubs based on BLM, USFWS, and/or CDFG recommendations.
4. Prepare a transportation plan for implementation during all phases of the project. Address methods for reducing construction worker traffic volumes and transport of project related equipment and materials.
    a. Consider providing a construction worker rideshare program.
    b. Consider scheduling shift changes and deliveries to avoid conflict with peak hour traffic patterns.
    c. Describe transport of facility hazardous and non-hazardous materials, components, main assembly cranes, and other large pieces of equipment.
    d. Consider specific object sizes, weights, origin, destination, peak hour traffic, and unique handling requirements and evaluate alternative transportation approaches.
5. Obtain vehicle oversize and overweight permits, as appropriate.
6. Obtain utility encroachment permits from appropriate agencies.
7. Conduct ongoing ground transportation planning to evaluate road use, minimize traffic volume, and ensure that roads are maintained adequately to minimize associated impacts.
8. Consult with local planning authorities regarding increased traffic during the construction phase, including an assessment of the number of vehicles per day, their size, and type.
9. Ensure signs are placed along construction roads to identify speed limits, travel restrictions, and other standard traffic control information. To minimize impacts on local commuters, consideration should be given to limiting construction vehicles traveling on public roadways during the morning and late afternoon commute times.
10. Restrict traffic to the roads specified for the project. Use of other unimproved roads should be restricted to emergency situations involving potential injury or loss of life.

11. Future specific project areas should only be accessed from existing county roads or a permitted highway access location. Any new access or additional trips to an existing access may require a focused traffic analysis, a traffic control plan, or other necessary studies.
12. Instruct project personnel and contractors to adhere to speed limits commensurate with road types, traffic volumes, vehicle types, and site-specific conditions, to ensure safe and efficient traffic flow and to reduce wildlife collisions and disturbance and airborne dust. Consider requiring driver attendance at Traffic Safety Awareness training.
13. Vehicle tires should be inspected regularly to allow faulty tires to be replaced before they fail on the road.
14. Implement a program with truck owner/operators to cover loads per California Vehicle Code 23114(a); sweep, clean, or hose truck and trailers after loading and unloading and before entering a public road.
15. Repair or reconstruct to pre-project conditions project-related access roads that are damaged by project construction activities.
16. All structures crossing washes or streams should be located and constructed so that they do not decrease channel stability or increase water velocity, to avoid erosion and changes to surface water runoff.
17. Potential soil erosion from road building or use should be controlled at culvert outlets with appropriate structures. Catch basins, roadway ditches, and culverts should be cleaned and maintained regularly.

C-A10: AVIATION

BEST MANAGEMENT PRACTICES

GENERAL

1. Mitigate impacts to air traffic safety. So that interference from electrical generation facilities can be quickly recognized by aircraft with onboard radar systems, work with the FAA to determine best practices for conveying warning information to the aircraft and mitigating the interference.
2. Notify the FAA of any construction or alteration of navigable airspace within 5,000 feet from a heliport or 20,000 feet of any airport runway more than 3,200 feet in length, via the filing of FAA Form 7460.
3. Mitigate impacts to DoD/military low fly zones. Work with local and/or appropriate military representatives to determine best practices for conveying warning information to aircraft and mitigating interference to address interference from electrical generation facilities. Notify the appropriate representatives of any proposed construction or alteration of navigable airspace in low fly zones.

C-A11: VISUAL RESOURCES

BEST MANAGEMENT PRACTICES

GENERAL

1. Ensure the public is involved and informed about the visual site design elements of the proposed project. Possible approaches include conducting public participation forums for disseminating information, offering organized tours of operating solar developments, and using computer simulation and visualization techniques in public presentations.
2. Reduce visual impacts during construction by minimizing areas of surface disturbance, controlling erosion, using non-chemical dust suppression techniques, and restoring exposed soils as closely as possible to their original contour and vegetation.
3. Color and finish surfaces of all project structures and buildings visible to the public to ensure they minimize visual intrusion and contrast and minimize glare. Paint grouped structures the same color to reduce visual complexity and color contrast.
4. Establish a regular litter pick-up procedure within and around the perimeter of the project site.
5. Use perimeter berms and/or decorative landscape plantings, where appropriate for effective facility screening, on the perimeter of the project site, outside of security fencing. Use native, drought tolerant plants to the maximum extent possible.
6. Inspect landscaping regularly and replace dead plantings in a timely manner.

C-A12: WATER SUPPLY AND QUALITY

BEST MANAGEMENT PRACTICES

GENERAL

1. Ensure that any wastewater generated in association with temporary, portable sanitary facilities is periodically removed by a licensed hauler and disposed into an existing municipal sewage treatment facility.
2. Temporary, portable sanitary facilities provided for construction crews should be adequate to support expected on-site personnel and should be removed at completion of construction activities.
3. Consider cleaning company vehicles at commercial car washes rather than washing vehicles on the company's property so that dirt, grease, and detergents are treated effectively at existing facilities designed to handle those types of wastes.
4. Comply with local requirements for permanent, domestic water use and wastewater treatment.

   Groundwater withdrawal may result in aquifer drawdown, potentially impacting hydrologically connected surface water bodies and riparian areas by reducing inflows. Historical groundwater data indicate that groundwater levels in the East Salton Sea Subbasin have been declining (USGS 2011). Long-term withdrawal of groundwater for the purpose of energy production may result in further localized groundwater drawdown. BMPs may include aquifer testing, groundwater level monitoring, and locating production wells outside of riparian areas to minimize inflow impacts to adjacent surface waters. Groundwater withdrawal should not exceed recharge to the reasonably defined sub-basin from which it is produced.

   Water and waste treatment facilities may be required for energy production facilities with long term operational water needs, including for drinking water and mirror/panel washing or dust suppression. Potable water needs may likely be met by a small package water treatment plant that would have a relatively small acreage footprint in the context of the entire facility. Additionally, any wastewater generated by operational uses may be treated and recycled for future use or evaporated. A similar package wastewater treatment system may be sufficient. Any discharge of wastes would require applicable permits.
5. Project developers should identify the source(s) of project water, and provide analysis proving that adequate quantity and quality of water are available from identified source(s).
6. Submittal of a Jurisdictional Determination for streams within the REEA, and submittal of a Preliminary Jurisdictional Determination form (PJD) required by the USACE to expedite the determination process. By obtaining a Jurisdictional

Determination, an applicant will establish USACE jurisdictionality for on-site aquatic resources.

7. All practicable steps will be taken to avoid and minimize impacts to aquatic resources; additionally, large mainstem streams will be avoided as much as practical.
8. Consultation with the USACE through pre-application meetings during the design phase of projects will be encouraged to avoid and minimize impacts to aquatic resources.
9. It is assumed that all streams or aquatic resources located on site within the West Chocolate Mountains REEA are jurisdictional, should be considered provisionally restricted from development, and the BLM would accept USACE mitigation requirements for permitting projects. Some of these streams may flow directly into the Salton Sea, or into canals and drainages prior to entering the Salton Sea; a Section 404 permit is likely required for any type of discharge of dredge or fill material in ephemeral streams within the West Chocolate Mountains REEA. The USACE would restrict from development all jurisdictional waters from high water mark to high water mark and impose strict conditions on the use of any lands within (such as road crossings). All washes identified by the USGS National Hydrography Dataset within the West Chocolate Mountains REEA would be expected to have restrictions on development and/or significant stipulations based on Jurisdictional Delineation efforts by the USACE. Jurisdictional Delineation efforts for Section 404 of the Clean Water Act (consultation with USACE) would begin prior to publication of an Notice of Intent. Preliminary Jurisdictional Determinations have been suggested by the USACE to expedite the determination process. Obtainment of a Jurisdictional Determination by the applicant will establish the USACE's jurisdiction over aquatic resources on site. Washes would be a significant issue due to USACE Section 404 permitting requirements. Avoidance of project development in wetlands and setback stipulations would be strictly enforced.

GEOTHERMAL ENERGY DEVELOPMENT

Water/Brine Injection and Water Supply

If geothermal power plants are properly designed and sited, water supply and well injection issues can be addressed. Flash geothermal power plants can satisfy up to 95 percent of their water supply needs, including cooling tower make-up water, by recycling steam condensed from produced geothermal brine (CE Obsidian Energy LLC 2009). Water-cooled binary power plants require an external source of cooling water because the brine remains within a closed-loop system until injected, according to Imperial County (County of Imperial, Department of Public Works, n.d.). The brine may include concentrated amounts of contaminants which would present problems to the cooling system and the environment. Use of dry cooling or non-potable or degraded surface or groundwater would protect potable water supplies. Dry cooling can reduce the efficiency or electrical energy output of the power plant by as much as 50 percent in hot weather.

The quality of underground sources of drinking water can be protected through careful well and casing design. Imperial County notes that contamination of groundwater aquifers could be caused by upflow through a fault or by leakage of the injected fluid behind the casing due to a poor cement bond or through a casing damaged by corrosion or mechanical causes.

Hydraulic fracturing, widely known as hydrofracking, is a well stimulation process that enhances subsurface fracture systems, to facilitate the movement of the underground energy source—in this case geothermal fluid—from rock pores to production wells. Hydraulic fluids, typically consisting of water and chemical additives, are pumped into geological formation at high pressures. Once pressure is sufficient, the hydraulic fluid, or flowback fluid, will rise to the surface. Potential impacts associated with hydrofracking include the use of high volumes of water, potentially impacting local water resources, and the discharge of hydraulic fluid containing chemical additives that may result in contamination of groundwater and surface waters. Flowback water is either discharged to surface waters, regulated under the National Pollutant Discharge Elimination System (NPDES) program, or injected into the ground, regulated by the EPA or state Underground Injection Control (UIC) program. Currently, EPA is preparing a new study to evaluate the potential impacts of hydrofracking on drinking water and public health. This purpose of the study is to address recent concerns related to hydrofracking fluid and to update the findings of an EPA study that resulted in the exemption of hydrofracking fluid from regulation under the Safe Drinking Water Act UIC program (EPA 2011). BMPs may include groundwater level and quality monitoring, as well as obtaining and complying with criterion set forth in applicable permits.

Geothermal operations may result in water loss through evaporation. Evaporative losses may vary from 5 to 33 percent (Clark 2010). Binary cycle geothermal power plants typically have lower evaporative losses (5 percent). To mitigate impacts associated with evaporative water losses, appropriate technologies, such as binary cycle, may be implemented.

Water/Brine Injection Wells

1. Begin planning for injection early in the field development stage. Prepare a preliminary injection strategy as soon as the first few exploration and production wells have been drilled and tested.
2. Use tracer testing and numerical modeling of the reservoir to develop an optimum injection strategy (disappointing production wells should not necessarily be converted to injection wells).
3. Prevent injection pressure buildup with proper chemical treatment and/or filtering of the injection fluid to prevent scaling and/or plugging of injection wells.
4. Increase the spacing between injection wells or the number of injection wells to redistribute the total amount of injection over a larger area and, thereby, correct for ground heaving.
5. Avoid locating injection wells near known active faults and do not allow injection pressure to exceed original pore pressure to avert induced seismicity.
6. Design wells with casing that run from the surface to the depth below the underground source of drinking water. A well should have two casing strings; each sealed its entire length. Test casings, cements, and other materials before selecting them for use in construction at the specific well site.
7. At shallow depths, include multiple casing strings in geothermal wells.

8. If injecting under pressure, monitor injection pressures to avoid excessive pressure and minimize likelihood of injection-induced seismic activity from increased subsurface pressure and the stresses on the injection well equipment.
9. Inject at a rate that will not cause a pressure build-up in the formation or result in reduced fluid temperature at production wells. Monitor injection rates along with pressure monitoring to assess and ensure casing integrity.
10. Design and construct cellars around the casing wellhead. Keep these cellars dry or well drained to prevent corrosion of the casing at the soil-air-water interface.
11. Monitor well integrity to prevent unintended release from within the well to the surrounding formations and interzonal migration of fluids between the casing and the formation.
12. Observe surface conditions daily for casing leaks.
13. If an injection well penetrates an underground source of drinking water, perform mechanical integrity testing periodically to detect actual and potential leaks, casing failures, and cementing problems. Perform these tests prior to initial injection, after well workovers and repairs, and on a routine schedule during normal operations.

Water Supplies Best Management Practices

The use of surface or ground water for cooling a geothermal facility must be thoroughly evaluated and impacts mitigated. This assessment may result in lengthy delays of permitting timeframes.

1. For flash-steam cycle plants minimize the use of fresh water by using geothermal fluid as the major source of cooling water. Use high-efficiency fills in cooling towers to enhance air-to-water contact.
2. For binary geothermal plants, use air-cooled condensers, only, during fall, winter and spring (October through April). During the summer season (May through September), plant electrical efficiency can be improved by using one of the following pre-cooling strategies:
    a. Direct deluge cooling of the air-cooled condenser tubes. Add a purified water rinse to wash away new forming scale when the deluge system is shut down for the winter.
    b. Spray-cooling enhancement (that is, pre-cooling with spray nozzles capable of creating micron-sized water droplets).
    c. Honey-comb, porous evaporative-cooling media (for example, Munters media). Use degraded or reclaimed water sources for geothermal-source water supplies, as much as possible. Minimize use of fresh water supplies.
3. Submittal of a Jurisdictional Determination for streams within the REEA, and submittal of a Preliminary Jurisdictional Determination form (PJD) required by the USACE to expedite the determination process. By obtaining a Jurisdictional Determination, an applicant will establish USACE jurisdictionality for on-site aquatic resources.

4. All practicable steps will be taken to avoid and minimize impacts to aquatic resources; additionally, large mainstem streams will be avoided as much as practical.

Sufficient water supply (for construction, cooling, geothermal makeup water, etc.) must be guaranteed by an applicant before the lease can be approved. The Applicant may need a Conditional Use Permit (CUP) approved by Imperial County to present to BLM before the lease would be granted. Water use would be evaluated during the NEPA process at the project level.

Proximity to Existing Plugged and Abandoned Wells

1. Given that there are existing plugged and abandoned oil and gas and geothermal wells within the REEA, all proposed drill sites should be accurately plotted on maps and cross checked with California Department of Oil, Gas and Geothermal Resources (CDOGGR) maps.
2. Operators must have a bond on file before certain well operations are undertaken.
3. Written approval from the CDOGGR supervisor will required prior to changing the physical condition of any well.
4. CDOGGR must be notified to witness or inspect all operations specified in the approval of any notice. This includes tests and inspections of blowout-prevention equipment, reservoir and freshwater protection measures, and well-plugging operations.
5. CDOGGR recommends that adequate safety measures be taken to prevent unauthorized access to equipment. Safety shut-down devices on wells and other oilfield equipment must be considered, when appropriate.
6. If any plugged and abandoned or unrecorded wells are damaged or uncovered during excavation or grading, remedial plugging operations may be required. If such damage or discovery occurs, CDOGGR's Cypress district office must be contacted to obtain information on the requirements for and approval to perform remedial operations.

C-B BMPs from the 2010 BLM Geothermal and Solar PEISs

The following BMPs will be considered at the time BLM reviews site-specific project development proposals. All relevant mitigation and BMPs will be incorporated in the analyses and those that are appropriate to prevent undue or unnecessary degradation to public lands will be approved in the respective RODs for EIS-level analyses or Decision Records for Environmental Assessment (EA) level analyses.

This appendix presents BMPs by individual resource, and is organized as follows:

C-B1: Air Quality

C-B2: Biological Resources

C-B3: Cultural and Historic Resources

C-B4: Hazardous Materials, Pesticides, and Waste Management

C-B5: Noise and Vibration

C-B6: Paleontological Resources

C-B7: Safety, Health, and Nuisances

C-B8: Soils, Drainage, Erosion, Stormwater, and Flooding

C-B9: Traffic and Transportation Roads

C-B10: Aviation

C-B11: Visual Resources

C-B12: Water Supply and Quality

C-B13: Lands and Realty

C-B14: Special Management Areas

C-B15: Rangeland

C-B16: Recreation

C-B17: Socioeconomics

C-B18: Reclamation

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C-B1: AIR QUALITY

BEST MANAGEMENT PRACTICES

COMMON TO ALL

- Dust abatement techniques should be used to minimize airborne dust and reduce air emissions. These techniques may include, but are not limited to, surfacing roads with aggregate materials, paving highly used roads, revegetating cleared areas, keeping soil moist, minimizing height of load drops, covering loads while traveling, particulate traps, oxidation catalysts, and using diesel fuel having sulfur content of 15 ppm or less.

GEOTHERMAL ENERGY DEVELOPMENT

- The operator will coordinate with the [State Air Quality Division] to develop and implement an air quality monitoring plan.
- The operator will prepare and submit to the agency an Equipment Emissions Mitigation Plan for managing diesel exhaust, An Equipment Emissions Mitigation Plan will identify actions to reduce diesel particulate, carbon monoxide, hydrocarbons, and nitrogen oxides associated with construction and drilling activities. The Equipment Emissions Mitigation Plan will require that all drilling/construction related engines are maintained and operated as follows:
    - Are tuned to the engine manufacturer's specification in accordance with an appropriate time frame.
    - Do not idle for more than five minutes (unless, in the case of certain drilling engines, it is necessary for the operating scope).
    - Are not tampered with in order to increase engine horsepower.
    - Include control devices to reduce air emissions. The determination of which equipment is suitable for control devices should be made by an independent Licensed Mechanical Engineer. Equipment suitable for control devices may include drilling equipment, work over and service rigs, mud pumps, generators, compressors, graders, bulldozers, and dump trucks.

SOLAR ENERGY DEVELOPMENT

Most solar facilities would be located in desert environments. Fugitive dust emissions from vehicle traffic on unpaved roads and/or from soil-disturbing activities would be the greatest concern with respect to air quality impacts, especially during construction. These fugitive dust emissions and other combustion-related emissions would need to be controlled through stipulations included in the ROW authorization and other permitting processes. The emissions would need to comply with applicable laws, ordinances, regulations, and standards. Many of the BMPs recommended below have been adapted from those discussed in the following

references: BrightSource Energy, Inc. (2007), Beacon Solar, LLC (2008), and Stirling Energy Systems (SES) Solar Two, LLC (2008).

A project- and location-specific Dust Abatement Plan should be prepared for all solar facilities. Water spraying, which is widely used as a dust control measure, is sometimes not cost effective, for example, in water-deprived locations. Paving also is not justifiable for low-volume traffic roads within and around a solar facility. Gravel can be used to reduce fugitive dust from roads. Another solution for controlling dust is to apply a dust suppressant, although this is not a permanent solution. Currently, a wide variety of dust suppressants are commercially available. Selection of the proper dust abatement program should be based on road conditions, environmental impacts, and long-term cost. Primary factors for road conditions include number of vehicles, number of wheels, vehicle speed, vehicle weight, particle size distribution of road surface material, degree of road compaction, and meteorological conditions (e.g., wind speed, humidity, and precipitation) (Bolander and Yamada 1999). Dust palliatives could migrate due to careless application, runoff, leaching, and resuspension of loose materials after abrasion by vehicles, adhesion to tires, and so on. Environmental concerns associated with the application of dust palliatives include potential impacts on surface water and groundwater quality, the freshwater aquatic environment, and plant communities. Potential environmental impacts on these receptors would depend on soil permeability and depth of groundwater and on the composition, persistency, and toxicity of the chemicals. Bolander and Yamada (1999) discuss in detail the types of dust palliatives, dust palliative selection and application tips, and environmental impacts.

General Multiphase Measures

- Access roads, on-site roads, and parking lots should be surfaced with aggregate with hardness sufficient to prevent vehicles from crushing the aggregate and thus causing dust or compacted soil conditions. Paving could also be used on access roads and parking lots. Alternatively, chemical dust suppressants or durable polymeric soil stabilizers should be used on these locations. The choice of dust suppression measures should consider the potential impacts on wildlife from the windborne dispersal of fugitive dust containing dust suppressants and the potential impact on future reclamation.
- All unpaved roads, disturbed areas (e.g., areas of scraping, excavation, backfilling, grading, and compacting), and loose materials generated during project activities should be watered as frequently as necessary to minimize fugitive dust generation. In water-deprived locations, water spraying should be limited to active disturbance areas only and non-water-based dust control measures should be implemented in areas with intermittent use or use that is not heavy, such as stockpiles or access roads.
- Machinery should use air emission-control devices as required by federal, state, and local regulations or ordinances.
- On-site vehicle use should be reduced to the extent feasible.
- Travel should be limited to stabilized roads.
- The main access road to the main power block and the main maintenance building area should be paved.

- Speed limits (e.g., 10 mph [16 km/h]) within the construction site should be posted with visible signs and enforced to minimize airborne fugitive dust.
- All vehicles that transport loose materials as they travel on public roads should be covered, and their loads should be sufficiently wet and kept below the freeboard of the truck.
- Workers should be trained to comply with the speed limit, use good engineering practices, minimize the drop height of materials, and minimize the number and extent of disturbed areas. The project developer should enforce these requirements.
- Wind fences should be installed around disturbed areas that could affect the area beyond the site boundaries (e.g., nearby residences).
- All soil disturbance activities and travel on unpaved roads should be suspended during periods of high winds. A critical site-specific wind speed should be established on the basis of soil properties determined during site characterization, and monitoring of the wind speed would be required at the site during construction, operation, and reclamation.
- Any stockpiles created should be kept on-site, with an upslope barrier in place to divert runoff. Stockpiles should be sprayed with water, covered with tarpaulins, and/or treated with appropriate dust suppressants, especially in preparation for high wind or storm conditions. Compatible native vegetative plantings may also be used to limit dust generation from stockpiles that will be inactive for a relatively long period. Chemical dust suppressants that emit VOCs should be avoided within or near ozone nonattainment areas.
- The idling time of diesel equipment should be limited to no more than 10 minutes unless idling must be maintained for proper operation (e.g., drilling, hoisting, and trenching).
- Potential environmental impacts from the use of dust palliatives should be minimized by taking all necessary measures to keep the chemicals out of sensitive soil and streams. In addition, the application of dust palliatives should comply with federal, state, and local laws and regulations. Dust palliatives must meet the requirements of the applicable transmission system operator (e.g., Western Area Power Administration construction standards prohibit the use of oil as a dust suppressant [Western 2008]).

Construction

- Access to the construction site and staging areas should be limited to authorized vehicles only through the designated treated roads.
- Construction should be staged to limit the exposed area at any time, whenever practical.
- Tires of all construction-related vehicles should be inspected and cleaned as necessary so they are free of dirt before they enter paved public roadways.
- Visible trackout or runoff dirt on public roadways from the construction site should be cleaned (e.g., through street vacuum sweeping).

- Topsoil from all excavations and construction activities should be salvaged and reapplied during reclamation or, where feasible, used for interim reclamation by being reapplied to construction areas not needed for facility operation as soon as activities in that area have ceased.
- Because of low winds and stable atmospheric conditions occurring in the early morning from late fall to early spring, the highest 24-hr concentrations of particulate matter during construction would be attributable to activities occurring during those hours. Thus, soil disturbance activities should be eliminated or minimized under these atmospheric conditions, particularly for construction activities occurring near facility boundaries.

- All soil-disturbing activities and travel on unpaved roads under high-wind events should be limited.

Operations

Typically, a utility-scale solar facility would have few emission sources during normal operations, as discussed in Section 5.11.1.3. However, the following BMPs are appropriate:

- All combustion sources should comply with state emission standards (e.g., best available control technology requirements).
- For portions of facilities that are maintained to be free of vegetation during operations, the dust control BMPs that were used to limit fugitive dust emissions during the construction phase should be implemented to minimize fugitive dust emissions from bare surfaces and unpaved access roads.
- Alternative fuel, electric, or latest-model-year vehicles should be used, when available, as facility service vehicles.

Decommissioning/Reclamation

Decommissioning activities are generally the reverse of construction activities, so the BMPs applied during construction should also be applied during decommissioning.

Transmission Lines and Roads

Most BMPs applied to the construction, operation, and decommissioning activities discussed above also should be implemented during the entire life of transmission lines. An additional BMP would include accessing the transmission lines from public roads and designated routes to the maximum extent possible in order to minimize fugitive dust emissions.

C-B2: BIOLOGICAL RESOURCES

BEST MANAGEMENT PRACTICES

COMMON TO ALL

- All pre-disturbance surveys should be conducted by qualified biologists following accepted protocols established by the USACE, BLM, USFWS, or other federal or state regulatory agencies, as determined appropriate by the managing agency, to identify and delineate the boundaries of important, sensitive, or unique habitats in the project vicinity including waters of the United States, wetlands, springs, seeps, ephemeral streams, intermittent streams, 100-year floodplains, ponds and other aquatic habitats, riparian habitat, remnant vegetation associations, rare or unique natural communities, and habitats supporting special status species populations.
- Projects shall be sited and designed to avoid direct and indirect impacts on important, sensitive, or unique habitats in the project vicinity, including, but not limited to, waters of the United States, wetlands (both jurisdictional and nonjurisdictional), springs, seeps, streams (ephemeral, intermittent, and perennial), 100-year floodplains, ponds and other aquatic habitats, riparian habitat, remnant vegetation associations, rare or unique biological communities, crucial wildlife habitats, and habitats supporting special status species populations (including designated and proposed critical habitat). For cases in which impacts cannot be avoided, they shall be minimized and mitigated appropriately. Project planning shall be coordinated with the appropriate federal and state resource management agencies.
- If trucks and construction equipment are arriving from locations with known invasive vegetation problems, a controlled inspection and cleaning area will be established to visually inspect construction equipment arriving at the project area and to remove and collect seeds that may be adhering to tires and other equipment surfaces.
- Fill materials and road surfacing materials that originate from areas with known invasive vegetation problems will not be used.
- Revegetation, habitat restoration and weed control activities will be initiated as soon as possible after construction activities are completed.
- Use of pesticides must be approved by the agency. Pesticide use will be limited agency approved pesticides and will only be applied in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications.
- The operator shall prepare a habitat restoration plan to avoid (if possible), minimize, or mitigate negative impacts on vulnerable wildlife while maintaining or enhancing habitat values for other species. The plan will identify revegetation, soil stabilization, and erosion reduction measures that will be implemented to ensure that all temporary use areas are restored. The plan will require that restoration occur as soon as possible

after completion of activities to reduce the amount of habitat converted at any one time and to speed up the recovery to natural habitats.

- The collection, harassment, or disturbance of plants, wildlife, and their habitats (particularly special status species) should be reduced through employee and contractor education about applicable state and federal laws. In addition, the following measures should be implemented: (1) all personnel should be instructed to avoid harassment and disturbance of local plants and wildlife; (2) personnel should be made aware of the potential for wildlife interactions around facility structures; (3) food refuse and other garbage should be placed in closed containers so it is not available to scavengers; and (4) workers should be prohibited from bringing firearms and pets to project sites.

GEOTHERMAL ENERGY DEVELOPMENT

- The operator will conduct surveys for plant and animal species that are listed or proposed for listing as threatened or endangered and their habitats in areas proposed for development where these species could potentially occur, following accepted protocols and in consultation with the USFWS or NMFS, as appropriate. Particular care should be taken to avoid disturbing listed species during surveys in any designated critical habitat. The operator will monitor activities and their effects on ESA-listed species throughout the duration of the project.
- The operator will identify important, sensitive, or unique habitat and biota in the project vicinity and site and should design the project to avoid (if possible), minimize, or mitigate potential impacts on these resources. The design and siting of the facilities will follow appropriate guidance and requirements from the BLM, FS, and other resource agencies, as available and applicable.

Noxious Weeds and Pesticides

- If pesticides are used on the site, an integrated pest management plan will be developed to ensure that applications would be conducted within the framework of all Federal, State, and local laws and regulations and entail only the use of EPA-registered pesticides.

Wild Horses and Burros

- The operator will ensure employees, contractors, and site visitors avoid harassment and disturbance of wild horses and burros, especially during reproductive (e.g., breeding and birthing) seasons. In addition, any pets will be controlled to avoid harassment and disturbance of wild horses and burros.
- Observations of potential problems regarding wild horses or burros, including animal mortality, will be immediately reported to the agency.

Wildlife

- Ponds, tanks and impoundments (including but not limited to drill pits) containing liquids can present hazards to wildlife. Any liquids contaminated by substances which may be harmful due to toxicity, or fouling of the fur or feathers (detergents, oils), should be excluded from wildlife access by fencing, netting or covering at all times

when not in active use. Liquids at excessive temperature should likewise be excluded. If exclusion is not feasible, such as a large pond, a hazing program based on radar or visual detection, in conjunction with formal monitoring, should be implemented. Clean water impoundments can also present a trapping hazard if they are steep-sided or lined with smooth material. All pits, ponds and tanks should have escape ramps functional at any reasonably anticipated water level, down to almost empty. Escape ramps can take various forms depending on the configuration of the impoundment. Earthen pits may be constructed with one side sloped 3:1 or greater lined ponds can use textured material; straight-sided tanks can be fitted with expanded metal escape ladders.

- Pipelines constructed above ground due to thermal gradient induced expansion and contraction will rest on cradles above ground level, allowing small animals to pass underneath. Projects should be analyzed to ensure adequate passage for all wildlife species. The pipeline will be raised higher to allow wildlife passage where needed. Because pipeline corridors through certain habitat types can alter local predator-prey dynamics by providing predators with lines of sight and travel corridors, large projects should be analyzed to ensure there will be no significant changes to predator-prey balance.
- Underground utilities will be installed to minimize the amount of open trenches at any given time, keeping trenching and backfilling crews close together. Avoid leaving trenches open overnight. Where trenches cannot be back-filled immediately, escape ramps should be constructed at least every 100 feet.

Livestock and Grazing

- The operator will coordinate with livestock operators to minimize impacts to livestock operations.

SOLAR ENERGY DEVELOPMENT

Many BMPs are similar for the different types of ecological resources (plant communities and habitats, wildlife, aquatic resources, and special status species). Many of the BMPs are applicable for ecological resources in general. The more general measures are presented first for each phase and then by more specific measures for specific resource types.

Siting and Design

- To the extent practicable, projects should be sited on previously disturbed lands close to energy load centers to avoid and minimize impacts on remote, undisturbed lands.
- Existing access roads, utility corridors, and other infrastructure should be used to the maximum extent feasible.
- As practical, staging and parking areas should be located within the site of the utility-scale solar energy facility to minimize habitat disturbance in areas adjacent to the site.
- Appropriate agencies (e.g., the BLM, the USFWS, and state resource management agencies) should be contacted early in the planning process to identify potentially sensitive ecological resources, including but not limited to aquatic habitats, wetland habitats, unique biological communities, crucial wildlife habitats, and special status

species locations and habitats, as well as designated critical habitat, that might be present in the area proposed for a solar energy facility and associated access roads and ROWs. This coordination should be used to identify the need for and scope of pre-disturbance surveys of the project area and vicinity.

- Projects should not be sited in designated critical habitat, ACECs, or other specially designated areas that are considered necessary for special status species and habitat conservation.
- Projects should be designed to avoid, minimize, and mitigate impacts on wetlands, waters of the United States, and other special aquatic sites.
- Project facilities and activities, including associated roads and utility corridors, should not be located in or near occupied habitats of special status animal species. Buffer zones should be established, (e.g., identified in the land use plan or substantiated by best available information or science), around these areas to prevent any destructive impacts associated with project activities.
- Buffer zones should be established around sensitive habitats, and project facilities and activities should be excluded or modified within those areas (e.g., identified in the land use plan or substantiated by best available information or science).
- Habitat loss, habitat fragmentation, and resulting edge habitat due to project development should be minimized to the extent practicable. Habitat fragmentation could be reduced by consolidating facilities (e.g., access roads and utilities could share common ROWs, where feasible), reducing the number of access roads to the minimum amount required, minimizing the number of stream crossings within a particular stream or watershed, and, locating facilities in areas where habitat disturbance has already occurred. Individual project facilities should be located and designed to minimize disruption of animal movement patterns and connectivity of habitats.
- Locating solar power facilities near open water or other areas known to attract a large number of birds should be avoided.
- Plant species that would attract wildlife should not be planted along high speed or high-traffic roads.
- Tall structures should be located to avoid known flight paths of birds and bats.
- Transmission line conductors should span important or sensitive habitats within limits of standard structure design.
- If cattle guards are identified for the design for new roads, they should be wildlife friendly. To the extent practicable, improvements should be made to existing ways and trails that require cattle to pass through existing fences, fence-line gates, new gates, and standard wire gates alongside them.
- Fences should be built (as practicable) to exclude livestock and wildlife from all project facilities, including all water sites.

- Project developers should identify surface water runoff patterns at the project site and develop mitigation that prevents soil deposition and erosion throughout and downhill from the site.
- Developers should avoid the placement of facilities or roads in drainages and make necessary accommodations for the disruption of runoff.
- Any necessary stream crossings should be designed to provide instream conditions that allow for and maintain uninterrupted movement and safe passage of fish during all project periods. Section 5.9.3 presents mitigation recommendations to minimize impacts on water quality associated with stream crossings.
- Projects should avoid surface water or groundwater withdrawals that affect sensitive habitats (e.g., aquatic, wetland, and riparian habitats) and any habitats occupied by special status species. Applicants should demonstrate, through hydrologic modeling, that the withdrawals required for their project are not going to affect groundwater discharges that support special status species or their habitats.
- The capability of local surface water or groundwater supplies to provide adequate water for the operation of proposed solar facilities should be considered early in the project siting and design. Technologies that would result in large withdrawals that would affect water bodies that support special status species should not be considered.
- New roads should be designed and constructed to meet the appropriate BLM road design standards, such as those described in BLM Manual 9113 (BLM 1985), and be no larger than necessary to accommodate their intended functions (e.g., traffic volume and weight of vehicles). Roads internal to solar facility sites should be designed to minimize ground disturbance.
- Pipelines that transport hazardous liquids (e.g., oils) that will pass through aquatic or other habitats containing sensitive species should be designed with block or check valves on both sides of the waterway or habitat to minimize the amount of product that could be released as a result of leaks. Such pipelines should be constructed of double-walled pipe at river crossings.

General Multiphase Measures

General BMPs for eliminating or reducing impacts on plant communities and habitats, wildlife resources, aquatic resources, and special status species that apply to all or nearly all of the project phases include the following:

- Project developers should designate a qualified biologist who will be responsible for overseeing compliance with all BMPs related to the protection of ecological resources throughout all project phases, particularly in areas requiring avoidance or containing sensitive biological resources, such as special status species and important habitats. Additional qualified biological monitors may be required on-site during all project phases as determined by the authorizing federal agency, the USFWS, and appropriate state agencies.
- All personnel should be instructed on the identification and protection of ecological resources (especially for special status species), including knowledge of BMPs required

by federal, state, and local agencies. Workers must be aware that only qualified biologists are permitted to handle listed species according to specialized protocols approved by the USFWS. Workers should not approach wildlife for photographs or feed wildlife.

- Projects should maintain native vegetation cover and soils to the extent possible and minimize grading to reduce flooding, maintain natural infiltration rates, maintain wildlife habitat, maintain soil health, and reduce erosion potential. All short (i.e., less than 7-in. [18-cm] tall) native vegetation should be retained to the maximum extent possible. Blading within the project site should be minimized to the maximum extent possible. Where necessary and feasible, shrub cover may be mowed and/or raked to smooth out the surface. Retention of native root structure and seeds within the project area would help retain soil stability, minimize soil erosion, and minimize fugitive dust pollution. Retention of native seed and roots within the project site will also facilitate recovery of vegetative cover. Use of native plant species will minimize the need to water the vegetation because native species are already adapted to the local climate and moisture regime of the area.
- Plants, wildlife, and their habitats should be protected from fugitive dust. See Section 5.11.3 for recommended dust abatement practices.
- Activities should be timed to avoid, minimize, or mitigate impacts on wildlife. For example, crucial winter ranges for elk, deer, pronghorn, and other species should be avoided especially during their periods of use. If activities are planned during bird breeding seasons, a nesting bird survey should be conducted first. If active nests are detected, the nest area should be flagged, and no activity should take place near the nest (at a distance determined in coordination with the USFWS) until nesting is completed (i.e., nestlings have fledged or the nest has failed) or until appropriate agencies agree that construction can proceed with the incorporation of agreed-upon monitoring measures. The timing of activities should be coordinated with the authorizing federal agency, USFWS, and appropriate state agencies.
- Noise reduction devices (e.g., mufflers) should be employed to minimize the impacts on wildlife and special status species populations. Explosives should be used only within specified times and at specified distances from sensitive wildlife or surface waters as established by the managing agency or other federal and state agencies. Operators should ensure that all equipment is adequately muffled and maintained in order to minimize disturbance to wildlife.
- BMPs for hazardous materials and waste management regarding refueling, equipment maintenance, and spill prevention and response should be applied to reduce the potential for impacts on ecological resources.
- Low-water crossings (fords) should be used only as a last resort and then during the driest time of the year. Rocked approaches to fords should be used. The pre-existing

stream channel, including bed and banks, should be restored after the need for a low-water ford has passed.

- The number of areas where wildlife could hide or be trapped (e.g., open sheds, pits, uncovered basins, and laydown areas) should be minimized. For example, an uncovered pipe that has been placed in a trench should be capped at the end of each workday to prevent animals from entering the pipe. If a special status species is discovered inside a component, that component must not be moved or, if necessary, moved only to remove the animal from the path of activity, until the animal has escaped.
- During all project phases, buffer zones should be established around sensitive habitats, and project facilities and activities should be excluded or modified within those areas, to the extent practicable.
- Project activities should not be located in or near occupied habitats of special status animal species. Buffer zones should be established around these areas (e.g., identified in the land use plan or substantiated by best available information or science), to prevent any destructive impacts associated with project activities.
- If any federally listed threatened and endangered species are found during any phase of the project, the USFWS should be consulted as required by Section 7 of the ESA, and an appropriate course of action should be determined to avoid or mitigate impacts.
- Access roads should be appropriately constructed, improved, maintained, and provided with signs to minimize potential wildlife/vehicle collisions and facilitate wildlife movement through the project area.
- Project vehicle speeds should be limited in areas occupied by special status animal species. Appropriate speed limits should be determined through coordination with federal and state resource management agencies. Traffic should stop to allow wildlife to cross roads. Shuttle vans or carpooling should be used where feasible to reduce the amount of traffic on access roads.
- Unless authorized, personnel should not attempt to move live, injured, or dead wildlife off roads, ROWs, or the project site. Honking horns, revving engines, yelling, and excessive speed are inappropriate and considered a form of harassment. If traffic is being unreasonably delayed by wildlife in roads, personnel should contact the project biologist and security, who will take any necessary action.
- Road closures or other travel modifications (e.g., lower speed limits, no foot travel) should be considered during crucial periods (e.g., extreme winter conditions, calving/fawning seasons). Personnel should be advised to minimize stopping and exiting their vehicles in the winter ranges of large game while there is snow on the ground.
- Any vehicle-wildlife collisions should be immediately reported to security. Observations of potential wildlife problems, including wildlife mortality, should be immediately reported to the BLM or other appropriate agency authorized officer. Procedures for removal of wildlife carcasses on-site and along access roads should be

addressed in the Nuisance Animal and Pest Control Plan, to avoid vehicle-related mortality of carrion-eaters.

- A Nuisance Animal and Pest Control Plan should be developed that identifies management practices to minimize increases in nuisance animals and pests in the project area, particularly those individuals and species that would affect human health and safety or that would have the potential to adversely affect native plants and animals. The plan would identify nuisance and pest species that are likely to occur in the area, risks associated with these species, species specific control measures, and monitoring requirements.
- An Integrated Vegetation Management Plan should be developed that is consistent with applicable regulations and agency policies for the control of noxious weeds and invasive plant species. The plan should address monitoring; ROW vegetation management; the use of certified weed-free seed and mulching; the cleaning of vehicles to avoid introducing invasive weeds; and the education of personnel on weed identification, the manner in which weeds spread, and the methods for treating infestations. For transmission line ROWs, the plan should be consistent with the existing vegetation management plan for that ROW. Principles of integrated pest management, including biological controls, should be used to prevent the spread of invasive species, per the Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States, and the National Invasive Species Management Plan, 2009. The plan should cover periodic monitoring, reporting, and immediate eradication of noxious weed or invasive species occurring within all managed areas. A controlled inspection and cleaning area should be established to visually inspect construction equipment arriving at the project area and to remove and collect seeds that may be adhering to tires and other equipment surfaces. To prevent the spread of invasive species, project developers should work with the local BLM field office to determine whether a pre-activity survey is warranted and, if so, to conduct the survey. If invasive plant species are present, project developers should work with the local BLM field office to develop a control strategy. The plan should include a post construction monitoring element that incorporates adaptive management protocols.
- Where revegetation and restoration are used as tools to mitigate or rehabilitate project impacts following construction and/or decommissioning, the project developer should assist in ongoing BLM efforts to procure and develop locally and regionally appropriate native plant materials. Where conditions permit, the developer could collect and voucher seeds from native plant species identified on BLM target lists for regional native plant material development following the BLM Seeds of Success Protocol as described in BLM's Integrated Vegetation Management Handbook (BLM 2008e). On the basis of the expected need for native plant materials, the project developer could contribute funding to support the BLM Native Plant Materials Development Program. The suggested funding rate is $100.00 USD per acre for each acre on which restoration

or revegetation will be used to mitigate project impacts and for each acre expected to be rehabilitated following site decommissioning.

- To reduce the risk of non-native and nuisance aquatic species introductions, equipment used in surface water should be decontaminated as appropriate especially equipment used to convey water (i.e., pumps).
- Herbicide use should be limited to nonpersistent, immobile substances. Only herbicides with low toxicity to wildlife and nontarget native plant species should be used, as determined in consultation with the USFWS. The typical herbicide application rate rather than the maximum application rate should be used where effective. All herbicides should be applied in a manner consistent with their label requirements and in accordance with guidance provided in the Final PEIS on vegetation treatments using herbicides (BLM 2007). No herbicides should be used near or in surface water, streams (including ephemeral, intermittent, or perennial), riparian areas, or wetlands. Setback distances should be determined through coordination with federal and state resource management agencies. Before herbicide treatments are begun, a qualified biologist should conduct bird nest surveys and special status species surveys to identify the special measures or BMPs necessary to avoid and minimize impacts on migratory birds and special status species.
- An Ecological Resources Mitigation and Monitoring Plan should be developed to avoid (if possible), minimize, or mitigate adverse impacts on important ecological resources. The plan should include but not necessarily be limited to the following element, where applicable:
    - Revegetation, soil stabilization, and erosion reduction measures that should be implemented to ensure that all temporary use areas are restored. The plan should require that restoration occur as soon as possible after activities are completed in order to reduce the amount of habitat converted at any one time and to speed up the recovery to natural habitats.
    - Mitigation and monitoring unavoidable impacts on waters of the United States, including wetlands.
    - Compensatory mitigation and monitoring to address any significant direct, indirect, and cumulative impacts on and loss of habitat for special status plant and animal species.
    - Demonstration of compliance of the project with the regulatory requirements of the Bald and Golden Eagle Protection Act. The plan should be developed in coordination with the USFWS.
    - Measures to protect birds (including migratory species protected under the Migratory Bird Treaty Act) developed in coordination with the appropriate federal and state agencies (e.g., BLM, USFWS, and state resource management agencies).

    - Measures to protect raptors developed in coordination with the appropriate federal and state agencies (e.g., BLM, USFWS, and state resource management agencies).
    - Measures to protect bats developed in coordination with the appropriate federal and state agencies (e.g., BLM, USFWS, and state resource management agencies).
    - Measures to mitigate and monitor impacts on special status species developed in coordination with the appropriate federal and state agencies (e.g., BLM, USFWS, and state resource management agencies).
    - Monitoring the potential for increase in predation of special status species (e.g., desert tortoise, Utah prairie dog, and greater sage-grouse) from ravens and other species that are attracted to developed areas and opportunistically use tall structures to spot vulnerable prey. Raven and other predator monitoring should also be addressed in the Nuisance Animal and Pest Control Plan.
    - Clearing and translocation of special status species, including the steps to implement the translocation as well as the follow-up monitoring of populations in the receptor locations, as determined in coordination with the appropriate federal and state agencies. The need for a Special Status Species Clearance and Translocation Plan should be determined on a project-specific basis.
- At the project level, recommendations contained in the Interim Golden Eagle Technical Guidance: Inventory and Monitoring Protocol; and Other Recommendations in Support of Golden Eagle Management and Permit Issuance (Pagel et al. 2010) should be considered in project planning, as appropriate. In addition, Instruction Memorandum No. 2010-156, Bald and Golden Eagle Protection Act—Golden Eagle National Environmental Policy Act and Avian Protection Plan Guidance for Renewable Energy (BLM 2010b) should be adhered to until programmatic permits from the USFWS are available. The analysis of potential impacts on and mitigation for golden eagles should be made in coordination with the USFWS, and the initiation of interagency coordination on golden eagle issues should occur early in the planning process.
- Take of golden eagles and other raptors should be avoided. Mitigation regarding the golden eagle should be developed in consultation with the USFWS and appropriate state natural resource agencies. A permit may be required under the Bald and Golden Eagle Protection Act.
- A Water Resources Monitoring and Mitigation Plan should be developed for each project. Changes in surface water or groundwater quality (e.g., chemical contamination, increased salinity, increased temperature, decreased dissolved oxygen, and increased sediment loads) or flow that result in the alteration of terrestrial plant communities or communities in wetlands, springs, seeps, intermittent streams, perennial streams, and riparian areas (including the alterations of cover and community structure, species composition, and diversity) off the project site should be avoided to the extent

practicable. A monitoring plan should be developed that determines the effects of groundwater withdrawals on plant communities. See Section 5.9.3 for measures applicable to protecting water quality.

- Ecological monitoring programs should provide for monitoring during all project phases, including periods prior to construction (to establish baseline conditions) and during construction, operations, and decommissioning.
- The monitoring program requirements, including adaptive strategies, should be established at the project level to ensure that potential adverse impacts are mitigated. Monitoring programs should consider the monitoring requirements for each ecological resource present at the project site, establish metrics against which monitoring observations can be measured, identify potential BMPs, and establish protocols for incorporating monitoring observations and additional BMPs into standard operating procedures and BMPs.
- A Spill Prevention and Emergency Response Plan should be developed that considers sensitive ecological resources. Spills of any toxic substances should be promptly addressed and cleaned up before they can enter aquatic or other sensitive habitats as a result of runoff or leaching. Section 5.9.3 also discusses the need for a Spill Prevention and Emergency Response Plan.
- A Fire Management and Protection Plan should be developed to implement measures that minimize the potential for a human-caused fire to affect ecological resources and that respond to natural fire situations.
- A Trash Abatement Plan should be developed that focuses on containing trash and food in closed and secured containers and removing them periodically to reduce their attractiveness to opportunistic species, such as common ravens, coyotes, and feral dogs that could serve as predators on native wildlife and special status animals.
- Prior to any ground-disturbing activity, seasonally appropriate walkthroughs should be conducted by a qualified biologist or team of biologists to ensure that important or sensitive species or habitats are not present in or near project areas. Attendees at the walkthrough should include appropriate federal agency representatives, state natural resource agencies, and construction contractors, as appropriate. Habitats or locations to be avoided (with appropriately sized buffers) should be clearly marked.
- If it is determined through coordination with the appropriate federal and state agencies (e.g., BLM, USFWS, and state resource management agencies) that it is necessary to translocate plant and wildlife species from project areas, developers should ensure that qualified biologists conduct pre- and post-translocation surveys for target species (especially if the target species are special status species) and release individuals to protected off-site locations as approved by the federal and state agencies. The biologists should coordinate with appropriate agencies the safe handling and transport of any special status species encountered.

- In accordance with adaptive management strategies, new BLM Instruction Memorandums (IMs) addressing wildlife and plants issues should be incorporated as appropriate.

Site Characterization

Site characterization activities would generally result in only minimal impacts on ecological resources. The amount and extent of necessary pre-project survey data would be determined, in part, on the basis of the environmental setting of the proposed project location. Potentially applicable BMPs include the following:

- Vehicles and site workers should avoid entering aquatic habitats such as streams and springs during site characterization activities until surveys by qualified biologists have evaluated the potential for unique flora and fauna to be present.
- Meteorological towers and solar sensors should be located to avoid sensitive habitats or areas where wildlife (e.g., sage-grouse) are known to be sensitive to human activities; applicable land use plans or best available information and science shall be referred to in order to determine avoidance distances. Installation of these components should be scheduled to avoid disrupting wildlife reproductive activities or migratory or other important behaviors. Guy wires on meteorological towers should be avoided whenever possible. If guy wires are necessary, permanent markers (bird flight diverters) should be attached to them to increase their visibility.
- Meteorological towers, soil borings, wells, and travel routes should be located to avoid important, sensitive, or unique habitats including but not limited to wetlands, springs, seeps, ephemeral streams, intermittent streams, 100-year floodplains, ponds and other aquatic habitats, riparian habitat, remnant vegetation associations, rare natural communities, and habitats supporting special status species populations, as identified in applicable land use plans or best available information and science.

Construction

Implementation of BMPs during the construction phase may eliminate or reduce the potential for direct or indirect impacts on ecological resources. Potentially applicable BMPs for ecological resources during the construction phase of a solar energy project include the following:

- Prior to construction of the facility, environmental training should be provided to contractor personnel whose activities or responsibilities could affect the environment during construction. An environmental compliance officer and other inspectors, the contractor's construction field supervisor(s), and all construction personnel should be expected to play an important role in maintaining strict compliance with all permit conditions in order to protect wildlife and their habitats to the extent practicable during construction.
- Prior to construction, all areas to be disturbed should be surveyed by qualified biologists using approved survey techniques or established species-specific survey protocols to determine the presence of special status species in the project area.
- If possible, on-site construction access routes should be rolled and compacted to allow trucks and equipment to access construction locations. Following construction,

disturbed areas should be lightly raked and/or ripped and reseeded with seeds from low-stature plant species collected from the immediate vicinity.

- To the extent practicable, vegetation clearing, grading, and other construction activities should occur outside of the bird breeding season. If activities are planned for the breeding season, a survey of nesting birds should be conducted first. If active nests are not detected, construction activities may be conducted. If active nests are detected, the nest area should be flagged, and no activity should take place near the nest (at a distance coordinated with the USFWS) until nesting is completed (i.e., nestlings have fledged or the nest has failed) or until appropriate agencies agree that construction can proceed with the incorporation of agreed-upon monitoring measures. If active nests are not detected, appropriate agencies should be consulted to confirm that construction may proceed.
- Explosives should be used only within specified times and at specified distances from sensitive wildlife or surface waters, as established by the managing agency, or other federal and state agencies. The occurrence of flyrock from blasting should be limited by using blasting mats.
- The extent of habitat disturbance during construction should be reduced by keeping vehicles on access roads and minimizing foot and vehicle traffic through undisturbed areas.
- Temporary or project-created access roads should be closed to unauthorized vehicle use, where appropriate.
- Where a pipeline trench may drain a wetland, trench breakers should be constructed and/or the trench bottom should be sealed to maintain the original wetland hydrology.
- Because open trenches could impede the seasonal movements of large game animals and alter their distribution, they should be backfilled as quickly as is possible. Open trenches could also entrap smaller animals; therefore, escape ramps should be installed at regular intervals along open-trench segments at distances identified in the applicable land use plan or best available information and science.
- An appropriate number of qualified biological monitors (as determined by the federal authorizing agency and the USFWS) should be on-site during initial site preparation and during the construction period to monitor, capture, and relocate animals that could be harmed and are unable to leave the site on their own.
- When possible, any reptile or amphibian species found in harm's way should be relocated away from the activity.
- Construction debris, especially treated wood, should not be stored or disposed of in areas where it could come in contact with aquatic habitats.
- As directed by the local BLM field office, Joshua trees (*Yucca brevifolia*), other Yucca species, and most cactus species, shall be salvaged prior to land clearing, and they shall be transplanted, held for use to revegetate temporarily disturbed areas, or otherwise protected as prescribed by state or local BLM requirements.
- Project-specific Integrated Vegetation Management Plans shall investigate the possibility of revegetating parts of the solar array area. Where revegetation is accomplished, fire breaks are required, such that the vegetated areas would not result in increased fire hazard.

Operations

BMPs that limit periodic or continued impacts from operations of a solar energy facility include the following:

- Areas left in a natural condition during construction (e.g., wildlife crossings) should be maintained in as natural a condition as possible within safety and operational constraints.
- To minimize habitat loss and fragmentation, as much habitat as possible should be re-established after construction is complete by maximizing the area reclaimed during solar energy operations.
- Lighting should be designed to provide the minimum illumination needed to achieve safety and security objectives. It should be shielded and orientated to focus illumination on the desired areas and to minimize or eliminate lighting of off-site areas or the sky. All unnecessary lighting should be turned off at night to limit attracting migratory birds or special status species.
- To minimize the potential for bird strikes, applicants should use audio visual warning system (AVWS) technology for any structures exceeding 200 ft. (60 m) in height. If the FAA denies a permit for use of AVWSs, applicants should coordinate with the USFWS and appropriate state natural resource agencies to identify lighting that meets the minimum FAA safety requirements, and minimizes the possibility of bird strikes.
- Evaporation ponds should be fenced and netted, where feasible, to prevent use by wildlife. Open water sources in the desert provide subsidies to ravens and other predators that feed on special status species (e.g., desert tortoise). In addition, these water sources may have elevated levels of harmful contaminants (e.g., TDS and selenium) and could attract wildlife into an industrialized area where they are more likely to be killed. The lower 18 in. (46 cm) of the fencing should be a solid barrier that would exclude entrance by amphibians and other small animals.
- In order to prevent the effects of the West Nile virus on wildlife, a mosquito abatement program should be implemented for all evaporation ponds or other standing bodies of water that have the potential to support mosquito reproduction.
- Appropriate fish screens should be installed on cooling water intakes to limit the potential for impingement impacts on organisms in surface water sources used for cooling water. Intake designs should minimize the potential for aquatic organisms from surface waters to be entrained in cooling water systems.

Decommissioning/Reclamation

BMPs to protect ecological resources during and following decommissioning and reclamation include the following:

- A Decommissioning and Site Reclamation Plan that is specific to the project should be developed, approved by the BLM, and implemented and should include the following elements:
    - The plan should contain an adaptive management component that allows for the incorporation of lessons learned from monitoring data.

- The plan should require that land surfaces be returned to pre-development contours to the greatest extent feasible immediately following decommissioning.
- The plan should be designed to expedite the re-establishment of vegetation and require restoration to be completed as soon as practicable.
- To ensure rapid and successful re-establishment efforts, the plan should specify site-specific measurable success criteria, including target dates, which should be developed in coordination with the BLM and be required to be met by the operator.
- Vegetation re-establishment efforts should continue until all success criteria have been met.
- Bonding to cover the full cost of vegetation re-establishment should be required.
- Species used for re-establishing vegetation should consist of native species that are dominant within the plant communities in adjacent areas that have similar soil conditions.
- The plan should require the use of weed-free seed mixes of native shrubs, grasses, and forbs of local sources where available. When available, seeds of known origin, as labeled by state seed certification programs, should be used. Local native genotypes should be used. If cultivars of native species are used, certified seed (i.e., blue tag) should be used. "Source identified" seeds (i.e., yellow tag) should be used when native seeds are collected from wildland sites.
- The cover, species composition, and diversity of the re-established plant community should be similar to those present on-site prior to project development and in the vicinity of the site. Baseline data should be collected in each project area prior to its development as a benchmark for measuring the success of reclamation efforts. In areas where suitable native species are unavailable, other plant species approved by the BLM could be used. If non-native plants are necessary, they should be noninvasive, noncompetitive, and ideally, be short-lived, have low reproductive capabilities, or be self-pollinating to prevent gene flow into the native community. The non-native plants that are used should not exchange genetic material with common native plant species.
- The plan should be developed in coordination with appropriate federal and state agencies.

- Access roads should be reclaimed when they are no longer needed. However, seasonal restrictions (e.g., nest and brood rearing) should be considered, as appropriate (e.g., identified in the land use plan or substantiated by best available information or science).
- All holes and ruts created by the removal of structures and access roads should be filled or graded.
- While structures are being dismantled, care should be taken to avoid leaving debris on the ground in areas where wildlife regularly move.
- Post-decommissioning protocols should include monitoring for the recovery of native vegetation, colonization and spread of invasive species; use by wildlife; and use by special status species. Monitoring data should be used to determine the success of reclamation activities and the need for changes in ongoing management or for additional reclamation measures. Ongoing visual inspections for a minimum of 5 years following decommissioning activities should be required to ensure that there is

adequate restoration and minimal environmental degradation. This period should be extended until satisfactory results are obtained.

- The facility fence should remain in place for several years to help reclamation (e.g., the fence would preclude large mammals and vehicles from disturbing revegetation efforts). Shorter times for maintaining fencing may be appropriate in cases where the likelihood of disturbance by cattle and wildlife is low. In some cases, it may be appropriate to replace the original exclusion fence with a new fence that excludes cattle and vehicles but allows for use by pronghorn and large-game wildlife. This secondary fencing shall remain in place until the revegetation efforts meet success criteria.
- The placement of transmission towers within aquatic and wetland habitats should be avoided whenever feasible. If towers must be placed within these habitats, they should not impede flows or fish passage.
- If transmission lines are located near aquatic habitats or riparian areas (e.g., minimum buffers identified in the applicable land use plan or best available science and information), vegetation maintenance should be limited and performed mechanically rather than with herbicides. Cutting in wetlands or stream and wetland buffers should be done by hand or by feller-bunchers. Tree cutting in stream buffers should target only trees able to grow into a transmission line conductor clearance zone within 3 to 4 years. Cutting in such areas for construction or vegetation management should be minimized, and the disturbance of soil and remaining vegetation should be minimized.
- Habitat disturbance should be minimized by considering the use of helicopters for construction, to lessen the need for access roads, and by locating transmission facilities in previously disturbed areas. Existing utility corridors and other support structures should be used to the maximum extent feasible.
- The establishment and spread of invasive species and noxious weeds within the ROW and in associated areas where there is ground surface disturbance or vegetation cutting should be prevented. The area should be monitored regularly, and invasive species should be eradicated immediately.
- If needed, temporary access roads should be developed primarily by the removal of woody vegetation, although temporary timber mats should be used in areas of wet soils. Wide-tracked or balloon-tired equipment, timber corduroy, or timber mat work areas should be used on wet soils where wetland or stream crossings are unavoidable and where crossing on frozen ground is not possible in winter. Areas rutted by equipment should be immediately regraded and revegetated. Towers should be installed by airlift helicopters, where necessary, to avoid extensive crossing of wetlands or highly sensitive areas (such as those identified as rare natural habitats).
- ROW development and construction activities should adhere to locally established wildlife and/or habitat protection provisions. Exceptions or modifications to spatial buffers or timing limitations should be evaluated on a site-specific/species-specific basis in coordination with the local federal administrator and state wildlife agency.
- Restrictions on timing or duration may be required to minimize impacts on nesting birds (especially neotropical migrants and listed species), and should be developed in coordination with the USFWS.
- To the extent practicable, work personnel should stay within the ROW and/or easements.

- Removal of raptor nests should take place only if the birds are not actively using the nest, particularly during the nesting and brood-rearing period. Nests should be relocated to nesting platforms, when possible; otherwise, they must be destroyed when removed. An annual report on all nests moved or destroyed should be provided to the appropriate federal and/or state agencies. Coordination with the USFWS should occur in the event that a raptor nest is located on a transmission line support structure. Removal or relocation of a golden eagle or bald eagle nest (even an inactive nest) requires a permit from the USFWS.
- Raven nests should be removed from transmission towers to reduce predation pressure on sensitive species such as the desert tortoise, greater sage-grouse, and Utah prairie dog. Raven nests can be removed only when inactive (i.e., no eggs or young), if removal is otherwise necessary, a Migratory Bird Treaty Act take permit from the USFWS is required. The removal of raven nests should be addressed in the Nuisance Animal and Pest Control Plan.
- Current guidelines and methodologies (e.g., APLIC and USFWS 2005; APLIC 2006) would be used in the design and analysis of the proposed transmission facilities in order to minimize the potential for raptors and other birds to be electrocuted by them or collide with them.
- Transmission line support structures and other facility structures should be designed to discourage their use by raptors for perching or nesting (e.g., by use of anti-perching devices). This design would also reduce the potential for increased predation of special status species such as the desert tortoise, sage grouse, and Utah prairie dog. Mechanisms to visually warn birds (permanent markers or bird flight diverters) should be placed on transmission lines at regular intervals to prevent birds from colliding with the lines.
- To the extent practicable, the use of guy wires should be avoided because these pose a collision hazard for birds and bats. Guy wires should be clearly marked with bird flight diverters to reduce the probability of collision.
- Shield wires should be marked with devices that have been scientifically tested and found to significantly reduce bird collision potential.
- Any mortality of important bird species (e.g., raptors) that is associated with power lines should be monitored and reported to the managing agency and the USFWS, and measures should be taken to prevent future mortality.

Transmission Lines and Roads

Many of the BMPs presented above could also reduce, minimize, or avoid impacts on ecological resources from the construction and operation of transmission lines. In addition, the following BMPs are specifically applicable to protecting ecological resources from transmission lines construction, operation, and maintenance:

- The placement of transmission towers within aquatic and wetland habitats should be avoided whenever feasible. If towers must be placed within these habitats, they should not impede flows or fish passage.
- If transmission lines are located near aquatic habitats or riparian areas (e.g., minimum buffers identified in the applicable land use plan or best available science and information), vegetation maintenance should be limited and performed mechanically

rather than with herbicides. Cutting in wetlands or stream and wetland buffers should be done by hand or by feller-bunchers. Tree cutting in stream buffers should target only trees able to grow into a transmission line conductor clearance zone within 3 to 4 years. Cutting in such areas for construction or vegetation management should be minimized, and the disturbance of soil and remaining vegetation should be minimized.

- Habitat disturbance should be minimized by considering the use of helicopters for construction, to lessen the need for access roads, and by locating transmission facilities in previously disturbed areas. Existing utility corridors and other support structures should be used to the maximum extent feasible.
- The establishment and spread of invasive species and noxious weeds within the ROW and in associated areas where there is ground surface disturbance or vegetation cutting should be prevented. The area should be monitored regularly, and invasive species should be eradicated immediately.
- If needed, temporary access roads should be developed primarily by the removal of woody vegetation, although temporary timber mats should be used in areas of wet soils. Wide-tracked or balloon-tired equipment, timber corduroy, or timber mat work areas should be used on wet soils where wetland or stream crossings are unavoidable and where crossing on frozen ground is not possible in winter. Areas rutted by equipment should be immediately regraded and revegetated. Towers should be installed by airlift helicopters, where necessary, to avoid extensive crossing of wetlands or highly sensitive areas (such as those identified as rare natural habitats).
- ROW development and construction activities should adhere to locally established wildlife and/or habitat protection provisions. Exceptions or modifications to spatial buffers or timing limitations should be evaluated on a site-specific/species-specific basis in coordination with the local federal administrator and state wildlife agency.
- Restrictions on timing or duration may be required to minimize impacts on nesting birds (especially neotropical migrants and listed species), and should be developed in coordination with the USFWS.
- To the extent practicable, work personnel should stay within the ROW and/or easements.
- Removal of raptor nests should take place only if the birds are not actively using the nest, particularly during the nesting and brood-rearing period. Nests should be relocated to nesting platforms, when possible; otherwise, they must be destroyed when removed. An annual report on all nests moved or destroyed should be provided to the appropriate federal and/or state agencies. Coordination with the USFWS should occur in the event that a raptor nest is located on a transmission line support structure. Removal or relocation of a golden eagle or bald eagle nest (even an inactive nest) requires a permit from the USFWS.
- Raven nests should be removed from transmission towers to reduce predation pressure on sensitive species such as the desert tortoise, greater sage-grouse, and Utah prairie dog. Raven nests can be removed only when inactive (i.e., no eggs or young), if removal is otherwise necessary, a Migratory Bird Treaty Act take permit from the

USFWS is required. The removal of raven nests should be addressed in the Nuisance Animal and Pest Control Plan.

- Current guidelines and methodologies (e.g., APLIC and USFWS 2005; APLIC 2006) would be used in the design and analysis of the proposed transmission facilities in order to minimize the potential for raptors and other birds to be electrocuted by them or collide with them.
- Transmission line support structures and other facility structures should be designed to discourage their use by raptors for perching or nesting (e.g., by use of anti-perching devices). This design would also reduce the potential for increased predation of special status species such as the desert tortoise, sage grouse, and Utah prairie dog. Mechanisms to visually warn birds (permanent markers or bird flight diverters) should be placed on transmission lines at regular intervals to prevent birds from colliding with the lines.
- To the extent practicable, the use of guy wires should be avoided because these pose a collision hazard for birds and bats. Guy wires should be clearly marked with bird flight diverters to reduce the probability of collision.
- Shield wires should be marked with devices that have been scientifically tested and found to significantly reduce bird collision potential.
- Any mortality of important bird species (e.g., raptors) that is associated with power lines should be monitored and reported to the managing agency and the USFWS, and measures should be taken to prevent future mortality.

C-B3: CULTURAL AND HISTORIC RESOURCES

BEST MANAGEMENT PRACTICES

COMMON TO ALL

- Project developers should conduct a records search of published and unpublished literature for past cultural resource finds in the area; coordinate with researchers working locally in the area, and, depending on the extent of existing information, develop a survey design in coordination with the managing agency and SHPO, and complete a Class III cultural resources inventory. The inventory should be conducted according to the standards set forth in the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 FR 44716), BLM Handbook H-8110: Guidelines for Identifying Cultural Resources (BLM 2002), and revised BLM Manual 8110 (BLM 2004). All inventory data should be provided to the managing agency in digitized format that meets applicable accuracy standards, including shape files for surveyed areas.
- Consult with Native American governments early in the planning process to identify issues and areas of concern regarding the proposed renewable energy development. Aside from the fact that consultation is required under the NHPA, consultation is necessary to establish whether the project is likely to disturb traditional cultural properties, affect access rights to particular locations, disrupt traditional cultural practices, and/or visually impact areas important to the Tribe(s). Under the conditions of the nationwide BLM PA, the state BLM offices should already have established a relationship with local Tribal governments. A list of the federally recognized Tribes for the 11-state region is available in Chapter 7.
- If cultural resources are present at the site, or if areas with a high potential to contain cultural material have been identified, a CRMP should be developed. This plan should address mitigation activities to be implemented for cultural resources found at the site. Avoidance of the area is always the preferred mitigation option. Other mitigation options include archaeological survey and excavation (as warranted) and monitoring. If an area exhibits a high potential, but no artifacts are observed during an archaeological survey, monitoring by a qualified archaeologist could be required during all excavation and earthmoving in the high-potential area. A report should be prepared documenting these activities. The CRMP also should (1) establish a monitoring program, (2) identify measures to prevent potential looting/vandalism or erosion impacts, and (3) address the education of workers and the public to make them aware of the consequences of unauthorized collection of artifacts and destruction of property on public land.
- If significant or NRHP-eligible cultural resources are present at the site and would be adversely affected or if areas with a high potential to contain additional cultural material have been identified, a formalized agreement should be required to address management and mitigation options in the form of various planning documents (such as a monitoring and mitigation plan, data recovery plan, historic treatment plan, etc.). The

agreement should be developed in consultation with the SHPO, appropriate federally recognized Tribes, and any consulting parties. The agreement also should identify measures to prevent potential looting/vandalism or erosion impacts and address the education of workers and the public to make them aware of the consequences of unauthorized collection of cultural resources on public land.

- Unexpected discovery of cultural or paleontological resources during construction will be brought to the attention of the responsible BLM authorized officer immediately. Work will be halted in the vicinity of the find to avoid further disturbance to the resources while they are being evaluated and appropriate BMPs are being developed.

GEOTHERMAL ENERGY DEVELOPMENT

- Before any specific permits are issued under leases, treatment of cultural resources will follow the procedures established by the Advisory Council on Historic Preservation for compliance with Section 106 of the National Historic Preservation Act. A pedestrian inventory will be undertaken of all portions that have not been previously surveyed or are identified by BLM as requiring inventory to identify properties that are eligible for the NRHP. Those sites not already evaluated for NRHP eligibility will be evaluated based on surface remains, subsurface testing, archival, and/or ethnographic sources. Subsurface testing will be kept to a minimum whenever possible if sufficient information is available to evaluate the site or if avoidance is an expected mitigation outcome. Recommendations regarding the eligibility of sites will be submitted to the BLM, and a treatment plan will be prepared to detail methods for avoidance of impacts or mitigation of effects. The BLM will make determinations of eligibility and effect and consult with SHPO as necessary based on each proposed lease application and project plans. The BLM may require modification to exploration or development proposals to protect such properties, or disapprove any activity that is likely to result in adverse effects that cannot be successfully avoided, minimized or mitigated. Avoidance of impacts through project design will be given priority over data recovery as the preferred BMP. Avoidance measures include moving project elements away from site locations or to areas of previous impacts, restricting travel to existing roads, and maintaining barriers and signs in areas of cultural sensitivity. Any data recovery will be preceded by approval of a detailed research design, Native American Consultation, and other requirements for BLM issuance of a permit under the Archaeological Resources Protection Act (BLM 2007a).
- Operators will determine whether paleontological resources exist in a project area on the basis of the sedimentary context of the area, a records search for past paleontological finds in the area, and/or, depending on the extent of existing information, a paleontological survey.

Solar energy development

For all potential impacts, the application of BMPs developed in consultation under Section 106 of the National Historic Preservation Act (NHPA) would avoid, reduce, or mitigate the potential for adverse impacts on significant cultural resources. Section 106 consultations between the BLM and the State Historic Preservation Officers (SHPOs), appropriate Tribes, and other consulting parties would be required. Thresholds for the involvement of and review by the Advisory Council on Historic Preservation (ACHP) include non-routine interstate and/or interagency programs; undertakings directly and adversely affecting National Historic Landmarks or National Register eligible properties of national significance; and/or highly controversial undertakings, when ACHP review is requested by the managing agency, SHPO, Indian Tribe, local government, or the applicant for a BLM authorization. Ongoing Tribal consultation, in accordance with the NHPA, would help determine areas of sensitivity, appropriate survey and mitigation needs, and other issues of concern, such as access rights or disruption of cultural practices (see Section 5.16.3), and to take those concerns into consideration during project development. The following describes the process the BLM follows to address impacts on historic properties for individual projects.

Site-specific NEPA analyses and a Section 106 review would be conducted on individual projects. The BLM would require the completion of comprehensive identification (e.g., field inventory), evaluation, protection, and resolution of adverse effects (mitigation) following the policies and procedures contained in the 1997 BLM National Programmatic Agreement (PA) (BLM 1997) and under state protocols.7 If significant cultural resources are present at the project location or if there is a high potential for the project area to contain significant cultural resources that could be adversely affected, a formalized agreement may be required to address management and mitigation options (e.g., avoidance, data recovery, monitoring, preventive measures for looting, vandalism, and erosion, and worker education) in the form of various planning documents (e.g., cultural resources monitoring and mitigation plan, cultural data recovery plan, historic properties treatment plan). The agreement should be developed in consultation with the SHPO, appropriate federally recognized Tribes, and any consulting parties. Also, the BLM would continue to implement government-to-government consultation with Tribes and state and local governments on a case-by-case basis.

The BLM does not approve any ground-disturbing activities that may affect any historic properties, sacred sites or landscapes, and/or resources protected under the NHPA; the American Indian Religious Freedom Act; the Native American Graves Protection and Repatriation Act (NAGPRA); E.O. 13007, “Indian Sacred Sites” (*Federal Register*, Volume 61, page 26771, May 24, 1996); or other statutes and E.O.s until it completes its obligations under applicable requirements of the NHPA and other authorities. The BLM may require modification to development proposals to protect such properties, or it may disapprove any activity that is likely to result in adverse effects that cannot be successfully avoided, minimized, or otherwise mitigated.

The BLM develops specific BMPs on a project-by-project basis. Avoidance of the resource is the preferred option. Data recovery is a common option for addressing adverse effects, but it does not eliminate the adverse effect. Mitigation of adverse effects can include many other options, such as monitoring and surveillance to protect sites from looting or vandalism; off-site mitigation; education and interpretive programs, including the use of volunteers; and funding of historic preservation efforts proportionate to the anticipated effects.

Several BMPs for other disciplines (soils, air quality, vegetation, hydrology) to encourage use of previously disturbed lands, prevent erosion, and require use of designated routes only to prevent off-road damage are also appropriate for protecting historic properties, but are not all repeated here (access roads and water control structures would be considered part of the area of potential effects and would require a survey). To protect sacred sites and portions of historic trails that are potentially eligible for listing on the NRHP from visual intrusion and to maintain the integrity of the historic cultural setting, the managing agency could require that surface disturbance be restricted or prohibited within the viewshed of a sacred site or within the viewshed of the trail along those portions of the trail for which eligibility is tied to the visual setting. Mitigation for the demolition of historic structures typically entails detailed architectural records and historical documentation; for the impacts on settings of historic structures, measures such as those for historic trails and sacred sites are appropriate. Ultimately, mitigation strategies would be determined during project-specific consultation.

Specific BMPs to reduce impacts on cultural resources should be required and include the following, as applicable.

Siting and Design

- The use of previously disturbed lands, rather than pristine lands, should be encouraged.
- A phased sampling strategy, beginning with a Class II inventory to assess various alternative development areas, is recommended prior to the selection of individual project locations. The Class II inventory should meet the standards set forth in the Secretary of Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 FR 44716), BLM Handbook H-8110: Guidelines for Identifying Cultural Resources (BLM 2002), and revised BLM Manual 8110 (BLM 2004a).
- To protect historic properties, sacred sites, and portions of historic trails that are eligible for listing in the NRHP from visual intrusion and to maintain the integrity of the historic cultural setting, the managing agency could require that surface disturbance be restricted or prohibited within the viewshed of a historic property, sacred site, or trail segment for which eligibility is tied to the visual setting. These types of adverse effects will be minimized, avoided, or otherwise resolved (mitigated) through the Section 106 consultation process.

Construction, Operation, and Decommissioning/Reclamation

- In cases where there is a probability of encountering cultural resources during construction that could not be fully detected during a Class III inventory, cultural field monitors (appropriate for the resource anticipated) should be employed to monitor ground disturbing activities. Development of a monitoring plan is recommended.
- The unexpected discovery of cultural resources during construction should be brought to the attention of the responsible authorized officer immediately. Work should be halted in the vicinity of the find. The area of the find should be protected to ensure that resources are not removed, handled, altered, or damaged while they are being evaluated and to ensure that appropriate BMPs are being developed.
- The use of management practices, such as training/education programs for workers and the public, should be implemented to reduce occurrences of human-related disturbances to nearby cultural sites. The specifics of these management practices should be

established in project-specific consultations between the applicant and the BLM as well as with the SHPO and Tribes, as appropriate.

NATIVE AMERICAN CONCERNS

Potentially Applicable BMPs

Government-to-government consultations among the managing agency and the directly and substantially affected Tribes is required under Executive Order 13175 *(Federal Register*, Volume 65, page 67249). In addition, Section 106 of the NHPA requires federal agencies to consult with Indian Tribes for undertakings on Tribal lands and for historic properties of significance to the Tribes that may be affected by an undertaking (CFR 36 800.2 (c)(2)). BLM Manual 8120 (BLM 2004b) and Handbook H-8120-1 (BLM 2004c) provide guidance for Native American consultations. For impacts on Native American resources, such as traditional cultural properties, that constitute historic properties under the NHPA, the application of BMPs developed in consultation under Section 106 of the NHPA would avoid, reduce, or mitigate the potential for adverse impacts. The use of management practices, such as training/education programs for workers and the public, could reduce occurrences of human related disturbances to nearby cultural sites. The specifics of these management practices should be established in project-specific consultations among the applicant and the managing agency, Tribes, and SHPOs, as appropriate. See Section 5.15.3 for additional potential BMPs for historic properties.

For those resources not considered historic properties under the NHPA, ongoing Tribal consultation would help determine other issues of concern, including but not limited to access rights, disruption of cultural practices, impacts on visual resources important to the Tribes, and impacts on subsistence resources. Ecological issues and potential BMPs are discussed in Section 5.10. Impacts on water use and quality and potential BMPs are discussed in Section 5.9. It should be noted that even when consultation and an extensive inventory or data collection occur, not all impacts on tribally sensitive resources can be fully mitigated.

Some specific BMPs are listed below (all BMPs listed in Section 5.15.3 for cultural resources would also apply to historic properties of concern to Native Americans):

- The importance of any Native American archaeological or other culturally important site identified in archaeological inventories in project areas should be determined and validated through consultation with appropriate Native American governments and cultural authorities. Appropriate mitigation steps, such as avoidance, removal, repatriation of Native American human remains and associated items of cultural patrimony, or curation, should be determined during this consultation.
- Visual intrusion on sacred areas should be avoided to the extent practical through the selection of the solar facility location and solar technology. When avoidance is not possible, timely and meaningful consultation with the affected Tribe(s) should be conducted to formulate a mutually acceptable plan to mitigate or reduce the adverse effect.
- Tribal burial sites should be avoided. A contingency plan for encountering unanticipated burials and funerary goods during construction, maintenance, or operation of a solar facility should be developed as part of a formalized agreement to address management and mitigation options for significant cultural resources (see

Section 5.15.3) in consultation with the appropriate Tribal governments and cultural authorities well in advance of any ground disturbances. The contingency plan should include consultation with the lineal descendants or Tribal affiliates of the deceased and human remains and objects of cultural patrimony should be protected and repatriated according to NAGPRA statutory procedures and regulations.

- Springs and other water sources that are or may be sacred or culturally important should be avoided whenever possible. If construction, maintenance, or operational activities must occur in proximity to springs or other water sources, appropriate measures, such as the use of geotextiles or silt fencing, should be taken to prevent silt from degrading water sources. The effectiveness of these mitigating barriers should be monitored. Measures for preventing water depletion impacts on spring flows should also be employed. Particular mitigations should be determined in consultation with the appropriate Native American Tribe(s).
- Culturally important plant species should be avoided when possible. When it is not possible to avoid these plant resources, consultations should be undertaken with the affected Tribe(s). If the species is available elsewhere on agency-managed lands, guaranteeing access may suffice. For rare or less common species, establishing (transplanting) an equal amount of the plant resource elsewhere on agency-managed land accessible to the affected Tribe may be acceptable.
- Culturally important wildlife species and their habitats should be avoided. When it is not possible to avoid these habitats, solar facilities should be designed to minimize impacts on game trails, migration routes, and nesting and breeding areas of Tribally important species. Mitigation and monitoring procedures should be developed in consultation with the affected Tribe(s).
- Archaeological sites created by ancestral Native American populations should be avoided whenever possible. However, when archaeological excavations are necessary, affiliated Tribe(s) should be consulted, and the concerns of the affected descendant Native American population taken into account when developing a data recovery strategy. Possible mitigations include scientific excavation; monitoring or participation in excavations by Tribal representatives; and repatriation or approved curation of artifacts.
- Rock art (panels of petroglyphs and/or pictographs) should be avoided whenever possible. These panels may be just one component of a larger sacred landscape, in which avoidance of all impacts may not be possible. Mitigation plans for eliminating or reducing (minimizing) potential impacts on rock art should be formulated in consultation with the appropriate Tribal cultural authorities.
- Standard noise BMPs (see Section 5.13.3) should be employed when solar facilities would be located near sacred sites to minimize the impacts of noise on culturally significant areas.
- Health and safety BMPs for the general public (see Section 5.21.3) should be employed when solar facilities are located near to Native American traditional use areas in order to minimize potential health and safety impacts to Native Americans.
    - Prior to construction, consideration should be given to training contractor personnel whose activities or responsibilities could affect resources of significance to Native Americans during construction.

- When there is a reasonable expectation of encountering previously unidentified cultural resources during construction, monitoring of construction by a qualified cultural resource specialist should be considered to minimize impacts on resources of significance to Tribes to the extent possible.

C-B4: HAZARDOUS MATERIALS, PESTICIDES, AND WASTE MANAGEMENT

BEST MANAGEMENT PRACTICES

COMMON TO ALL

- Operators will develop a hazardous materials management plan addressing storage, use, transportation, and disposal of each hazardous material anticipated to be used at the site. The plan will identify all hazardous materials that would be used, stored, or transported at the site. It will establish inspection procedures, storage requirements, storage quantity limits, inventory control, nonhazardous product substitutes, and disposition of excess materials. The plan will also identify requirements for notices to federal and local emergency response authorities and include emergency response plans.
- Operators will develop a waste management plan identifying the waste streams that are expected to be generated at the site and addressing hazardous waste determination procedures, waste storage locations, waste-specific management and disposal requirements, inspection procedures, and waste minimization procedures. This plan will address all solid and liquid wastes that may be generated at the site.
- A comprehensive Spill Prevention and Emergency Response Plan should address the possibility of accidental releases for all hazardous materials stored on site. The plan should include the following: be written, periodically updated, and made available to the entire workforce; contain procedures for timely notification of appropriate authorities, including the designated BLM land manager; provide spill/emergency contingency planning for each type of hazardous material present, including the abatement or stabilizing of the release, recovery of the spilled product, and remediation of the affected environmental media; be supported by the strategic deployment of appropriate spill response materials and equipment, including PPE for individuals with spill or emergency response assignments; provide for prompt response to spills and timely delivery of recovered spill materials and contaminated environmental media to appropriately permitted off-site treatment or disposal facilities; formally assign spill and emergency response duties to specified individuals; provide and document appropriate training to individuals with spill or emergency response assignments; provide general awareness training to remaining facility personnel; and provide for written documentation of each event, including root cause analysis, description of corrective actions taken, and characterization of the resulting environmental or health and safety impacts.

GEOTHERMAL ENERGY DEVELOPMENT

- A safety assessment will be conducted to describe potential safety issues and the means that would be taken to mitigate them, including issues such as site access, construction,

safe work practices, security, heavy equipment transportation, traffic management, emergency procedures, and fire control.

- A health and safety program will be developed to protect both workers and the general public during construction and operation of geothermal projects.
- Regarding occupational health and safety, the program will identify all applicable federal and state occupational safety standards; establish safe work practices for each task (e.g., requirements for personal protective equipment and safety harnesses; Occupational Safety and Health Administration [OSHA] standard practices for safe use of explosives and blasting agents; and measures for reducing occupational electric and magnetic fields [EMF] exposures); establish fire safety evacuation procedures; and define safety performance standards (e.g., electrical system standards and lightning protection standards). The program will include a training program to identify hazard training requirements for workers for each task and establish procedures for providing required training to all workers. Documentation of training and a mechanism for reporting serious accidents to appropriate agencies will be established.
- Regarding public health and safety, the health and safety program will establish a safety zone or setback for generators from residences and occupied buildings, roads, ROWs, and other public access areas that is sufficient to prevent accidents resulting from the operation of generators. It will identify requirements for temporary fencing around staging areas, storage yards, and excavations during construction or rehabilitation activities. It will also identify measures to be taken during the operation phase to limit public access to hazardous facilities (e.g., permanent fencing would be installed only around electrical substations, and facility access doors would be locked).
- Operators will consult with local planning authorities regarding increased traffic during the construction phase, including an assessment of the number of vehicles per day, their size, and type. Specific issues of concern (e.g., location of school bus routes and stops) will be identified and addressed in the traffic management plan.
- Operators will develop a fire management strategy to implement measures to minimize the potential for a human-caused fire.
- All refueling will occur in a designated fueling area that includes a temporary berm to limit the spread of any spill.
- Drip pans will be used during refueling to contain accidental releases.
- Drip pans will be used under fuel pump and valve mechanisms of any bulk fueling vehicles parked at the construction site.
- Any containers used to collect liquids will be enclosed or screened to prevent access to contaminants by wildlife, livestock, and migratory birds.
- Spills will be immediately addressed per the spill management plan, and soil cleanup and removal initiated as soon as feasible.

Means to eliminate or reduce adverse impacts from hazardous materials and wastes include compliance with applicable laws, ordinances, and regulations and conformance with relevant industry standards (including those issued by nonregulatory bodies such as the National Fire Protection Association). For the solar facility projects issued ROWs by the BLM, construction and operation plans must also incorporate elements of relevant construction standards and interconnection requirements of the transmission system operator as well as the reliability requirements of FERC orders.16

Solar facility developers should construct several plans addressing various aspects of hazardous materials and waste, including a Hazardous Materials and Waste Management Plan, a Construction and Operation Waste Management Plan, a Fire Management and Protection Plan, a Nuisance Animal and Pest Control Plan, and Vegetation Management Plan (if the facility will use pesticides/herbicides), and a Spill Prevention and Emergency Response Plan. These plans will include the following items:

- A Construction and Operation Waste Management Plan should identify the waste streams that are expected to be generated at the site and address hazardous waste determination procedures, waste storage locations, waste-specific management and disposal requirements (e.g., selecting appropriate waste storage containers, appropriate off-site treatment, storage, and disposal facilities), inspection procedures, and waste minimization procedures. The plan should address all solid and liquid wastes that may be generated at the site in compliance with the CWA requirements to obtain the project's NPDES permit.
- A Fire Management and Protection Plan should be developed to implement measures to minimize the potential for fires associated with substances used and stored at the site. The flammability of the specific HTF used at the facility should be considered.
- If pesticides/herbicides are to be used on the site, a Nuisance Animal and Pest Control Plan and an Integrated Vegetation Management Plan should be developed to ensure that applications will be conducted within the framework of managing agencies and will entail the use of only EPA-registered pesticides/herbicides that are nonpersistent and immobile and approved by the managing agency.

Potentially applicable BMPs for hazardous materials and wastes at solar facilities include the following:

- All site characterization, construction, operation, and decommissioning activities should be conducted in compliance with applicable federal and state laws and regulations, including the Toxic Substances Control Act of 1976, as amended (15 USC 2601, et seq.). In addition, any release of toxic substances (leaks, spills, and the like) in excess of the reportable quantity established by 40 CFR Part 117 should be reported as required by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, Section 102b. A copy of any report required or requested by any federal agency or state government as a result of a reportable release or spill of any toxic substances should be furnished to the authorized officer concurrent with the filing of the reports to the involved federal agency or state government. In addition, the United States should be indemnified against any liability arising from the release of any

hazardous substance or hazardous waste on the facility or associated with facility activities.

- Project developers should survey project sites for unexploded ordnance, especially if projects are within 20 mi (32 km) of a current U.S. Department of Defense (DoD) installation or formally used defense site.
- Pollution prevention opportunities should be identified and implemented, including material substitution of less hazardous alternatives, recycling, and waste minimization.
- Systems containing hazardous materials should be designed and operated in a manner that limits the potential for their release, constructed of compatible materials in good condition (as verified by periodic inspections), including provision of secondary containment features (to the extent practical); installation of sensors or other devices to monitor system integrity; installation of strategically placed valves to isolate damaged portions and limit the amount of hazardous materials in jeopardy of release; and robust inspection and use of repair procedures.

Systems containing hazardous materials should be designed and operated in a manner that limits the potential for their release, constructed of compatible materials in good condition (as verified by periodic inspections), including provision of secondary containment features (to the extent practical); installation of sensors or other devices to monitor system integrity; installation of strategically placed valves to isolate damaged portions and limit the amount of hazardous materials in jeopardy of release; and robust inspection and use of repair procedures.

- Dedicated areas with secondary containment should be established for off-loading hazardous materials transport vehicles.
- To the greatest extent practical and by considering the remoteness of a given facility, “just-in-time” ordering procedures should be employed that are designed to limit the amounts of hazardous materials present on the site to quantities minimally necessary to support continued operations. Excess hazardous materials should receive prompt disposition.
- Written procedures for the storage, use, and transportation of each type of hazardous material present should be provided, including all vehicle and equipment fuels.
- Authorized users for each type of hazardous material should be identified.
- Procedures should be established for fuel storage and dispensing, including shutting off vehicle (equipment) engines; using only authorized hoses, pumps, and other equipment in good working order; maintaining appropriate fire and spill response materials at equipment-fueling stations; providing emergency shutoffs for fuel pumps; ensuring that fueling stations are paved; ensuring that both aboveground fuel tanks and fueling areas have adequate secondary containment; prohibiting smoking, welding, or open flames in fuel storage and dispensing areas; equipping the area with fire suppression devices, as appropriate; conducting routine inspections of fuel storage and dispensing areas; requiring prompt recovery and remediation of all spills, and providing for the prompt removal of all fuel and fuel tanks used to support construction vehicles and equipment at the completion of facility construction and decommissioning phases.
- Refueling areas should be located away from surface water locations and drainages and on paved surfaces; features should be added to direct spilled materials to sumps or safe storage areas where they can be subsequently recovered.

- All vehicles and equipment should be in proper working condition to ensure that there is no potential for leaks of motor oil, antifreeze, hydraulic fluid, grease, or other hazardous materials.
- Hazardous materials and waste storage areas or facilities should be formally designated and access to them restricted to authorized personnel. Construction debris, especially treated wood, should not be disposed of or stored in areas where it could come in contact with aquatic habitats.
- Design requirements should be established for hazardous materials and waste storage areas that are consistent with accepted industry practices as well as applicable federal, state, and local regulations and that include, at a minimum, containers constructed of compatible materials, properly labeled, and in good condition; secondary containment features for liquid hazardous materials and wastes; physical separation of incompatible chemicals; and fire-fighting capabilities when warranted.
- Written procedures should be established for inspecting hazardous materials and waste storage areas and for plant systems containing hazardous materials; identified deficiencies and their resolution should be documented.
- Schedules should be established for the regular removal of wastes (including sanitary wastewater generated in temporary, portable sanitary facilities) for delivery by licensed haulers to appropriate off-site treatment or disposal facilities.
- During facility decommissioning, the following should occur: emergency response capabilities should be maintained throughout the decommissioning period as long as hazardous materials and wastes remain on-site, and emergency response planning should be extended to any temporary material and equipment storage areas that may have been established; temporary waste storage areas should be properly designated, designed, and equipped; hazardous materials removed from systems should be properly containerized and characterized, and recycling options should be identified and pursued; off-site transportation of recovered hazardous materials and wastes resulting from decommissioning activities should be conducted by authorized carriers; all hazardous materials and waste should be removed from on-site storage and management areas (including surface impoundments), and the areas should be surveyed for contamination and remediated as necessary.

C-B5: NOISE AND VIBRATION

BEST MANAGEMENT PRACTICES

COMMON TO ALL

- Project developers should take measurements to assess the existing background ambient sound levels both within and outside the project site and compare them with the anticipated noise levels associated with the proposed facility. The ambient measurement protocols of all affected land management agencies should be considered and utilized. Nearby residences and likely sensitive human and wildlife receptor locations should be identified at this time. Noisy construction activities (including blasting) should be limited to the least noise-sensitive times of day (daytime only between 7 a.m. and 10 p.m.) and weekdays.

GEOTHERMAL ENERGY DEVELOPMENT

- Within [2] miles of existing, occupied residences, geothermal well drilling or major facility construction operations will be restricted to non-sleeping hours (7:00 am to 10:00 pm).
- All equipment will have sound-control devices no less effective than those provided on the original equipment. All construction equipment used will be adequately muffled and maintained.
- All stationary construction equipment (i.e., compressors and generators) will be located as far as practicable from nearby residences.
- If blasting or other noisy activities are required during the construction period, nearby residents will be notified by the operator at least 1 hour in advance.
- Explosives will be used only within specified times and at specified distances from sensitive wildlife or streams and lakes, as established by the federal and state agencies.

SOLAR ENERGY DEVELOPMENT

The following BMPs during construction, operation, and decommissioning are recommended as ways to reduce potential noise impacts on the neighboring communities. Many of the BMPs recommended below have been adapted from those discussed in the following references: Beacon Solar, LLC (2008); BrightSource Energy, Inc. (2007); DOI and USDA (2007); SES Solar Two, LLC (2008); Wang (1979); and Wood (1992).

Siting and Design

- Siting of stationary construction equipment (e.g., compressors and generators) should be as far from nearby residences and other sensitive receptors as the specific project configuration allows.

- Permanent sound-generating facilities (e.g., compressors, pumps) should be sited away from residences and other sensitive receptors. In areas of known conflicts, consideration should be given to the installation of acoustic screening.
- Where feasible, low-noise systems (e.g., for ventilation systems, pumps, generators, compressors, and fans) should be incorporated, and equipment that has no prominent discrete tones should be selected.
- If a wet-cooling tower is to be used, the louvered side should be sited to face away from sensitive human receptors. The cooling tower should be located such that nearby equipment can act as a barrier and further reduce noise. Quieter fans should be selected in the facility design, and fans should be operated at a lower speed, particularly if they are to operate at night. If a high degree of reduction in noise is required, silencers should be used on the fan stacks.
- Noise reduction measures that should be considered include siting noise sources to take advantage of topography and distance and constructing engineered sound barriers and/or berms or sound-insulated buildings, if needed, to reduce potential noise impacts at the locations of nearby sensitive receptors. As an alternative, solar facilities generating higher operational noise (e.g., a solar dish engine facility) could take advantage of higher background noise. For example, they could be sited within an existing noisy area, such as close to a well-traveled highway, where the ambient sounds partially mask the noise from the facility.

General Multiphase Measures

- All equipment should be maintained in good working order in accordance with manufacturers' specifications. For example, suitable mufflers and/or air-inlet silencers should be installed on all internal combustion engines (ICEs) and certain compressor components.
- If residences or sensitive receptors are nearby, noisy equipment, such as turbines and motors, should be placed in enclosures.
- All vehicles traveling within and around the project area should be operated in accordance with posted speed limits to reduce vehicle noise levels.
- Warning signs should be posted in high-noise areas, and a hearing protection program should be implemented for work areas with noise in excess of 85 dBA.
- Project developers should realize that complaints about noise may still occur, even when the noise levels from the facility do not exceed regulatory levels. Accordingly, a noise complaint process and hotline for the surrounding communities should be implemented, including documentation, investigation, evaluation, and resolution of all legitimate project-related noise complaints.

Construction and Decommissioning/Reclamation

- Construction and decommissioning activities and construction traffic should be scheduled to minimize disruption to nearby residents and existing operations surrounding the project areas.
- If residences or sensitive receptors are nearby, noisy construction and decommissioning activities should be limited to the least noise-sensitive times of day (daytime between 7 a.m. and 7 p.m.) and weekdays. Quieter activities, such as instrumentation or interior installation, could be conducted at any time.
- Whenever feasible, different noisy activities should be scheduled to occur at the same time, since additional sources of noise generally do not increase noise levels at the site boundary by much. That is, less-frequent but noisy activities would generally be less annoying than lower level noise occurring more frequently.
- Noise control measures (e.g., erection of temporary wooden noise barriers) should be implemented if noisy activities are expected near sensitive receptors.
- If noisy activities, such as blasting or pile driving, are required during the construction or decommissioning period, nearby residents should be notified in advance.

Operations

- If noise from a transformer becomes an issue, a new transformer with reduced flux density, which generates noise levels as much as 10 to 20 dB lower than National Electrical Manufacturers Association (NEMA) standard values, could be installed. Alternatively, barrier walls, partial enclosures, or full enclosures could be adopted to shield or contain the transformer noise, depending on the degree of noise control needed.

Transmission Lines and Roads

Most BMPs applied to the construction, operation, and decommissioning activities discussed above should also be implemented during the entire life of transmission lines. An additional BMP in the case of helicopter use, typically of short duration but with high-level noise, is the following:

- Helicopter flights at low altitude (under 1,500 ft [457 m]) near noise-sensitive receptors should be minimized except at locations where only helicopter activities can perform the task.

C-B6: PALEONTOLOGICAL RESOURCES

BEST MANAGEMENT PRACTICES

COMMON TO ALL

- If paleontological resources are present at the site or if areas with a high potential to contain paleontological material have been identified, a paleontological resources management plan should be developed. This should include a mitigation plan; mitigation may include avoidance, removal of fossils (data recovery), stabilization, monitoring, use of protective barriers and signs, or use of other physical or administrative protection measures. The paleontological resources management plan should also identify measures to prevent potential looting, vandalism, or erosion impacts and address the education of workers and the public to make them aware of the consequences of unauthorized collection of fossils on public land.
- Project developers should determine whether paleontological resources exist in a project area on the basis of the following: the sedimentary context of the area and its potential to contain paleontological resources (PFYC [potential fossil yield classification] Class, if it is available); a records search of published and unpublished literature for past paleontological finds in the area; coordination with paleontological researchers working locally in potentially affected geographic areas and geologic strata; and/or depending on the extent of existing information, the completion of a paleontological survey.
- If an area has a high potential but no fossils are observed during survey, monitoring by a qualified paleontologist may be required by the managing agency during all excavation and earthmoving activities in the sensitive area. Development of a monitoring plan is recommended.

GEOTHERMAL ENERGY DEVELOPMENT

- Before any specific permits are issued under leases, treatment of cultural resources will follow the procedures established by the Advisory Council on Historic Preservation for compliance with Section 106 of the National Historic Preservation Act. A pedestrian inventory will be undertaken of all portions that have not been previously surveyed or are identified by BLM as requiring inventory to identify properties that are eligible for the NRHP. Those sites not already evaluated for NRHP eligibility will be evaluated based on surface remains, subsurface testing, archival, and/or ethnographic sources. Subsurface testing will be kept to a minimum whenever possible if sufficient information is available to evaluate the site or if avoidance is an expected mitigation outcome. Recommendations regarding the eligibility of sites will be submitted to the BLM, and a treatment plan will be prepared to detail methods for avoidance of impacts or mitigation of effects. The BLM will make determinations of eligibility and effect and consult with SHPO as necessary based on each proposed lease application and project plans. The BLM may require modification to exploration or development proposals to

protect such properties, or disapprove any activity that is likely to result in adverse effects that cannot be successfully avoided, minimized or mitigated. Avoidance of impacts through project design will be given priority over data recovery as the preferred BMP. Avoidance measures include moving project elements away from site locations or to areas of previous impacts, restricting travel to existing roads, and maintaining barriers and signs in areas of cultural sensitivity. Any data recovery will be preceded by approval of a detailed research design, Native American Consultation, and other requirements for BLM issuance of a permit under the Archaeological Resources Protection Act (BLM 2007a).

SOLAR ENERGY DEVELOPMENT

For all potential impacts, the application of BMPs developed in consultation with the BLM could reduce or eliminate (if avoidance of the resource is chosen) the potential for adverse impacts on significant paleontological resources. Coordination between the project developer and the managing agency would be required for all projects before areas are developed. The use of management practices, such as training/education programs to reduce the amount of inadvertent destruction to paleontological sites, could also reduce the occurrences of human-related disturbances to nearby sites. The specifics of these management practices would be established in project-specific coordination between the project developer and the managing agency. BLM Instruction Memorandum (IM) 2009-011 provides guidance for assessing potential impacts on paleontological resources and determining BMPs.

BMPs to reduce impacts on paleontological resources would be required and could include the following, as applicable:

- If fossils are discovered during construction, the managing agency should be notified immediately. Work should be halted at the fossil site and continued elsewhere until a qualified paleontologist can visit the site and make site-specific recommendations for collection or other resource protection. The area of the discovery should be protected to ensure that the fossils are not removed, handled, altered, or damaged.

If these types of BMPs are implemented during the initial project design and planning phases and are adhered to throughout the course of development, the potential impacts on paleontological resources discussed under the Section 5.14.1 would be mitigated to the fullest extent possible. Adopting this approach does not mean that there would be no impacts on paleontological resources. The exact nature and magnitude of the impacts would vary from project to project and would need to be examined in detail in future NEPA reviews of site specific projects.

C-B7: SAFETY, HEALTH, AND NUISANCES

BEST MANAGEMENT PRACTICES

SOLAR ENERGY DEVELOPMENT

Occupational Health and Safety

The following BMPs to protect solar energy facility and transmission line workers are recommended for implementation during all phases associated with a project.

- All site characterization, construction, operation, and decommissioning activities must be conducted in compliance with applicable federal and state occupational safety and health standards (e.g., the Occupational Health and Safety Administrations [OSHA's] Occupational Health and Safety Standards, 29 CFR Parts 1910 and 1926, respectively).
- A safety assessment should be conducted to describe potential safety issues and the means that would be taken to mitigate them, covering issues such as site access; construction; safe work practices; glare exposure from mirrors, heliostats, and/or power towers; security; heavy equipment transportation; traffic management; emergency procedures; and fire control.
- A health and safety program should be developed to protect workers during site characterization, construction, operation, and decommissioning of a solar energy project. The program should identify all applicable federal and state occupational safety standards and establish safe work practices addressing all hazards, including requirements for developing the following plans: general injury prevention; PPE requirements and training; respiratory protection; hearing conservation; electrical safety; hazardous materials safety and communication; housekeeping and material handling; confined space entry; hand and portable power tool use; gas-filled equipment use; and rescue response and emergency medical support, including on-site first-aid capability.
- In addition, the health and safety program should address OSHA standard practices for the safe use of explosives and blasting agents (e.g., if used to construct foundations for power tower facilities); measures for reducing occupational EMF exposures; the establishment of fire safety evacuation procedures; and required safety performance standards (e.g., electrical system standards and lighting protection standards). The program should include training requirements for applicable tasks for workers and establish procedures for providing required training to all workers. Documentation of training and a mechanism for reporting serious accidents to appropriate agencies should be established.

- A health risk assessment should evaluate potential cancer and noncancer risks to workers from exposure to facility emission sources during construction and operations. If potential risks are found to exceed applicable threshold levels, measures should be taken to decrease emissions from the source.
- Electrical systems should be designed to meet all applicable safety standards (e.g., National Electrical Code [NEC]) and should comply with the interconnection requirements of the transmission system operator.
- In the event of an accidental release of hazardous substances to the environment, project developers should document the event, including a root cause analysis, a description of appropriate corrective actions taken, and a characterization of the resulting environmental or health and safety impacts. Documentation of the event should be provided to the permitting agencies and other federal and state agencies within 30 days, as required.
- For the mitigation of explosive hazards, workers should be required to comply with the OSHA standard (29 CFR 1910.109) for the safe use of explosives and blasting agents.
- Measures should be considered to reduce occupational EMF exposures, such as backing electrical generators with iron to block the EMF, shutting down generators when work is being done near them, and otherwise limiting exposure time and proximity while generators are running.

Public Health and Safety

The following BMPs for the protection of public health and safety are recommended for implementation during all phases associated with a solar energy project:

- The project health and safety program should address protection of public health and safety during site characterization, construction, operation, and decommissioning for a solar energy project. The program should establish a safety zone or setback for solar facilities and associated transmission lines from residences and occupied buildings, roads, ROWs, and other public access areas that is sufficient to prevent accidents resulting from various hazards during all phases of development. It should identify requirements for temporary fencing around staging areas, storage yards, and excavations during construction or decommissioning activities. It should also identify measures to be taken during the operations phase to limit public access to facilities (e.g., equipment with access doors should be locked to limit public access, and permanent fencing with slats should be installed around electrical substations).
- A Traffic Management Plan should be prepared for the site access roads to control hazards that could result from increased truck traffic (most likely during construction or decommissioning), to ensure that traffic flow would not be adversely affected and that specific issues of concern (e.g., the locations of school bus routes and stops) are identified and addressed. This plan should incorporate measures such as informational signs, flaggers (when equipment may result in blocked throughways), and traffic cones

to identify any necessary changes in temporary lane configurations. The plan should be developed in coordination with local planning authorities.

- Solar facilities should be sited and designed properly to eliminate glint and glare effects on roadway users, nearby residences, commercial areas, or other highly sensitive viewing locations, or reduce it to the lowest achievable levels (see similar BMP under Section 5.14.3). Regardless of the solar technology proposed, a Glint and Glare Assessment, Mitigation, and Monitoring Plan should accurately assess and quantify potential glint and glare effects and determine potential health, safety, and visual impacts associated with glint and glare effects. The assessment should be conducted by qualified individuals using appropriate and commonly accepted software and procedures. The assessment results should be made available to the managing agency in advance of project approval. If the project design is changed during the siting and design process such that substantial changes to glint and glare effects may occur, glint and glare effects shall be recalculated, and the results made available to the managing agency. If any potential for exposure at levels that could cause retinal damage is identified, measures to eliminate the exposure should be implemented (e.g., slatted fencing to shield views from outside the facility). The plan should also set up a system for logging, investigating, and responding to complaints regarding glare.
- A health risk assessment should evaluate potential cancer and noncancer risks to the general public from exposure to facility emission sources during construction and operations. If potential risks are found to exceed applicable threshold levels, measures should be taken to decrease emissions from the source.
- Proper signage and or engineered barriers (e.g., fencing) should be used to limit access to electrically energized equipment and conductors in order to prevent access to electrical hazards by unauthorized individuals or wildlife.
- Because of the high global warming potential of SF6, the use of alternative dielectric fluids that do not have a high global warming potential should be required.
- If operation of the solar facility and associated transmission lines and substations is expected to cause potential adverse impacts on nearby residences and occupied buildings from noise, sun reflection, or EMF, recommendations for addressing these concerns should be incorporated into the project design (e.g., establishing a sufficient setback from transmission lines).
- The project should be planned to comply with FAA regulations, including lighting requirements, and to avoid potential safety issues associated with proximity to airports, military bases or training areas, or landing strips.
- Operators should develop a Fire Management and Protection Plan to implement measures to minimize the potential for a human-caused fire and to respond to human-caused or natural-caused fires.

- Project developers should work with appropriate agencies (e.g., DOE and TSA) to address critical infrastructure and key resource vulnerabilities at solar facilities, to minimize and plan for potential risks from natural events, sabotage, and terrorism.

C-B8: SOILS, DRAINAGE, EROSION, STORMWATER, AND FLOODING

BEST MANAGEMENT PRACTICES

COMMON TO ALL

- The operator will perform a detailed geotechnical analysis prior to the construction of any structures; so they will be sited to avoid any hazards from subsidence or liquefaction (i.e., the changing of a saturated soil from a relatively stable solid state to a liquid during earthquakes or nearby blasting).

SOLAR ENERGY DEVELOPMENT

Soil Resources

The main objective of the BMPs for soil resources is to preserve the health and functioning of project area soils by reducing or controlling the ground-disturbing activities that cause the soil impacts described in Section 5.7.1. Preserving the health and functioning of project area soils is an essential step in reducing impacts on other important resources (Table 5.7-1). Erosion control measures would be based on an assessment of site-specific conditions and would include minimizing the extent of disturbed areas, stabilizing disturbed areas, and protecting slopes and channels in the project area. Measures to control sedimentation would focus on retaining sediment on-site and implementing controls along the project site perimeter (CASQA 2004).

Developers would conduct (as necessary) geotechnical engineering and hydrology studies to characterize site conditions related to drainage patterns, soils, vegetation, surface water bodies, land subsidence, and steep or unstable slopes. The results of such studies would be compiled into reports to aid in the permitting, design, and construction of a proposed solar energy project. In the geotechnical engineering report, factors such as soil properties, engineering constraints, the corrosive potential of construction materials, stability, and facility design criteria would be identified. The hydrology report would present data on local water bodies, surface water drainage patterns, floodplains, rainfall, and expected runon and runoff volumes and flow rates.

Many of the BMPs listed below would be components of the various plans required to mitigate the impacts of solar energy facilities, particularly the Drainage, Erosion, and Sedimentation Control Plan, Wind Erosion Management Plan, Access Road Siting and Management Plan, Dust Abatement Plan, Integrated Vegetation Management Plan, Ecological

Resource Mitigation and Monitoring Plan, Habitat Restoration and Management Plan, Spill Prevention and Emergency Response Plan, and Stormwater Management Plan. Plans would be revised or amended as necessary to account for changes in site conditions as a project proceeds from construction through decommissioning. Applicants must obtain and meet the requirements of all applicable federal, state, and county permits and building codes. Studies

may also be needed to determine whether construction and operation of a solar facility within a proposed SEZ would affect the eolian processes that maintain nearby sand dunes (e.g., Big Dune in Amargosa Valley in Nevada). The need for such studies would be evaluated on a case-by-case basis.

The following subsections identify potentially applicable BMPs for solar energy facilities, grouped by phase of development. These measures address a range of site conditions and may not be applicable to every solar project. However, they should be implemented by projects if they are applicable. The mitigations measures listed here have been adapted from those outlined in reports such as DOI and USDA (2006), BLM (2010a), State of California Department of Transportation (2003), USFS (2000), and Desert Managers Group (2010). Project developers should implement these measures, as applicable, and develop others that address unique site conditions not anticipated here. Routine site inspections should be conducted to identify and correct improperly installed, damaged, or ineffective measures. Inspections should be made more frequently during the rainy season and during and following1 intense rainfall events to ensure the timeliness of corrective actions.

Siting and Design

- The footprint of disturbed areas, including the number and size/length of roads, fences, borrow areas, and laydown and staging areas, should be minimized. The boundaries of disturbed area footprints should be clearly delineated on the ground (e.g., through the use of construction fencing).
- Project structures and facilities should be sited to avoid disturbance in areas with existing biological soil crusts to the extent possible.
- Project areas should be replanted with native vegetation at spaced intervals to the extent possible to break up areas of exposed soil and reduce soil loss by wind erosion (see also Section 5.10.5).
- Land disturbance (including crossings) in natural drainage systems and groundwater recharge zones, specifically ephemeral washes and dry lake beds, should be avoided. Any structures crossing drainages should be located and constructed so that they do not decrease channel stability or increase water volume or velocity. Developers should obtain all applicable federal and state permits.
- Solar facilities or components (e.g., heliostats, panels, dishes, and troughs) should not be placed in natural drainage ways.
- Adequate space (i.e., setbacks) between solar facilities and natural washes should be maintained to preserve their hydrological function and provide a buffer for flood control.
- Existing roads, disturbed areas, and borrow pits should be used. In addition, all borrow pits shall be identified beforehand, and included in the NEPA direct and indirect analyses. If new roads are necessary, they should be designed and constructed to the appropriate road design standards, such as those described in BLM Manual 9113 (BLM 1985) and BLM (2007). The specifications and codes developed by the U.S. Department of Transportation (DOT) should also be taken into account.

- New roads should be designed to follow natural land contours and avoid or minimize hill cuts in the project area and avoid existing desert washes. Siting of new roads and walking trails (if any) should be consistent with the designation criteria specified by the BLM in 43 CFR 8342.1.
- Ground-disturbing geotechnical studies (e.g., geotechnical drilling) should adhere to the permitting requirements specified by the BLM in 43 CFR 2920.
- Roads should be designed on the basis of local meteorological conditions, soil moisture, and erosion potential in order to avoid erosion and changes in surface water runoff.
- Temporary roads should be designed with eventual reclamation in mind.
- Areas with unstable slopes should be avoided, and local factors that can cause slope instability (e.g., groundwater conditions, precipitation, earthquake activity, slope angles, and the dip angles of geologic strata) should be identified.
- Excessive grades should be avoided on roads, road embankments, ditches, and drainages, especially in areas with erodible soils.
- The creation of excessive slopes should be avoided during site preparation and construction. Special construction techniques should be used, where applicable, in areas of steep slopes, erodible soil, and drainage ways.
- Construction should be conducted in stages to limit the areas of exposed soil at any given time. For example, only land that will be actively under construction in the near term (e.g., within the next 6 to 12 months) should be cleared of vegetation.

General Multiphase Measures

- Potential soil erosion should be controlled at culvert outlets with appropriate structures.
- Catch basins, roadway ditches, and culverts should be cleaned and maintained regularly.
- Abandoned roads and roads no longer needed should be subsoiled to increase infiltration and reduce soil compaction, then recontoured and revegetated.
- Ground-disturbing activities should be minimized, especially during the rainy season.
- Originally excavated materials should be stockpiled and used for backfill.
- The speed of vehicles and equipment on unpaved surfaces should be controlled to reduce dust emissions.
- Runoff from slope tops should be controlled and directed to settling or rapid infiltration basins (temporarily) until disturbed slopes are stabilized. Disturbed slopes should be stabilized as quickly as possible.
- Drainage crossings should be stabilized as quickly as possible, and channel erosion from runoff caused by the project should be prevented.
- Sediment-laden waters from disturbed, active areas within the project site should be retained through the use of barriers and sedimentation devices (e.g., berms, straw bales,

sandbags, jute netting, or silt fences). Such barriers and devices should not be installed in wildlife crossing areas.

- Barriers and sedimentation devices should be placed around drainages and wetlands to prevent contamination by sediment-laden water.
- Sediment from barriers and sedimentation devices should be removed to restore sediment control capacity.
- Routine site inspections should be conducted to assess the effectiveness and maintenance requirements for erosion and sediment control systems.
- Barriers and sedimentation devices should be maintained, repaired, or replaced as necessary to ensure optimum control.
- A spill prevention plan to identify sources, locations, and quantities of potential chemical releases (through spills, leaks, or fires) and to define response measures and notification requirements should be developed and followed to reduce the potential for soil contamination. The plan should also identify individuals and their responsibilities for implementing the plan.

Site Characterization and Construction

- Construction activities should take place over as short a timeframe as possible once ground disturbance has occurred. If an activity requires an extended schedule, measures to limit wind and water erosion should be employed during the activity (rather than after the activity), to the extent possible.
- Construction traffic should avoid unpaved surfaces (to reduce the risk of compaction) and reduce speed to lessen fugitive dust emissions.
- The clearing and disturbing of sensitive areas (e.g., steep slopes and natural drainages) and other areas should be avoided outside the construction zone. The construction zone boundaries should be clearly delineated on the ground (e.g., through the use of construction fencing).
- Ground disturbance from construction-related activities, such as vehicle and foot traffic, should avoid areas with intact biological soil crusts to the extent possible. For cases in which impacts cannot be avoided, soil crusts should be salvaged and restored, on the basis of recommendations by BLM, once construction has been completed.
- The creation of excessive slopes should be avoided during site preparation and construction (e.g., during excavation).Special construction techniques should be used, where applicable, in areas of steep slopes, erodible soil, and stream channel crossings.
- Electrical lines from solar collectors should be buried along existing features (e.g., roads or other paths of disturbance) to minimize the overall area of surface disturbance whenever possible.
- Borrow materials should be obtained only from authorized and permitted sites.
- Construction grading should be conducted in compliance with good industry practice (e.g., the American Society for Testing and Materials [ASTM] international standard

methods) and other requirements (e.g., BLM and/or local grading and construction permits), as they apply.

- Erosion control structures (e.g., rock lining or apron) should be added at culvert outlets to reduce flow velocity and minimize the potential for scouring.
- Temporary stabilization of disturbed areas that are not actively under construction should occur throughout the construction phase. Soil stabilization methods such as erosion matting (organic or synthetic mats or blankets) or soil aggregation (binding) are examples of measures that should be used to limit wind erosion and dust emissions, as site conditions warrant.
- Permanent stabilization of disturbed areas should occur during final grading and landscaping of the site.
- Water or other stabilizing agents should be used to wet roads in active construction areas and laydown areas in order to minimize the windblown erosion of soil.
- Topsoil from all excavation and construction activities should be salvaged so it can be reapplied to the disturbed area once construction is completed.
- Native plant communities in disturbed areas should be restored by natural revegetation or by seeding and transplanting (using weed-free native grasses, forbs, and shrubs), on the basis of BLM recommendations, as early as possible once construction is completed (see also Sections 5.10.1 and 5.10.5).
- Construction on wet soils should be avoided.

Operations

- All appropriate BMPs developed for the construction phase should be applied to similar activities during the operations phase.
- The area disturbed by operation of a solar energy project should be minimized (e.g., by using existing roads).

Decommissioning/Reclamation

- All BMPs developed for the construction phase should be applied to similar activities during the decommissioning/reclamation phase.
- The original grade and drainage pattern should be re-established.
- Native plant communities in disturbed areas should be restored by natural revegetation or by seeding and transplanting (using weed-free native grasses, forbs, and shrubs), on the basis of BLM recommendations, as early as possible once decommissioning is completed (see also Sections 5.10.1 and 5.10.5).

Geologic Hazards

The potential geologic hazards that could be significant at solar project sites in the six-state study area include seismic ground shaking, ground rupture, liquefaction, volcanic activity, slope instability, subsidence (collapse) and settlement, expansive soils, and flooding and debris

flows.). Solar project developers should conduct geotechnical studies (as needed) to identify and assess these hazards and to propose facility design criteria and site-specific BMPs. The BMP to address geologic hazards therefore would be to build project structures in accordance with the design basis recommendations specified in the project-specific geotechnical investigation report. Structure designs must meet the requirements of all applicable federal, state, and county permits and building codes.

In areas of high seismic activity (especially those having soils with a high liquefaction potential) or in areas that encompass 100-year floodplains, the most effective BMP is to alter the location or scope of the proposed project.

MINERALS (FLUIDS, SOLIDS, AND GEOTHERMAL RESOURCES)

Potentially Applicable BMPs

- Where valid mining claims or leases exist, early coordination with claim or lease holders should be initiated to determine whether it would be possible to locate solar facilities in or near these areas in such a way as to avoid future adverse effects on mineral development activities.
- All solar energy development ROWs should contain the stipulation that BLM retains the right to issue oil and gas or geothermal leases with stipulation of no surface occupancy within the ROW area. Upon designation, SEZs should be classified as no-surface-occupancy areas for oil and gas and geothermal leasing.
- Transmission lines should be located to avoid conflicts with mining activities in areas with active mineral development.

C-B9: TRAFFIC AND TRANSPORTATION ROADS

BEST MANAGEMENT PRACTICES

COMMON TO ALL

- A traffic management plan should be prepared for the site access roads to ensure that no hazards would result from the increased truck traffic and that traffic flow would not be adversely impacted. This plan should incorporate measures such as informational signs, flaggers when equipment may result in blocked throughways, and traffic cones to identify any necessary changes in temporary lane configuration. Signs should be placed along roads to identify speed limits, travel restrictions, and other standard traffic control information. To minimize impacts on local commuters, consideration should be given to limiting construction vehicles traveling on public roadways during the morning and late afternoon commute time.

GEOTHERMAL ENERGY DEVELOPMENT

- Operators will consult with local planning authorities regarding increased traffic prior to the construction phase, including an assessment of the number of vehicles per day, their size, and type. Specific issues of concern (e.g., location of school bus routes and stops) will be identified and addressed in the traffic management plan.
- To plan for efficient use of the land, necessary infrastructure will be consolidated wherever possible.
- Existing roads and pad sites will be used to the maximum extent feasible, but only if located in a safe and environmentally sound location. No new roads and pad sites will be constructed without agency authorization. If new roads and pad sites have been authorized, they will be designed and constructed by the operator to the appropriate agency standard, no higher than necessary to accommodate their intended function. Roads and pad sites will be routinely maintained by the operator maintain public safety and to minimize impacts to the environment such as erosion, sedimentation, fugitive dust, loss of vegetation.
- An access road siting and management plan will be prepared incorporating existing Agency standards regarding road design, construction, and maintenance such as those described in the BLM 9113 Manual and the *Surface Operating Standards for Oil and Gas Exploration and Development* (i.e., the Gold Book, 4th Edition, 2007).
- Where possible, access roads will be located to follow natural contours and minimize side hill cuts and fills. Excessive grades on roads, road embankments, ditches, and drainages shall be avoided, especially in areas with erodible soils.

- Roads will be designed so that changes to surface water runoff are minimized and new erosion is not initiated.
- Access roads will be located to minimize stream crossings. All structures crossing streams will be located and constructed so that they do not decrease channel stability or increase water velocity. Operators will obtain all applicable federal and state water crossing permits.
- Roads will be located away from drainage bottoms and avoid wetlands, if practicable.
- Traffic will be restricted to the roads developed for the project. Use of other unimproved roads will be restricted to emergency situations.
- Signs will be placed along roads to identify speed limits, travel restrictions, and other standard traffic control information. Signs directing vehicles to alternative park access and parking will be posted in the event construction temporarily obstructs recreational parking areas near trailheads. Whenever active work is being performed, the area will be posted with "construction ahead" signs on any adjacent access roads or trails that might be affected.
- Project personnel and contractors will be instructed and required to adhere to speed limits commensurate with road types, traffic volumes, vehicle types, and site-specific conditions, to ensure safe and efficient traffic flow and to reduce wildlife collisions and disturbance and fugitive dust.
- When practical, construction activities will be avoided during high recreational use periods.
- The operator will obtain agency authorization prior to borrowing soil or rock material from agency lands.
- Road use will be restricted during the wet season if road surfacing is not adequate to prevent soil displacement, rutting, etc., and resultant stream sedimentation.
- Access roads and on-site roads will be surfaced with aggregate materials where necessary to provide a stable road surface, support anticipated traffic, reduce fugitive dust, and prevent erosion,
- Dust abatement techniques will be used before and during surface clearing, excavation, or blasting activities. Dust abatement techniques will be used on unpaved, unvegetated surfaces to minimize fugitive dust. Speed limits (e.g., 25 mph [40 kph]) will be posted and enforced to reduce fugitive dust. Construction materials and stockpiled soils will be covered if they are a source of fugitive dust.
- Culvert outlets will be rip-rapped to dissipate water energy at the outlet and reduce erosion. Catch basins, roadway ditches, and culverts will be cleaned and maintained regularly.

SOLAR ENERGY DEVELOPMENT

Depending on site-specific characteristics, a number of BMPs may be required for transportation impacts. Appropriate measures should be determined during the siting and

design phase through the development of a Transportation Plan and a Traffic Management Plan. Measures appropriate to implement include the following:

- Easements could be required for public roadway corridors through a site to maintain proper traffic flows and retain more direct routing for the local population.
- To mitigate impacts related to the daily commutes of construction workers, the operator may be required to implement local road improvements, provide multiple site access locations and routes, stagger work schedules for different work functions (e.g., site preparation, array foundation installation, array assembly, and electrical connections), shift work hours to facilitate off-peak commuting times to minimize impact on local commuters, and/or implement a ride-sharing or shuttle program.
- To reduce hazards for incoming and outgoing traffic, as well as to expedite traffic flow, the operator may be required to implement traffic control measures, such as intersection realignment coupled with speed limit reduction; the installation of traffic lights and/or other signage; and the addition of acceleration, deceleration, and turn lanes on routes with site entrances. These types of measures can be considered during the siting and design phase through development of the following plans:
    - Transportation Plan, particularly for oversized or overweight components specific to a solar energy development (STGs). The plan should consider component sizes, weights, origin, destination, and unique handling requirements. It should also evaluate alternate transportation approaches (barge, rail).

C-B10: AVIATION

BEST MANAGEMENT PRACTICES

SOLAR ENERGY DEVELOPMENT

- Decisions regarding the location of solar facilities and transmission facilities near or within MTRs or adjacent to military or civilian airports should be coordinated with military and civilian airspace managers very early in the processing of solar project applications, in order to identify and mitigate potential impacts on military and civilian airport and airspace use.
- The FAA shall be contacted early in the process of considering a solar energy project application to determine if there might be any potential impacts on aviation and if any mitigation might be required to protect military or civilian aviation use.
- As part of the evaluation of impacts from the development of solar energy facilities, their potential for impacting the operation of existing military installations, either because they displace species onto an installation or because they increase the significance of special status species populations on the installation, should be included as part of the environmental impact analysis of the solar energy project.

C-B11: VISUAL RESOURCES

BEST MANAGEMENT PRACTICES

COMMON TO ALL

- Project developers should exhaust opportunities to minimize visual dominance of projects by siting projects outside the viewsheds of KOPs, or by siting them as far away as possible, diminishing dominance by maximizing visible separation with distance.
- Facility siting should incorporate measures to minimize the profile of all facility-related structures to reduce visibility and visual dominance within the viewshed, particularly for facilities proposed within the foreground/ middle ground distance zone (0 to 5 mi [0 to 8 km]) of sensitive viewing locations with extended viewing opportunities and/or moving viewpoints, including, but not limited to National Scenic Byways, All-American Roads, State Scenic Byways and BLM Backcountry Byways, SRMAs, trails, residential areas, etc.
    - Construct low-profile structures whenever possible to reduce structure visibility.
    - Select and design materials and surface treatments to repeat or blend with landscape elements.
    - Site projects outside of the viewsheds of publically accessible vantage points, or if this cannot be avoided, as far away as possible;
    - Site projects to take advantage of both topography and vegetation as screening devices to restrict views of projects from visually sensitive areas;
    - Site facilities away from and not adjacent to prominent landscape features (e.g., knobs and water features);
    - Avoid placing facilities on ridgelines, summits, or other locations such that they will be silhouetted against the sky from important viewing locations;
    - Collocate facilities to the extent possible to use existing and shared rights-of-way, existing and shared access and maintenance roads, and other infrastructure to reduce visual they do not bisect ridge tops or run down the center of valley bottoms.
    - Select colors that would reduce the visual impact. Non-reflective paint and coatings should be applied to the exterior of the structures.

GEOTHERMAL ENERGY DEVELOPMENT

- When any ROW application includes remnants of a National Historic Trail, is located within the viewshed of a National Historic Trail's designated centerline, or includes or is within the viewshed of a trail eligible for listing on the NRHP, the operator will evaluate the potential visual impacts to the trail associated with the proposed project and identify appropriate BMPs for inclusion in the operation plan.

- Site linear features (aboveground pipelines, rights-of-way, and roads) to follow natural land contours rather than straight lines (particularly up slopes) when possible. Fall-line cuts should be avoided.
- Site facilities, especially linear facilities, to take advantage of natural topographic breaks (i.e., pronounced changes in slope) to avoid siting facilities on steep side slopes.
- Where available, site linear features such as rights-of-ways and roads to follow the edges of clearings (where they will be less conspicuous) rather than passing through the centers of clearings.
- Site facilities to take advantage of existing clearings to reduce vegetation clearing and ground disturbance, where possible.
- Site linear features (e.g., trails, roads, rivers) to cross other linear features at right angles whenever possible to minimize viewing area and duration.
- Site and design structures and roads to minimize and balance cuts and fills and to preserve existing rocks, vegetation, and drainage patterns to the maximum extent possible.
- Paint grouped structures the same color to reduce visual complexity and color contrast.
- Design and install efficient facility lighting so that the minimum amount of lighting required for safety and security is provided but not exceeded and so that upward light scattering (light pollution) is minimized. This may include, for example, installing shrouds to minimize light from straying off-site, properly directing light to only illuminate necessary areas, and installing motion sensors to only illuminate areas when necessary.
- Site construction staging areas and laydown areas outside of the viewsheds of publically accessible vantage points and visually sensitive areas, where possible, including siting in swales, around bends, and behind ridges and vegetative screens.
- Discuss visual impact mitigation objectives and activities with equipment operators prior to commencement of construction activities.
- Mulch or scatter slash from vegetation removal and spread it to cover fresh soil disturbances or, if not possible, bury or compost slash.
- If slash piles are necessary, stage them out of sight of sensitive viewing areas.
- Avoid installing gravel and pavement where possible to reduce color and texture contrasts with existing landscape.
- Use excess fill to fill uphill-side swales resulting from road construction in order to reduce unnatural-appearing slope interruption and to reduce fill piles.
- Avoid downslope wasting of excess fill material.
- Round road-cut slopes, vary cut and fill pitch to reduce contrasts in form and line, and vary slope to preserve specimen trees and nonhazardous rock outcroppings.
- Leave planting pockets on slopes where feasible.

- Combine methods of re-establishing native vegetation through seeding, planting of nursery stock, transplanting of local vegetation within the proposed disturbance areas and staging of construction enabling direct transplanting.
- Revegetate with native vegetation establishing a composition consistent with the form, line, color, and texture of the surrounding undisturbed landscape."
- Provide benches in rock cuts to accent natural strata.
- Use split-face rock blasting to minimize unnatural form and texture resulting from blasting.
- Segregate topsoil from cut and fill activities and spread it on freshly disturbed areas to reduce color contrast and to aid rapid revegetation.
- Bury utility cables in or adjacent to the road where feasible.
- Minimize signage and paint or coat reverse sides of signs and mounts to reduce color contrast with existing landscape.
- Prohibit trash burning; store trash in containers to be hauled off-site for disposal.
- Undertake interim restoration during the operating life of the project as soon as possible after disturbances. During road maintenance activities, avoid blading existing forbs and grasses in ditches and along roads.
- Randomly scarify cut slopes to reduce texture contrast with existing landscape and to aid in revegetation.
- Cover disturbed areas with stockpiled topsoil or mulch, and revegetate with a mix of native species selected for visual compatibility with existing vegetation.
- Restore rocks, brush, and natural debris whenever possible to approximate preexisting visual conditions.

SOLAR ENERGY DEVELOPMENT

The nature, extent, and magnitude of visual impacts from utility-scale solar facilities will vary on a site-specific basis and depend on the specific phase of the project (e.g., construction or operation). Similarly, visual impact BMPs will vary on a site-specific basis and depend on the specific phase of the project.

The BLM and DOI, as well as other federal agencies such as the USFS, have established BMPs for visual impacts of energy production, transmission, roads, and other forms of development on federal lands of the western United States. Several of their publications (BLM 1984, 1985, 1986a,b, 1992, 2006b, 2008b; DOI and USDA 2006; USFS 1975, 1977, 2001) were the primary sources for the BMPs listed in this section. Additional BMPs were identified in Stirling Energy Systems' Application for Certification, submitted to the BLM (SES Solar Two, LLC 2008). These publications describe additional BMPs and provide related information. This section presents potential BMPs applicable to utility-scale solar energy projects and associated electricity transmission projects and potential BMPs specific to electricity transmission projects. Solar energy development and related activities proposed on BLM-administered lands and connected actions should abide by VRM policies and procedures

defined in Visual Resource Management Manual M-8400 and handbooks, Visual Resource Inventory H- 8410-1, and Visual Resource Contrast Rating H-8431-1. Other policy requirements and clarifications are available in Instructional Memorandums 98-164 and 2009-167 (BLM 1998, 2009b).

Siting and Design

The greatest potential for visual impact mitigation associated with a utility-scale solar energy project and associated electricity transmission facilities occurs as a result of decisions made during the siting and design of the project. Visual impacts can be substantially reduced or avoided by careful project siting.

The BLM RMPs designate VRM Classes I□IV, which establish objectives for managing allowable levels of visual change to the landscape. Solar development and related activities are required to meet the VRM Class objectives. Project developers should consult the VRM Class designations and associated management objectives during the early phases of project planning, including those related to project due diligence, site selection, planning, and design. It is the developer's responsibility to conduct an early investigation into the respective project's compatibility with the VRM Class objectives, and the potential that these objectives can be met by applying thoughtful and creative design principles. Project developers should document and demonstrate how the visual management objectives were factored into the various phases of project planning and decision rationale.

The BLM Visual Resource Inventory (VRI) class values, including those for Scenic Quality, Sensitivity, and Distance Zones, should also be factored into the project planning, design, and decision making. Project developers should demonstrate how the visual values influence project design and document how impacts on these values are minimized through consideration for the proposed project location and its relationship to the surrounding viewshed. This information should be included as a part of the critical due diligence information considered when determining and selecting solar development sites and ROW boundaries. ROW location, size, and boundary determinations should consider terrain characteristics and opportunities for full or partial project concealment by recessing the project into the landscape terrain. Project developers should consult with the BLM in the early phases of project planning to help determine the proposed project's potential conformance to the applicable RMP's VRM Class designation and other potential constraints, thus avoiding costly unforeseen planning implications and re-design.

A qualified and licensed professional landscape architect with demonstrated experience with the BLM's VRM policies and procedures should be a part of the developer's and the BLM's respective planning teams evaluating visual resource issues as project siting options are considered. The visual issues should be addressed throughout the planning and design process and the final project plans should reflect intended methods for mitigating visual impacts.

The appropriate BLM field office and locally based public should be consulted to provide input on identifying important visual resources in the project area and on the siting and design process. The public should be involved and informed about the visual site design elements of the proposed solar energy facilities. Possible approaches include conducting public forums for disseminating information, offering organized tours of operating solar energy development projects, and using computer and visualization simulations in public presentations.

Project developers should also consult on viewshed protection objectives and practices with the respective land management agencies that have been assigned administrative responsibility for landscapes having special designations, such as Wilderness Areas, National Scenic and Historic Trails, Wild and Scenic Rivers, etc., and National Parks and National Wildlife Refuges located within the project's viewshed. Developers should demonstrate a concerted effort to reconcile conflicts while recognizing that the BLM retains authority for final decisions determining project approval and conditions.

The following are specific to National Historic Trails, but possibly pertain to other specially designated lands, such as Wild and Scenic Rivers, Wilderness Areas, National Parks, and National Wildlife Refuges:

- For applications that include artifacts and remnants of a National Historic Trail, are located within the viewshed of a National Historic Trail's designated centerline, or include or are within the viewshed of a trail eligible for listing on the *National Register of Historic Places* (NRHP) by virtue of its important historical or cultural values and integrity of setting, the applicant should evaluate the potential visual impacts on the trail associated with the proposed project; minimize, avoid, or mitigate adverse effects through the Section 106 consultation process; and identify appropriate BMPs for inclusion as stipulations in the Plan of Development (POD). This requirement does not supersede or amend National Historic Trails requirements cited in other sections, but is in addition to and supportive of them.
- Because the landscape setting observed from units of the National Park system, national historic sites, national trails, and Tribal cultural resources may be a part of the historic context contributing to the historic significance of the site or trail, project siting should avoid locating facilities that would alter the visual setting in a way that would reduce the historic significance or function, even if compliant with VRM objectives. This requirement does not supersede or amend national historic sites, national trails, and Tribal cultural resources requirements cited in other sections, but is in addition to and supportive of them.

Project developers should obtain engineering-design-quality topographical data and use digital terrain-mapping tools at a landscape-viewshed scale for project location selection, site planning and design, visual impact analysis, and visual impact mitigation planning and design. Visual mitigation planning and design should be performed through field assessments, applied global positioning system (GPS) technology, photo documentation, use of computer-aided design and development software, three-dimensional GIS modeling software, and imaging software to depict visual simulations to reflect a full range of visual resource BMPs. The digital terrain-mapping tools should be applied at a resolution and contour interval suitable for site design and accurate placement of proposed developments into the digital viewshed. Visual simulations should be prepared and evaluated in accordance with *Visual Resource Contrast Rating* in BLM Handbook H-8431-1 (BLM 1986b) and other agency directives, to create spatially accurate depictions of the appearance of proposed facilities. Simulations should depict proposed project facilities from key observation points (KOPs) and other visual resource sensitive locations.

The siting and design of solar facilities, structures, roads, and other project elements should explore and document design considerations for repeating the natural form, line, color, and texture of the existing landscape in accordance and compliance with the VRM class objectives.

The full range of visual BMPs should be considered, and plans should incorporate all pertinent BMPs. Visual resource monitoring and compliance strategies should be included as a part of the project mitigation plans to cover the construction, operation, and decommissioning phases.

Conformance with VRM objectives should be determined through the use of the BLM contrast rating procedures defined in *Visual Resource Contrast Rating* in BLM Handbook H-8431-1 (BLM 1986b). Visual contrast rating mitigation of visual impacts should abide by the requirements outlined in the handbook and other BLM directives. Plans for facilities determined not to be in conformance with VRM objectives should not be approved or should be redesigned in order to meet the VRM objectives, and updated visual simulations should be prepared. Revised project plans and simulations should be re-evaluated using the Contrast Rating procedures and repeated until the proposed action is found to be in conformance.

KOPs should be selected by first determining the extent of the viewshed by using the viewshed modeling tools previously cited. The viewshed modeling should illustrate the areas from where proposed facilities may be seen out to 25 mi (40 km)—line-of-sight measured from the top elevations of facilities out to 5.5 ft (1.7 m) above the ground terrain. From within the areas, KOPs would then be selected at places where people would be expected—at roads, trails, campgrounds, recreationally active river corridors, residential areas, etc. For the purpose of conducting a visual contrast rating evaluation, the number of KOPs would be reduced to those that serve as the best representations for demonstrating conformance to the respective VRM class objectives. The BLM must approve KOP selections, and the BLM reserves the right to require additional KOPs to further determine the extent of visual impact and conformance to VRM class objectives.

Visual design elements should be integrated into the construction plans, details, shop drawings and specifications; these should include, but not limited to, grubbing and clearing, vegetation thinning and clearing, grading, revegetation, drainage, and structural plans. Visual design elements within the plans should be measureable and monitored while under construction, while operational, and when decommissioned. The plans should include a monitoring and compliance plan that establishes the monitoring requirements and thresholds for acceptable performance. The contrast rating procedures should also be integrated as field-measuring compliance tools during operation and after decommissioning.

The following specific project siting measures can help reduce visual impacts of solar energy development projects and associated, but independent facilities. Project planning and designs should demonstrate the relevance and application of all BLM visual BMPs to the specific project, including, but not limited the following considerations.

Viewshed-Based Site Selection and Siting

- Project developers should exhaust opportunities to minimize visual dominance of projects by siting projects outside the viewsheds of KOPs, or by siting them as far away as possible, diminishing dominance by maximizing visible separation with distance.
- Locating of facilities near visually prominent landscape features (e.g., knobs and waterfalls) that naturally draws an observer's attention should be avoided.
- Visual "skylining" should be avoided by placing structures, transmission lines, and other facilities away from ridgelines, summits, or other locations where they would

silhouette against the sky from important viewing locations. Siting should take advantage of opportunities to use topography as a backdrop for views of facilities and structures to avoid skylining. Alternatives should be evaluated, and the least visually intrusive option should be selected when linear facilities (e.g., transmission lines) cross over ridgelines.

- Siting of linear features (e.g., ROWs and roads) should follow natural land contours rather than straight lines, particularly up slopes. Fall-line cuts should be avoided. Following natural contours echoes the lines found in the natural landscape and often reduces cut-and-fill requirements; straight lines can introduce conspicuous linear contrasts that appear unnatural.
- Linear developments (e.g., transmission lines, pipelines, and roads) should follow the edges of natural clearings or natural lines of transition between vegetation type, topography, etc. (where they would be less conspicuous), rather than passing through the center of clearings.

Reduction of Surface Disturbance, Grading and Edge Treatments

- In visually sensitive areas, air transport capability shall be used to mobilize equipment and materials for clearing, grading, and erecting transmission towers, thereby preserving the natural landscape conditions between tower locations and reducing the need for permanent and/or temporary access roads.
- Vegetation and ground disturbance should be minimized and take advantage of existing clearings.
- Structures and roads should be designed and located to minimize and balance cuts and fills. Retaining walls, binwalls, half bridges, and tunnels should be used to reduce cut-and-fill.
- Road-cut slopes should be rounded, and the cut-and-fill pitch should be varied to reduce contrasts in form and line; the slope should be varied to preserve specimen trees and nonhazardous rock outcroppings.
- Natural or previously excavated bedrock landforms should be sculpted and shaped when excavation of these landforms is required. Percent backslope, benches and vertical variations should be integrated into a final landform that repeats the natural shapes, forms, textures, and lines of the surrounding landscape. The earthen landform should be integrated and transitioned into the excavated bedrock landform. Sculpted rock face angles, bench formations, and backslopes need to adhere to the natural bedding planes of the natural bedrock geology. Half-case drill traces from presplit blasting should not remain evident in the final rock face. The color contrast from the excavated rock faces should be removed by color treating with a rock stain. Native vegetation (where feasible), or a mix of native and non-native species (if necessary to ensure successful revegetation) should be re-established with the benches and cavities created within the created bedrock formation.

- Where screening topography and vegetation are absent or minimal, natural looking earthwork landforms, vegetative, or architectural screening should be used to minimize visual impacts. The shape and height of earthwork landforms must be adapted to the surrounding landscape, and must consider distance and viewing angle from KOPs in order to ensure that the earthworks are visually unobtrusive.
- Openings in vegetation for facilities, structures, roads, etc., should be feathered and shaped to repeat the size, shape, and characteristics of naturally occurring openings.
- Topsoil from the site should be stripped, stockpiled, and stabilized before excavating earth for facility construction.
- All electrical collector lines and pipelines should be buried in a manner that minimizes additional surface disturbance (e.g., along roads or other paths of surface disturbance).

Building and Structural Materials

Visual impacts associated with solar energy and electricity transmission projects should be mitigated by choosing appropriate building and structural materials and surface treatments (i.e., paints or coatings designed to reduce contrast and reflectivity). A careful study of the site should be performed to identify appropriate colors and textures for materials; both summer and winter appearance should be considered as well as seasons of peak visitor use. Massing and scale of structures and the architectural character appropriate to the region where a solar facility is to be located should be considered (USFS 2001). Architectural character considerations should include integration of vertical and horizontal relief variation to create shadow lines that diminish the overall visual scale and dominance of facilities. The choice of colors should be based on the appearance at typical viewing distances and consider the entire landscape around the proposed development. 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. The BLM Standard Environmental Color Chart CC-001 and guidance should be referenced when selecting colors (BLM 2008d).

Specific BMPs include the following:

- Solar panel backs should be color-treated to reduce visual contrast with the landscape setting.
- Solar towers should be color-treated to reduce visual contrast.
- Materials, coatings, or paints having little or no reflectivity should be used whenever possible.
- Grouped structures should all be painted the same color to reduce visual complexity and color contrast.
- Multiple color camouflage technology applications should be considered for projects within sensitive viewsheds and with visibility distance between 0.25 and 2 mi (0.40 and 3.20 km). BLM guidance on the use of color to mitigate visual impacts should be consulted (BLM 2008d).
- Aboveground pipelines should be painted or coated to match their surroundings.

- Consideration should be given to the appropriate choice of monopoles vs. lattice towers for a given landscape setting. Monopoles may reduce visual impacts more effectively than lattice towers in foreground and midground views within built or partially built environments, while lattice towers tend to be more appropriate for less-developed rural landscapes where the latticework would be more transparent against background textures and colors.

Glint and Glare

- Solar facilities should be sited and designed properly to eliminate glint and glare effects on roadway users, nearby residences, commercial areas, or other highly sensitive viewing locations, or to reduce them to the lowest achievable levels. Regardless of the solar technology proposed, a study to accurately assess and quantify potential glint and glare effects and to determine the potential health, safety, and visual impacts associated with glint and glare should be conducted. The assessment should be conducted by qualified individuals using appropriate and commonly accepted software and procedures. The assessment results must be made available to the BLM in advance of project approval. If the project design is changed during the siting and design process such that substantial changes to glint and glare effects may occur, glint and glare effects should be recalculated, and the study results made available to BLM.
- Mirrors/heliostats should be deployed and operated to avoid high-intensity light (glare) being reflected toward off-site ground receptors. Where off-site glare is unavoidable and project site/off-site spatial relationships favor effective results, fencing with privacy slats or similar screening materials should be employed.
- Electricity transmission-distribution projects should utilize nonspecular conductors and nonreflective coatings on insulators.

Night-Sky Protection

- A lighting plan should 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.

- To minimize night-sky impacts from hazard navigation lighting associated with solar facilities, the applicant should use AVWS technology for any structures exceeding 200 ft (61 m) in height. If the FAA denies a permit for use of AVWS, the applicant should limit lighting to the minimum required to meet FAA safety requirements. The use of red or white strobe lights should be prohibited unless the BLM approves its use, because of conflicting mitigation requirements.
- The use of signs and project construction signs should be minimized. Necessary signs should be made of non-glare materials and utilize unobtrusive colors. The reverse sides of signs and mounts should be painted or coated using the most suitable color selected from the BLM Standard Environmental Color Chart (BLM 2008d) to reduce color contrasts with the existing landscape; however, placement and design of any signs required by safety regulations must conform to regulatory requirements.
- Commercial symbols or signs and associated lighting on buildings or other structures should be prohibited.

General Multiphase Measures

- "Good housekeeping" procedures should be developed to ensure that the site is kept clean of debris, garbage, fugitive trash or waste, and graffiti; to prohibit scrap heaps and dumps; and to minimize storage yards. BMPs for effective waste management should be employed.

Construction

A pre-construction meeting with BLM landscape architects or other designated visual/scenic resource specialists should 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 should include, but not be limited to grading, drainage, revegetation, vegetation clearing, and feathering plans, and they must demonstrate how VRM objectives will be met, monitored, and measured for conformance.

Project developers should integrate interim/final reclamation VRM mitigation elements early in the construction process; these may include treatments such as thinning and feathering vegetation along project edges, enhanced contour grading, salvaging landscape materials from within construction areas, special revegetation requirements, etc. Developers should coordinate with BLM in advance to have BLM landscape architects or other designated visual/scenic resource specialists on-site during construction to work on implementing visual resource requirements and BMPs.

Visual impacts associated with construction activities can be partially mitigated by implementing the following BMPs, where feasible:

- Project developers should reduce visual impacts during construction by clearly delineating construction boundaries and minimizing areas of surface disturbance; preserving existing, native vegetation to the greatest extent possible; 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.
- A Decommissioning and Site Reclamation Plan should be in place prior to construction. Reclamation of the construction site should begin immediately after construction to reduce the likelihood of visual contrasts associated with erosion and invasive weed infestation and to reduce the visibility of temporarily disturbed areas as quickly as possible.
- Visual impact mitigation objectives and activities should be discussed with equipment operators before construction activities begin.
- Existing rocks, vegetation, and drainage patterns should be preserved to the maximum extent possible.
- Brush-beating or mowing or using protective surface matting rather than removing vegetation should be employed where feasible.
- Slash from vegetation removal should be mulched and spread to cover fresh soil disturbances as part of the revegetation plan. Slash piles should not be left in sensitive viewing areas.
- All areas of disturbed soil should be reclaimed by using weed-free native grasses, forbs, and shrubs representative of the surrounding and intact native vegetation composition and/or using non-native species, if necessary to ensure successful revegetation.
- The visual color contrast of graveled surfaces should be reduced with approved color treatment practices.
- Horizontal and vertical pipeline bending should be used in place of cut-and fill activities where feasible.
- Road-cut slopes should be rounded, and the cut-and-fill pitch should be varied to reduce contrasts in form and line. The slope should be varied to preserve specimen trees and nonhazardous rock outcroppings.
- Topsoil from cut-and-fill activities should be segregated and spread on freshly disturbed areas to reduce color contrast and aid rapid revegetation. Topsoil piles should not be left in sensitive viewing areas.
- Excess fill material should not be disposed of downslope to avoid creating color contrast with existing vegetation and soils.
- Excess cut-and-fill materials should be hauled in or out to minimize ground disturbance and impacts from fill piles.
- Natural or previously excavated bedrock landforms should be sculpted and shaped when excavation of these landforms is required, and landforms should conform to the requirements listed and further described under Section A.2.2.13.1, Siting and Design.

Half-case drill traces from presplit blasting should not remain evident in the final rock face. The color contrast from the excavated rock faces should be removed by color-treating with a rock stain. Native vegetation (where feasible, or a mix of native and non-native species if necessary to ensure successful revegetation) should be re-established with the benches and cavities created within the created bedrock formation.

- Communication and other local utility cables should be buried where feasible.
- Culvert ends should be painted or coated to reduce color contrasts with the existing landscape.
- No paint or permanent discoloring agents should be applied to rocks or vegetation to indicate surveyor construction activity limits.
- All stakes and flagging should be removed from the construction area and disposed of in an approved facility.

Operations

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.

Visual impacts associated with operation and maintenance activities could be partially mitigated by implementing the following measures, where applicable:

- The project developer should maintain revegetated surfaces until a self-sustaining stand of vegetation is re-established and visually adapted to the undisturbed surrounding vegetation. No new disturbance should be created during operations without completion of a VRM analysis and approval by the authorized officer.
- Interim restoration should be undertaken during the operating life of the project as soon as possible after disturbances.
- Maintenance activities should include dust abatement (in arid environments) and noxious weed control.
- Road maintenance activities should avoid blading existing forbs and grasses in ditches and adjacent to roads.
- Painted facilities should be kept in good repair and repainted when color fades or flakes.
- Color-treated solar panel/mirror backs/supports should be kept in good repair, and retreated when color fades and flakes.

Decommissioning/Reclamation

A Decommissioning and Site Reclamation Plan, covering visual impact BMPs, should 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 can partially mitigate visual impacts associated with solar energy development, where feasible:

- Predevelopment visual conditions, and the inventoried visual quality rating (A, B, C) and integrity should be reviewed, and the visual elements of form, line, color, and texture should 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.
- A Decommissioning and Site Reclamation Plan should be developed, approved by the BLM, and implemented. The plan should require that all aboveground and near-ground structures be removed. Some structures should only be removed to a level below the ground surface that will allow reclamation/restoration. Topsoil from all decommissioning activities should be salvaged and reapplied during final reclamation. The plan should include provisions for monitoring and determining compliance with the project's visual mitigation and reclamation objectives.
- Soil borrow areas, cut-and-fill slopes, berms, water bars, and other disturbed areas should be contoured to approximate naturally occurring slopes, thereby avoiding form and line contrasts with the existing landscapes. Contouring to a rough texture would trap seed and discourage off-road travel, thereby reducing associated visual impacts.
- Cut slopes should be randomly scarified and roughened to reduce texture contrasts with existing landscapes and aid in revegetation.
- A combination of seeding, planting of nursery stock, transplanting of local vegetation within the proposed disturbance areas, and staging of construction enabling direct transplanting should be considered. Where feasible, native vegetation should be used for revegetating to establish a composition consistent with the form, line, color, and texture of the surrounding undisturbed landscape.
- Stockpiled topsoil should be reapplied to disturbed areas, and the areas should 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 should be removed or buried.
- Rocks, brush, and forest debris should be restored whenever possible to approximate pre-existing visual conditions.
- Edges of revegetated areas should be feathered to reduce form and line contrasts with the existing landscapes.
- A decommissioning VRM monitoring and compliance plan should be prepared by the operator and approved by the BLM that establishes the schedule and terms for monitoring and the conditions and methods of measurement for determining compliance.

Use of Off-Site BMPs

- In addition to BMPs that directly reduce the visual resource impacts of solar energy and associated facilities, the off-site mitigation of visual impacts may be an option in some situations. Off-site mitigation should be considered in situations where nonconforming proposed actions may lead to changing the VRM Class objectives through an RMP amendment. Unavoidable visual impacts may then be mitigated by a correction or remediation of a nonconforming existing condition resulting from a different proposed action located within the same viewshed for impacts of approximately equal magnitude, and within the same or a more protective VRM class. The off-site mitigation serves as a means to offset and recover the loss of visual landscape integrity. For example, off-site mitigation could include reclaiming unnecessary roads, removing abandoned buildings, reclaiming abandoned mine sites, putting utility lines underground, rehabilitating and revegetating existing erosion or disturbed areas, or establishing scenic conservation easements. In situations where off-site mitigation opportunities are absent within the same viewshed, then different viewsheds that need mitigation of visual impacts because they could affect highly sensitive visual resources (e.g., along National Scenic and Historic Trails, Wild and Scenic River corridors, Scenic or Backcountry Byways, etc.) may be considered. BLM policy guidance on off-site mitigation procedures is contained in BLM Instruction Memorandum No. 2008-204, Offsite Mitigation (BLM 2008f).

C-B12: WATER SUPPLY AND QUALITY

BEST MANAGEMENT PRACTICES

COMMON TO ALL

- Project developers should conduct a preliminary hydrologic study demonstrating a clear understanding of the local surface water and groundwater hydrology. The primary purpose of this preliminary hydrologic study is to identify surface watersheds and groundwater basins directly affected and connected to the location of the project site, and the study will include the following information:
    - The relationship of the project site hydrologic basin to the basins in the region;
    - Identification of all surface water bodies (including rivers, streams, ephemeral washes/drainages, lakes, wetlands, playas and floodplains);
    - Identification of all applicable groundwater aquifers; and
    - Preliminary estimates of the physical characteristics of surface water features and groundwater aquifers, the connectivity of surface water

- Operators will avoid creating hydrologic conduits between two aquifers during foundation excavation and other activities.

GEOTHERMAL ENERGY DEVELOPMENT

- Operators will develop a storm water management plan for the site to ensure compliance with applicable regulations and prevent offsite migration of contaminated storm water or increased soil erosion.

SOLAR ENERGY DEVELOPMENT

The main objectives of the BMPs for water resources are (1) to promote the sustainable use of water resources through appropriate technology selection and conservation practices and (2) to protect the quality of natural water bodies (including streams, wetlands, ephemeral washes, and floodplains, as well as groundwater aquifers) in and around solar energy facilities. An important aspect of implementing these measures is coordination with federal, state, and local agencies that regulate the use of water resources to meet the requirements of permits and approvals needed (1) to obtain water for development and (2) to alter the land surface. In the following subsections, potentially applicable BMPs for solar energy facilities are given, grouped by phase of development

Siting and Designing

- All structures related to the solar energy facility should be sited in locations that minimize impacts on surface water bodies, ephemeral washes, playas, and natural drainage areas (including groundwater recharge areas).
- Project developers should plan to implement water conservation measures related to solar energy technology water needs in order to reduce project water requirements. Developers would minimize the consumptive use of fresh water for power plant cooling by, for example, using dry cooling, using recycled or impaired water, or selecting solar energy technologies that do not require cooling water.
- Project developers should plan to avoid impacts on existing surface water features, including streams, lakes, wetlands, floodplains, intermittent streams, playas, and ephemeral washes/drainages (any unavoidable impacts would be minimized), in the development and in nearby regions according to:
    - All sections of the CWA, including Sections 401, 402, and 404 addressing licensing and permitting issues;
    - E.O. 11988 and E.O. 11990 of May 24, 1977, regarding floodplain and wetland management: E.O. 11988, "Floodplain Management" (Federal Register, Volume 42, page 26951 [42 FR 26951]), and E.O. 11990, "Protection of Wetlands" (42 FR 26961);
    - EPA stormwater management guidelines (EPA 2009a) and applicable state and local stormwater management guidelines;
    - National Wild and Scenic Rivers System (Public Law 90-542; 16 United States Code [U.S.C.] 1271 et seq.); and
    - Identification of impaired surface water bodies in accordance with Section 303(d) of the CWA.
- Project developers should avoid impacts on local surface water and groundwater drinking water supplies (amounts and water quality) and develop mitigation plans in the event that local drinking water sources are contaminated or depleted by project activities.
- Mitigation plans should be developed as described in Section 5.1. A Drainage, Erosion, and Sedimentation Control Plan should be developed that ensures protection of water quality and soil resources, demonstrates no increase in off-site flooding potential, and includes provisions for stormwater and sediment retention on the project site. The plan would identify site surface water runoff patterns and develop BMPs that prevent excessive and unnatural soil deposition and erosion throughout and downslope of the project site and project-related construction areas. The plan would achieve the following:
    - Runoff from parking lots, roofs, or other impervious surfaces would be directed to retention basins prior to being released downgradient of the site;

    - Any landscaping used for stormwater treatment would require little or no irrigation and would be recessed to create retention basins/areas used to capture runoff;
    - The amount of area covered by impervious surfaces would be reduced through the use of permeable pavement or other pervious surfaces; and
    - Natural drainages and a pre-project hydrograph would be maintained for the area.
- A Stormwater Management Plan should be developed for the site to ensure compliance with applicable regulations and prevent off-site migration of contaminated stormwater, changes in pre-project storm hydrographs, or increased soil erosion.
    - Siting in identified 100-yr floodplains should not be allowed within the development.
    - Project developers should maintain the pre-development flood hydrograph for all storms up to and including the 100-yr rainfall event. All stormwater retention and/or infiltration and treatment systems should also be designed for all storms up to and including the 100-yr storm event.
- As part of a Spill Prevention and Emergency Response Plan, measures to prevent potential groundwater and surface water contamination should be identified.
- Developers should be required to conduct a detailed hydrologic study that demonstrates their clear understanding of the local surface water and groundwater hydrology. At a minimum this hydrologic study should include:
    - Quantification of physical characteristics describing surface water features, such as streamflow rates, stream cross-sections, channel routings, seasonal flow rates (intermittent streams), peak flow rates (ephemeral washes/drainages), sediment characteristics and transport rates, lake depths, and surface areas of lakes, wetlands, and floodplains;
    - Hydrologic analysis and modeling to define the 100-yr, 24-hour rainfall event for the project area and calculation of projected runoff from this storm at site;
    - Hydrologic analysis and modeling to identify 100-yr floodplain boundaries of any surface water feature on the site;
    - Quantification of physical characteristics describing the groundwater aquifer, such as physical dimensions of the aquifer, sediment characteristics, confined/unconfined conditions, hydraulic conductivity and transmissivity distribution of the aquifer, groundwater surface elevations, and groundwater flow processes (direction, recharge/discharge, surface current basin extractions, surface water/groundwater connectivity, and lag times between groundwater withdrawals and surface water depletions);
    - Quantification of the regional climate, including seasonal and long-term information on temperatures, precipitation, evaporation, and evapotranspiration; and

- Quantification of the sustainable yield of surface waters and groundwater available to the project. Project developers should evaluate the water sources in terms of existing water rights and management plans for adequacy with regard to serving project demands while maintaining aquatic, riparian, and other water-dependent resources.
- Project developers should quantify water use requirements for project construction, operation, and decommissioning.
- Water sources used for potable water supply must meet federal, state, and local water quality standards (e.g., Sections 303 and 304 of the CWA).
- Developers should identify wastewater treatment measures and new or expanded facilities, if any, to be included as part of the facility's NPDES permit.
- Developers should coordinate with state/local regulatory agencies regarding the issuance of permits or "will-serve" agreements for the development and use of water and/or the operation of on-site wastewater treatment systems.
- Project developers should coordinate with appropriate water rights agencies for securing water rights.
- Project developers should choose appropriate water sources with respect to available water rights and management practices and with respect to maintaining aquatic, riparian, and other water-dependent sources (that may vary in water requirements on a temporal basis).
- Project developers who plan to use groundwater should develop and implement a groundwater Water Resources Monitoring and Mitigation Plan, which includes monitoring the effects of groundwater withdrawal for project uses, of vegetation restoration and dust control uses during decommissioning and of aquifer recovery after project decommissioning. Monitoring frequency should be decided on a site-specific basis and in coordination with federal, state, and local agencies that manage the groundwater resources of the region.
- If groundwater use is proposed, project developers should ensure that a comprehensive analysis of the groundwater basin is provided and that the following potential significant impacts are evaluated:
    - Creation or exacerbation of overdraft conditions and their potential to cause subsidence and loss of aquifer storage capacity;
    - Use that cause injury to other water rights claims in the basin;
    - Estimates of the total cone of depression considering cumulative drawdown from all potential pumping in the basin, including the project, for the life of the project through the decommissioning phase;
    - Changes in water quality that affect other beneficial use; and
    - Effects on surface water resources such as streams, springs, seeps, and wetlands that provide water and associated habitat for plants and animals.
- Project developers who plan to use surface water sources should develop a Water Resources Monitoring and Mitigation Plan that includes monitoring changes in flows,

volumes, and water quality during construction and operations as well as their recovery during decommissioning. Monitoring frequency should be decided on a site-specific basis and in coordination with federal, state, and local agencies that manage the surface water resources of the region.

- If surface water use is proposed, project developers should ensure that a comprehensive analysis of the supply is provided and that the following potential significant impacts are evaluated:
    - Effects on other users;
    - Effects on water quality;
    - Effects on other water resources;
    - Effects on other environmental resources, including plants and animals, that directly or indirectly depend on those water sources;
    - Effects on the natural hydrograph of the supply; and
    - Effects on the reliability of the supply.

Site Characterization and Construction

- The facility should obtain and comply with a construction stormwater permit through the EPA or state-run NPDES program (whichever applies within the state). In addition, the EPA requires that any development larger than 20 acres (0/08 km2) and begun after August 2011 must comply with a requirement to monitor construction discharges for turbidity concentrations (EPA 2009c).
- Groundwater wells constructed during any stage of the project would conform to state and local standards and records should include:
    - Legal description (township, range, section, and quarter section);
    - Project map with proposed and existing well locations;
    - Well design characteristics: casing diameter, screened interval(s), well depth, and static water level;
    - Results of groundwater pumping tests or other tests done in the well;
    - Anticipated pumping capacity and peak pumping rates;
    - Identification of the groundwater aquifer and its hydrogeologic characteristics;
    - Estimation of the potential cone of depression that might be produced by the proposed pumping throughout the lifetime of a project by using an analytical or numerical model; and
    - Estimate of the total cone of depression considering cumulative drawdown from all potential pumping in the basin, including the project, for the life of the project through the decommissioning phase (also using an analytical or numerical model).
- Construction activities should avoid land disturbance in ephemeral washes and dry lakebeds; any unavoidable disturbance would be minimized. Stormwater facilities

would be designed to route flow around the facility and maintain pre-project hydrographs.

- When stream or wash crossings are constructed, culverts or water conveyances for temporary and permanent roads should be designed to comply with county standards or to accommodate the runoff of a 100-year storm, whichever is larger.
- Geotextile mats should be used to stabilize disturbed channels and stream banks (CASQA 2003).
- Earth dikes, swales, and lined ditches should be used to divert work-site runoff that would otherwise enter a disturbed stream (CASQA 2003).
- Certified weed-free straw bale barriers should be installed to control sediment in runoff water; straw bale barriers should be installed only where sediment laden water can pond, thus allowing the sediment to settle out (CASQA 2003).
- Check dams (i.e., small barriers constructed of rock, gravel bags, sandbags, fiber rolls, or reusable products) should be placed across a constructed swale or drainage ditch to reduce the velocity of flowing water, thus allowing sediment to settle and reducing erosion (CASQA 2003).
- Special construction techniques should be used, where applicable, in areas of erodible soil, alluvial fans, and stream channel/wash crossings.
- Disturbed soils should be reclaimed as quickly as possible, or protective covers should be applied.
- Topsoil removed during construction should be reused for reclamation.
- Foundations and trenches should be backfilled with originally excavated material as much as possible; excess excavated material should be disposed of according to state and federal laws.
- If drilling activities are required as part of site characterization, any drilling fluids or cuttings should be maintained so that cuttings, fluids, or runoff from storage areas will not come in contact with aquatic habitats. Temporary impoundments for storing drilling fluids and cuttings should be lined to minimize the infiltration of runoff into groundwater or surface water.
- Washing equipment or vehicles in streams and wetlands should be avoided, because doing so increases their sediment loads.
- Entry and exit pits should be constructed in work areas to trap sediments from vehicles so that they do not enter into streams at stream crossings. Prerequisites to excavating the entry and exit pits should include:
    - Locating the entry and exit pits far enough from stream banks and at a sufficient elevation to avoid inundation by storm flow stream levels and to minimize excessive migration of groundwater into the entry or exit pits;
    - Isolating the excavation for the entry and exit pits from the surface water by using silt fencing to avoid sediment transport by stormwater; and

    - Isolating the spoils storage resulting from excavation of the entry and exit pits by using silt fencing to avoid sediment transport by stormwater.
- Good waste management practices should be adopted for handling, storing, and disposing of wastes generated by a construction project to prevent the release of waste materials into stormwater discharges. Waste management includes the following: spill prevention and control, construction debris and litter management, concrete waste management, and liquid waste management.
- Any wastewater generated in association with temporary, portable sanitary facilities should be periodically removed by a licensed hauler and introduced into an existing municipal sewage treatment facility. Portable sanitary facilities provided for construction crews should be adequate to support expected on-site personnel.
- The creation of hydrologic conduits between two aquifers should be avoided during foundation excavation and other activities.
- If chemical dust palliatives (suppressants) are used, they should be selected and applied in accordance with considerations stated in Section 5.11.1.3.
- When an herbicide/pesticide is used to control vegetation, the climate, soil type, slope, and vegetation type should be considered in determining the risk of herbicide/pesticide contamination (BLM 2006a). In addition, a Nuisance Animal and Pest Control Plan and an Integrated Vegetation Management Plan should be developed to ensure that applications are conducted within the framework of BLM and U.S. Department of the Interior (DOI) policies and standard operating procedures and will entail only the use of EPA-registered pesticides/herbicides that also comply with state and local regulations.
- All hazardous materials and vehicle/equipment fuels should be transported, stored, managed, and disposed of in accordance with accepted BMPs and in compliance with all applicable regulations and the requirements of approved plans, including, where applicable, a Stormwater Management Plan, Spill Prevention and Emergency Response Plan, and Hazardous Materials and Waste Management Plan (see Section 5.21 for further details).
- Project developers should avoid or minimize and mitigate the degradation of water quality (e.g., chemical contamination, increased salinity, increased temperature, decreased dissolved oxygen, and increased sediment loads) that could result from construction activities. Water quality in areas adjacent to or downstream from development areas should be monitored during the life of the project to ensure that water quality is protected.

Operations

The use of water should not contribute to the significant long-term decline of groundwater levels or surface water flows and volumes. Any project-related water use should not contribute to withdrawals that exceed the sustainable yield of the surface water or groundwater source.

Water use should be minimized by implementing conservation practices, such as treating spent wash water and storing it for reuse.

The treatment of sanitary and industrial wastewater either on-site or off-site would comply with federal, state, and local regulations. Any discharges to surface waters would require NPDES permitting. Any storage or treatment of wastewater on-site should have proper lining of holding ponds and tanks to prevent leaks.

Berms and other controls should be used at facilities to prevent off-site migration of any leaked or spilled HTF, TES fluids, or any other chemicals stored or used at the site.

Project developers should avoid or minimize and mitigate the degradation of water quality (e.g., chemical contamination, increased salinity, increased temperature, decreased dissolved oxygen, and increased sediment loads) that could result from operations. Water quality in areas adjacent to or downstream from development areas should be monitored during the life of the project to ensure that water quality is protected.

Decommissioning/Reclamation

- All management plans, BMPs, and stipulations developed for the construction phase should be applied to similar activities during the decommissioning/reclamation phase.
- Topsoil removed during construction should be reused during reclamation.
- Groundwater- and/or surface water-monitoring activities should be as outlined in the established groundwater monitoring plan for the site (discussed above).

C-B13: LANDS AND REALTY

BEST MANAGEMENT PRACTICES

SOLAR ENERGY DEVELOPMENT

- Where there are existing BLM ROW authorizations within solar energy development areas, pursuant to Title 43, Part 2807.14 of the Code of Federal Regulations (43 CFR 2807.14), the BLM would notify ROW holders that an application that might affect their existing ROW has been filed and would request their comments. Early discussion with existing ROW holders should occur to ensure their rights are protected and any issues are resolved.
- Where a designated transmission corridor is located within the area of proposed solar energy development project, the need for future transmission capacity in the corridor should be reviewed to determine whether the corridor should be excluded from solar development or whether the capacity of the designated transmission corridor can be reduced. Partially relocating the corridor to retain the current planned capacity would also be an option to consider, as will relocating the solar project outside the designated corridor.
- Legal access to private, state, and public lands surrounding the solar facilities should be retained to avoid creating areas that are inaccessible to the public and/or that would be difficult to manage. The effect on the manageability and uses of public lands remaining around boundaries of solar energy facilities should be considered during the environmental analysis of project applications.
- Coordination with federal, state, and county agencies; Tribes; property owners; and other stakeholders should be accomplished as early as possible in the planning process to identify potentially significant land use conflicts and issues and state and local rules that govern solar energy development. Significant issues that are raised, and potential modifications to proposed projects to eliminate or mitigate these issues, should be considered in the environmental analysis of the project application.
- Consolidation of access and other supporting infrastructure should be required for single projects and for cases in which there is more than one project in close proximity to another to maximize the efficient use of public land.
- The protection and preservation of evidence of the Public Land Survey System (PLSS) and related federal property boundaries are required of project developers. Prior to commencing any action, evidence of the PLSS and related property boundaries will be marked for protection. Coordination with BLM cadastral survey staff should be accomplished to help provide data, search for and evaluate evidence, locate monuments of the PLSS and related property boundaries, and protect them from destruction. If a

proposed action is within one-quarter mile of any project boundary, a Chain of Survey Certificate, conformal to the departmental standard, must be issued. In some cases, Land Description Reviews, Certificates of Inspection and Possession, Boundary Assurance Certificates, resurveys, re-monumentation, and/or referencing of PLSS corners may be required before the start of any action.

- If a proposed action might have an adverse effect on prime and unique farmland, this possibility should be discussed in the associated environmental analysis, along with a consideration of alternatives or appropriate BMPs.
- For solar energy and related transmission facilities, the hazards associated with the heights of facilities and the glare from reflective surfaces should be evaluated through coordination with local airport operators. Proposed construction of any facility that is taller than 200 ft (61 m) must be submitted to the Federal Aviation Administration (FAA) for evaluation of safety hazards.

C-B14: SPECIAL MANAGEMENT AREAS

BEST MANAGEMENT PRACTICES

SOLAR ENERGY DEVELOPMENT

- Solar facilities should be located and designed to minimize impacts on specially designated areas and lands with wilderness characteristics.
- Protection of existing values of specially designated areas and lands with wilderness characteristics should be evaluated during the environmental analysis of solar energy project applications, and the results should be incorporated into the project planning and design to minimize off-site impacts.
- Any lands that have not been recently inventoried for wilderness characteristics or any lands that have been identified in any citizen's wilderness proposal should be inventoried for wilderness characteristics prior to any solar development action being approved within these areas.

C-B15: RANGELAND

BEST MANAGEMENT PRACTICES

SOLAR ENERGY DEVELOPMENT

Livestock and Grazing

- Contact with grazing permittees should be initiated at the earliest possible time to explore whether modifications could be made to a solar development proposal to minimize impacts on grazing use; especially impacts related to water availability, livestock improvements, access road location, and movement of livestock between pastures. Compensation for or relocation of range improvements also should be discussed. The ROW applicant and permittee/lessee should be strongly encouraged to enter into an agreement that addresses mitigation and compensation for range improvements.
- Access roads should be constructed, improved, and maintained to minimize their impact on grazing operations. Road design would include appropriate fencing, cattle guards, and signs.
- Wherever there are reductions in grazing use, opportunities for mitigating this loss through changes in livestock management or installation of range improvements should be considered.

Wild Horses and Burros

- Activities of project developers should be coordinated with the managing agency to ensure that impacts on wild horses and burros and their management areas are minimized. Issues that would need to be addressed could include the installation of fencing and access control, provision for movement corridors, delineation of open range, traffic management (e.g., vehicle speeds), compensatory habitat restoration, and access to or development of water sources.
- Access roads should be appropriately constructed, improved, and maintained and should employ appropriate signs to minimize potential horse and burro collisions. Fences should be built (as practicable) to exclude wild horses and burros from all project facilities, including all water sites built for the development of facilities and roadways.

Wildland Fire

- In areas susceptible to wildland fires, coordination with the managing agency and local fire organizations should be required early in the project planning process to determine

BMPs that would be incorporated into the design of the project to prevent an increase in wildland fire frequency.

- A vegetation plan designed to prevent the establishment of non-native, invasive species on the solar energy facility and along transmission line ROWs and roads should be developed and implemented to minimize the potential for increasing the frequency of wildland fires.
- The ROWs for solar facilities should be large enough to ensure there is a sufficient firebreak inside the ROW, so there would be no threat to facilities from either a wildland fire approaching from outside the ROW or a fire moving from inside to outside of the ROW. This distance should be determined through coordination with fire management staff, and actions, both active and passive (e.g., vegetation manipulation) should be undertaken specifically to remove the need for protective responses, by the managing agency, state, and local fire organizations.
- The effectiveness of developing and adhering to a fire safety plan and providing worker training to reduce fire risks should be evaluated.

C-B16: RECREATION

BEST MANAGEMENT PRACTICES

SOLAR ENERGY DEVELOPMENT

- Public access through or around solar facilities should be retained to permit continued use of public lands and non-BLM administered lands.
- Solar facilities should not be placed in areas of unique or important recreation resources.
- Replacement of access lost for OHV use should be considered as part of the analysis of project-specific impacts. Any process for designating a replacement route would include the consideration of the designation criteria for routes as specified in 43 CFR 8342.1, and would be consistent with existing land use plans.

C-B17: SOCIOECONOMICS

BEST MANAGEMENT PRACTICES

SOLAR ENERGY DEVELOPMENT

The economic effects of solar energy projects can be positive, with increases in employment, income, and state tax revenues; thus, few, if any, BMPs may be necessary. On the basis of the potential magnitude of employment impacts of each solar technology, however, it is possible that the socioeconomic impacts of solar development projects, notably the impacts of in-migrating workers on local housing markets and on local government expenditures and employment, would require BMPs. A large in-migrant labor force has the potential to produce some degree of social disruption, whereby the cultural and social values of in-migrants conflict with those of the resident population, potentially creating alienation, crime, alcoholism, drug use, mental health problems, and the disruption of family life.

The following BMPs may be applicable to avoid or reduce these impacts, depending on site- and project-specific conditions.

- To address impacts on local issues, the BLM may include stipulations in the ROW authorization or require solar developers to enter into mitigation agreements with individual local jurisdictions and county agencies, as necessary.
- Project developers should collect and evaluate available information describing the socioeconomic conditions in the vicinity of the proposed project, as needed, to predict potential impacts of the project.
- If the managing agency concluded that the project is likely to have a substantial impact on the economic or social conditions of local communities, project developers should work with state, local and Tribal agencies and governments to develop community monitoring programs that would be sufficient to identify and evaluate socioeconomic impacts resulting from solar energy development. Monitoring programs should collect data reflecting the economic, fiscal, and social impacts of development at the state, local, and Tribal levels. Parameters to be evaluated could include impacts on local labor and housing markets, local consumer product prices and availability, local public services (police, fire, and public health), and educational services. Programs also could monitor indicators of social disruption (e.g., crime, alcoholism, drug use, and mental health) and the effectiveness of community welfare programs in addressing these problems.
- If the managing agency concludes that the project is likely to have a substantial impact on the economic or social conditions of local communities, the agency may include stipulations in the ROW authorization (if BLM) or require solar developers to enter into mitigation agreements with individual local jurisdictions and county agencies, as necessary, to address local issues. Also, project developers should work with state,

local, and Tribal agencies to develop community outreach programs that would help communities adjust to changes triggered by solar energy development. Such programs could include any of the following activities:
    - Establishing vocational training programs for the local workforce to promote development of skills required by the solar energy industry;
- Developing instructional materials for use in area schools to educate the local communities on the solar energy industry;
    - Supporting community health screenings; and
    - Providing financial support to local libraries for the development of information repositories on solar energy, including materials on the hazards and benefits of commercial development. Electronic repositories established by the operators could also be of great value.

ENVIRONMENTAL JUSTICE

Mitigation of environmental justice impacts, specifically those associated with visual impacts of solar generation facilities, may be required. Mitigation of visual impacts would include the siting of facilities to minimize contrast with scenic views, the appropriate use of construction materials that minimize scenic contrast, and the avoidance of traditional and cultural sites important to low-income and minority populations. Noise and dust impacts during construction of solar facilities, particularly those associated with the construction of access roads, would be reduced by using standard mitigation methods, while noise and any EMF effects during project operation would be minimal due to the remote locations of the majority of solar facilities in each of the six states and would be unlikely to require any mitigation.

Although the environmental impacts of solar development on low-income and minority populations are likely to be small, where such environmental justice impacts occur, the developer should make a plan to implement a number of BMPs to mitigate the potential environmental, economic, cultural, and health impacts on low-income and minority populations. These BMPs may include any or all of the following:

- Focused public information campaigns could be developed and implemented to provide technical and environmental health information directly to low-income and minority groups or to local agencies and representative groups. Key information would include the extent of any likely impact on air quality, drinking water supplies, subsistence resources, public services, and the relevant preventive measures that may be taken.
- Community health screenings for low-income and minority groups.
- Financial support to local libraries in low-income and minority communities could be provided for the development of information repositories on solar energy, including materials on the hazards and benefits of commercial development.

In addition to the environmental impacts that may affect low-income and minority populations, there are various economic impacts that may require mitigation, including lack of access to construction and operations employment. BMPs might include the following:

- Vocational training for the local low-income and minority workforce could be established to promote development of skills required by the solar energy industry, and
- Instructional materials could be developed for use in area schools to educate the local communities on the solar energy industry.

The likelihood of rapid population growth following the in-migration of workers in communities with low-income and minority populations could lead to overstressing of local community social structures. Beliefs and value systems among the local population and in migrants would likely contrast and, consequently, could lead to a range of changes in social and community life, including increases in crime, alcoholism, and drug use. In anticipation of these impacts, BMPs might include the following:

- Key information could be provided to local governments and directly to low-income and minority populations on the scale and timeline of expected solar projects and on the experience of other low-income and minority communities that have followed the same energy development path. In addition, information on planning activities that may be initiated to provide local infrastructure, public services, education, and housing could be made available.

C-B18: RECLAMATION

BEST MANAGEMENT PRACTICES

The following objectives, performance standards, and recommended reclamation BMPs and BMPs are based on the standards and guidelines found in the BLM and Forest Service Gold Book, 4th Edition, updated in 2007. [ ] Indicates site-specific values to be filled in by the authorized officer.

RECLAMATION OBJECTIVES

- The objective of interim reclamation is to restore vegetative cover and a portion of the landform sufficient to maintain healthy, biologically active topsoil; control erosion; and minimize habitat, visual, and forage loss during the life of the well or facilities.
- The long-term objective of final reclamation is to return the land to a condition approximating that which existed prior to disturbance. This includes restoration of the landform and natural vegetative community, hydrologic systems, visual resources, and wildlife habitats. To ensure that the long-term objective will be reached through human and natural processes, actions will be taken to ensure standards are met for site stability, visual quality, hydrological functioning, and vegetative productivity.

Reclamation Performance Standards

The following reclamation performance standards will be met:

Interim Reclamation – Includes disturbed areas that may be redisturbed during operations and will be redisturbed at final reclamation to achieve restoration of the original landform and a natural vegetative community.

- Will be judged successful when the BLM authorized officer determines that…
- Disturbed areas not needed for active, long-term production operations or vehicle travel have been recontoured, protected from erosion, and revegetated with a self-sustaining, vigorous, diverse, native (or as otherwise approved) plant community sufficient to minimize visual impacts, provide forage, stabilize soils, and impede the invasion of noxious, invasive, and non-native weeds.

Final Reclamation – Includes disturbed areas where the original landform and a natural vegetative community have been restored.

- Will be judged successful when the authorized officer determines that…
- The original landform has been restored for all disturbed areas including well pads, production facilities, roads, pipelines, and utility corridors.
- General: A self-sustaining, vigorous, diverse, native (or otherwise approved) plant community is established on the site, with a density sufficient to control erosion and invasion by non-native plants and to reestablish wildlife habitat or forage production.

At a minimum, the established plant community will consist of species included in the seed mix and/or desirable species occurring in the surrounding natural vegetation.

- Specific: No single species will account for more than [30]% total vegetative composition unless it is evident at higher levels in the adjacent landscape. Permanent vegetative cover will be determined successful when the basal cover of desirable perennial species is at least [80]% of the basal cover on adjacent or nearby undisturbed areas where vegetation is in a healthy condition; or [80]% of the potential basal cover as defined in the National Resource Conservation Service Ecological Site(s) for the area. Plants must be resilient as evidenced by well-developed root systems and flowers. [Shrubs, will be well established and in a "young" age class at a minimum (therefore, not comprised mainly of seedlings that may not survive until the following year).]
- In agricultural areas, irrigation systems and soil conditions are reestablished in such a way as to ensure successful cultivation and harvesting of crops.
- Erosion features are equal to or less than surrounding area and erosion control is sufficient so that water naturally infiltrates into the soil and gullying, headcutting, slumping, and deep or excessive rills (greater than 3 inches) are not observed.
- The site is free of State- or county-listed noxious weeds, oil field debris and equipment, and contaminated soil. Invasive and nonnative weeds are controlled.

Reclamation Actions

- During initial well pad, production facility, road, pipeline, and utility corridor construction and prior to completion of the final well on the well pad, pre-interim reclamation stormwater management actions will be taken to ensure disturbed areas are quickly stabilized to control surface water flow and to protect both the disturbed and adjacent areas from erosion and siltation. This may involve construction and maintenance of temporary silt ponds, silt fences, berms, ditches, and mulching.
- When the last well on the pad has been completed, some portions of the well location will undergo interim reclamation and some portions of the well pad will usually undergo final reclamation. Most well locations will have limited areas of bare ground, such as a small area around production facilities or the surface of a rocked road. Other areas will have interim reclamation where workover rigs and fracturing tanks may need a level area to set up in the future. Some areas will undergo final reclamation where portions of the well pad will no longer be needed for production operations and can be recontoured to restore the original landform.
- The following minimum reclamation actions will be taken to ensure that the reclamation objectives and standards are met. It may be necessary to take additional reclamation actions beyond the minimum in order to achieve the Reclamation Standards.

Reclamation - General

Procedure:

- The agency will be notified 24 hours prior to commencement of any reclamation operations.

Housekeeping:

- Immediately upon well completion, the well location and surrounding areas(s) will be cleared of, and maintained free of, all debris, materials, trash, and equipment not required for production.
- No hazardous substances, trash, or litter will be buried or placed in pits. Upon well completion, any hydrocarbons in the pit will be remediated or removed.

Vegetation Clearing:

- Vegetation removal and the degree of surface disturbance will be minimized wherever possible.
- *[Example of site-specific requirement*: During vegetation clearing activities, trees and woody vegetation removed from the well pad and access road will be moved aside prior to any soil disturbing activities. Care will be taken to avoid mixing soil with the trees and woody vegetation. Trees left for wood gathering will be cut [twelve inches or less from the ground], delimbed, and the trunks, six (6) inches or more in diameter will be removed and placed either by the uphill side of the access road, or moved to the end of the road, or to a road junction for easy access for wood gatherers and to reduce vehicle traffic on the well pad. Trees with a trunk diameter less than six (6) inches and woody vegetation will be used to trap sediment, slow runoff, or scattered on reclaimed areas to stabilize slopes, control erosion, and improve visual resources.]

Topsoil Management:

- Operations will disturb the minimum amount of surface area necessary to conduct safe and efficient operations. When possible, equipment will be stored and operated on top of vegetated ground to minimize surface disturbance.
- In areas to be heavily disturbed, the top [eight (8)] inches of soil material, will be stripped and stockpiled around the perimeter of the well location to control run-on and run-off, and to make redistribution of topsoil more efficient during interim reclamation. Stockpiled topsoil may include vegetative material. Topsoil will be clearly segregated and stored separately from subsoils.
- Earthwork for interim and final reclamation will be completed within 6 months of well completion or plugging unless a delay is approved in writing by the BLM authorized officer.
- Salvaging and spreading topsoil will not be performed when the ground or topsoil is frozen or too wet to adequately support construction equipment. If such equipment creates ruts in excess of four (4) inches deep, the soil will be deemed too wet.
- No major depressions will be left that would trap water and cause ponding.

Seeding:

- Seedbed Preparation. Initial seedbed preparation will consist of recontouring to the appropriate interim or final reclamation standard. All compacted areas to be seeded will be ripped to a minimum depth of 18 inches with a minimum furrow spacing of 2 feet,

followed by recontouring the surface and then evenly spreading the stockpiled topsoil. Prior to seeding, the seedbed will be scarified and left with a rough surface.

- If broadcast seeding is to be used and is delayed, final seedbed preparation will consist of contour cultivating to a depth of 4 to 6 inches within 24 hours prior to seeding, dozer tracking, or other imprinting in order to loosen up the soil and create seed germination micro-sites.
- Seed Application. Seeding will be conducted no more than 24 hours following completion of final seedbed preparation. A certified weed-free seed mix designed by BLM (shown below) to meet reclamation standards will be used. • The application rate shown in the table is based on [45] pure live seeds (PLS) per square foot, drill-seeded to a depth of 0.25 to 0.5 inch, which is the method that will be used where feasible. [However, shrub species will be seeded during the winter on the ground surface or preferably on top of snow.] In areas that will not be drill-seeded, the seed mix will be broadcast-seeded at twice the application rate shown in the table and covered no more than 0.25 inch deep with a harrow, drag bar, or roller or will be broadcast-seeded into imprints, such as fresh dozer cleat marks.
- No seeding will occur from [May 15 to September 15]. Fall seeding is preferred and will be conducted after [September 15] and prior to ground freezing. [Shrub species will be seeded separately and will be seeded during the winter.] Spring seeding will be conducted after the frost leaves the ground and no later than [May 15].

Erosion Control and Mulching:

- Mulch, silt fencing, waddles, hay bales, and other erosion control devices will be used on areas at risk of soil movement from wind and water erosion.
- Mulch will be used if necessary to control erosion, create vegetation micro-sites, and retain soil moisture and may include hay, small grain straw, wood fiber, live mulch, cotton, jute, or synthetic netting. Mulch will be free from mold, fungi, and certified free of noxious or invasive weed seeds.
- If straw mulch is used, it will contain fibers long enough to facilitate crimping and provide the greatest cover.

Pit Closure:

- Reserve pits will be closed and backfilled within **sixty (60)** days of release of the rig. All reserve pits remaining open after **sixty (60)** days will require written authorization of the authorized officer. Immediately upon well completion, any hydrocarbons or trash in the pit will be removed. Pits will be allowed to dry, be pumped dry, or solidified in-situ prior to backfilling.
- Following completion activities, pit liners will be completely removed or removed down to the solids level and disposed of at an approved landfill, or treated to prevent their reemergence to the surface and interference with long-term successful revegetation. If it was necessary to line the pit with a synthetic liner, the pit will not be trenched (cut) or filled (squeezed) while containing fluids. When dry, the pit will be backfilled with a minimum of 5 feet of soil material. In relatively flat areas the pit area

will be slightly mounded above the surrounding grade to allow for settling and to promote surface drainage away from the backfilled pit.

Management of Invasive, Noxious, and Non-Native Species:

- All reclamation equipment will be cleaned prior to use to reduce the potential for introduction of noxious weeds or other undesirable non-native species.
- An intensive weed monitoring and control program will be implemented prior to site preparation for planting and will continue until interim or final reclamation is approved by the authorized officer.
- Monitoring will be conducted at least annually during the growing season to determine the presence of any invasive, noxious, and nonnative species. Invasive, noxious, and non-native species that have been identified during monitoring will be promptly treated and controlled. A Pesticide Use Proposal (PUP) will be submitted to the BLM for approval prior to the use of herbicides.

Interim Reclamation Procedures - Additional

Recontouring:

- Interim reclamation actions will be completed no later than 6 months from when the final well on the location has been completed, weather permitting. The portions of the cleared well site not needed for active operational and safety purposes will be recontoured to the original contour if feasible, or if not feasible, to an interim contour that blends with the surrounding topography as much as possible. Sufficient semi-level area will remain for setup of a workover rig and to park equipment. In some cases, rig anchors may need to be pulled and reset after recontouring to allow for maximum interim reclamation.
- If the well is a producer, the interim cut and fill slopes prior to reseeding will not be steeper than a 3:1 ratio, unless the adjacent native topography is steeper. Note: Constructed slopes may be much steeper during drilling, but will be recontoured to the above ratios during interim reclamation.
- Roads and well production equipment will be placed on location so as to permit maximum interim reclamation of disturbed areas. If equipment is found to interfere with the proper interim reclamation of disturbed areas, the equipment will be moved so proper recontouring and revegetation can occur.

Application of Topsoil & Revegetation:

- Topsoil will be evenly respread and aggressively revegetated over the entire disturbed area not needed for all-weather operations including road cuts & fills and to within a few feet of the production facilities, unless an all-weather, surfaced, access route or small “teardrop” turnaround is needed on the well pad.
- In order to inspect and operate the well or complete workover operations, it may be necessary to drive, park, and operate equipment on restored, interim vegetation within the previously disturbed area. Damage to soils and interim vegetation will be repaired and reclaimed following use. To prevent soil compaction, under some situations, such

as the presence of moist, clay soils, the vegetation and topsoil will be removed prior to workover operations and restored and reclaimed following workover operations.

Visual Resources Mitigation for Reclamation:

- Trees, if present, and vegetation will be left along the edges of the pads whenever feasible to provide screening.
- To help mitigate the contrast of recontoured slopes, reclamation will include measures to feather cleared lines of vegetation and to save and redistribute cleared trees, debris, and rock over recontoured cut and fill slopes.
- To reduce the view of production facilities from visibility corridors and private residences, facilities will not be placed in visually exposed locations (such as ridgelines and hilltops).
- Production facilities will be clustered and placed away from cut slopes and fill slopes to allow the maximum recontouring of the cut and fill slopes.
- All long-term above ground structures will be painted [Covert Green] (from the "Standard Environmental Colors" chart) to blend with the natural color of the late summer landscape background.

Final Reclamation Procedures – Additional

- Final reclamation actions will be completed within 6 months of well plugging, weather permitting.
- All disturbed areas, including roads, pipelines, pads, production facilities, and interim reclaimed areas will be recontoured to the contour existing prior to initial construction or a contour that blends indistinguishably with the surrounding landscape. Resalvaged topsoil will be respread evenly over the entire disturbed site to ensure successful revegetation. To help mitigate the contrast of recontoured slopes, reclamation will include measures to feather cleared lines of vegetation and to save and redistribute cleared trees, woody debris, and large rocks over recontoured cut and fill slopes.
- Water breaks and terracing will only be installed when absolutely necessary to prevent erosion of fill material. Water breaks and terracing are not permanent features and will be removed and reseeded when the rest of the site is successfully revegetated and stabilized.
- If necessary to ensure timely revegetation, the pad will be fenced to BLM standards to exclude livestock grazing for the first two growing seasons or until seeded species become firmly established, whichever comes later. Fencing will meet standards found on page 18 of the BLM/FS Gold Book, 4th Edition, or will be fenced with operational electric fencing.
- Final abandonment of pipelines and flowlines will involve flushing and properly disposing of any fluids in the lines. All surface lines and any lines that are buried close to the surface that may become exposed in the foreseeable future due to water or wind erosion, soil movement, or anticipated subsequent use, must be removed. Deeply buried lines may remain in place unless otherwise directed by the authorized officer.

Reclamation Monitoring and Final Abandonment Approval

- Reclaimed areas will be monitored annually. Actions will be taken to ensure that reclamation standards are met as quickly as reasonably practical.
- Reclamation monitoring will be documented in an annual reclamation report submitted to the authorized officer by [March 1]. The report will document compliance with all aspects of the reclamation objectives and standards, identify whether the reclamation objectives and standards are likely to be achieved in the near future without additional actions, and identify actions that have been or will be taken to meet the objectives and standards. The report will also include acreage figures for: Initial Disturbed Acres; Successful Interim Reclaimed Acres; Successful Final Reclaimed Acres. Annual reports will not be submitted for sites approved by the authorized officer in writing as having met interim or final reclamation standards. Monitoring and reporting continues annually until interim or final reclamation is approved. Any time 30% or more of a reclaimed area is redisturbed, monitoring will be reinitiated.
- The authorized officer will be informed when reclamation has been completed, appears to be successful, and the site is ready for final inspection.

Appendix D

Errata Sheet

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WEST CHOCOLATE MOUNTAIN GEOTHERMAL LEASING EIS

ERRATA SHEET

INTRODUCTION

During their review of the Final EIS, U.S. EPA noticed some mistakes and errors in certain sections, it was determined that since most of these errors were small and were primarily "typos" an errata sheet should be issued to correct these. These errors did not result in changes to the Use Measures, Stipulations, or other BMPs listed in the Final EIS.

AIR QUALITY

Text in the West Chocolate Mountains Renewable Energy Evaluation Area Final Environmental Impact Statement (pgs. ES-12) is revised as follows:

> At least under Alternatives 3, 5, and 6, ~~D~~direct and indirect air emissions ~~are not expected to~~ are likely to exceed *de minimis* levels ~~to~~ and thus trigger a Federal Conformity Determination for NOx and PM_{10}.

Text in the West Chocolate Mountains Renewable Energy Evaluation Area Final Environmental Impact Statement (pgs. 4-78) is revised as follows:

> Since the full build out of the geothermal, solar, and wind RFD scenario could occur in the same air basin, cumulative impact issues could result from concurrent construction and operation of all elements of the RFD scenarios simultaneously. A preliminary comparison of the estimated emissions for the concurrent construction and operation of the ~~full~~ geothermal, full solar, and wind RFD scenarios (assumed to be developed in a four-year period) against the General Conformity thresholds shows that there is the potential for exceedances of ozone precursors (~~VOCs and~~ NOx) and PM10 annual emissions (Table 4.1-26). It should be noted that this conclusion corresponds to a general assessment, since the specifics of each geothermal energy project are not known. BMPs discussed in Appendices I-A and I-B are just a few examples of the types of protective measures ~~solutions~~ available to minimize air quality impacts. The BLM would not approve construction or operation of a facility unless air quality permit conditions and approvals are obtained by a project applicant from the ICAPCD, the SDAPCD, or the SCAQMD (depending on which is the relevant agency). Thus, this alternative would comply with the Air Quality Element of the CDCA Plan. A more detailed analysis would be conducted on a project-level basis to determine the detailed emissions, mitigation, and cumulative issues. ~~Since this is a programmatic document and~~ C~~c~~onformity is typically considered~~done~~ at the project level. A~~, a~~ conformity determination is~~would~~ not be required at the planning stage, and this discussion is therefore programmatic in character to inform the decision-maker regarding impacts, in a general way.

Table 4.1-26 to note that VOC emissions will exceed not exceed de minimis thresholds in Years 3 or 4.

Text in the West Chocolate Mountains Renewable Energy Evaluation Area Final Environmental Impact Statement (pgs. 4-401) is revised as follows:

The largest increase in air emissions, primarily occurring during construction, would take place under Alternative 3. ~~Whether t~~These emissions ~~would~~ are likely to trigger federal conformity or otherwise degrade air quality ~~to cause a change in attainment status is speculative at this time~~ and would trigger a Federal Conformity Determination.

DEVELOPMENT CAP STIPULATION

Text in the West Chocolate Mountains Renewable Energy Evaluation Area Final Environmental Impact Statement (pgs. ES-13 through ES-19) is revised as follows:

Noise

The development cap would limit geothermal and solar energy surface disturbance~~development~~ east of the Coachella Canal to less than 10 ~~a maximum of 10~~ percent of the BLM managed surface land (~~706~~ 700 acres) in the REEA.

Topography, Geology, and Geologic Hazards

The development cap would limit geothermal and solar energy energy surface disturbance~~development~~ east of the Coachella Canal to to less than 10 ~~a maximum of 10~~ percent of the BLM managed surface land (~~706~~ 700 acres) in the REEA.

Soils

The development cap would limit geothermal and solar energy energy surface disturbance~~development~~ east of the Coachella Canal to less than 10 ~~a maximum of 10~~ percent of the BLM managed surface land (~~706~~ 700 acres) in the REEA.

Water Resources

The development cap would limit geothermal and solar energy surface disturbance~~development~~ east of the Coachella Canal to less than 10 ~~a maximum of 10~~ percent of the BLM managed surfaceland (~~706~~ 700 acres) in the REEA.

Vegetation

The development cap would limit geothermal and solar energy surface disturbance~~development~~ east of the Coachella Canal to less than 10 ~~a maximum of 10~~ percent of the BLM managed surface land (~~706~~ 700 acres) in the REEA.

Fish and Wildlife

The development cap would limit geothermal and solar energy surface disturbance~~development~~ east of the Coachella Canal less than 10 ~~a maximum of 10~~ percent of the BLM managed surface land (~~706~~ 700 acres) in the REEA.

Special Status Species
The development cap would limit geothermal and solar energy surface disturbance~~development~~ east of the Coachella Canal to less than 10 ~~a maximum of 10~~ percent of the BLM managed surface land (~~706~~ 700 acres) in the REEA.

Cultural Resources
The development cap would limit geothermal and solar energy surface disturbance~~development~~ east of the Coachella Canal less than 10 ~~a maximum of 10~~ percent of the BLM managed surface land (~~706~~ 700 acres) in the REEA.

Paleontological Resources
The development cap would limit geothermal and solar energy surface disturbance~~development~~ east of the Coachella Canal to less than 10 ~~a maximum of 10~~ percent of the BLM managed surface land (~~706~~ 700 acres) in the REEA.

Visual Resources
The development cap would limit geothermal and solar energy surface disturbance~~development~~ east of the Coachella Canal to less than 10 ~~a maximum of 10~~ percent of the BLM managed surface land (~~706~~ 700 acres) in the REEA.

Lands and Realty
The development cap would limit geothermal and solar energy surface disturbance~~development~~ east of the Coachella Canal to less than 10 ~~a maximum of 10~~ percent of the BLM managed surface land (~~706~~ 700 acres) in the REEA.

Human Health and Safety/Hazardous Materials
The development cap would limit geothermal and solar energy surface disturbance~~development~~ east of the Coachella Canal to less than 10 ~~a maximum of 10~~ percent of the BLM managed surface land (~~706~~ 700 acres) in the REEA.

Energy and Minerals
The development cap would limit geothermal and solar energy surface disturbance~~development~~east of the Coachella Canal to less than 10 ~~a maximum of 10~~ percent of the BLM managed surface land (~~706~~ 700 acres) in the REEA.

Recreation
The development cap would limit geothermal and solar energy surface disturbancedevelopment east of the Coachella Canal to less than 10 ~~a maximum of 10~~ percent of the BLM managed surface land (~~706~~ 700 acres) in the REEA.

Special Management Areas
The development cap would limit geothermal and solar energy surface disturbance~~development~~ east of the Coachella Canal to less than 10 ~~a maximum of 10~~ percent of the BLM managed surface land (~~706~~ 700 acres) in the REEA.

Social and Economic Conditions
The development cap would limit geothermal and solar energy surface disturbance~~development~~ east of the Coachella Canal to less than 10 ~~a maximum of 10~~ percent of the BLM managed surface land (~~706~~ 700 acres) in the REEA.

Transportation and Traffic
The development cap would limit geothermal and solar energy surface disturbance~~development~~ east of the Coachella Canal to less than 10 ~~a maximum of 10~~ percent of the BLM managed surface land (~~706~~ 700 acres) in the REEA.

Text in the West Chocolate Mountains Renewable Energy Evaluation Area Final Environmental Impact Statement (pgs. 2-29) is revised as follows:

Development Cap (Controlled Surface Use [CSU]) - Surface ~~modification~~disturbance shall be limited to less than 10 percent of the ~~total~~ BLM managed surface land~~acreage~~ in the REEA east of the Coachella Canal based upon an estimated 7,006 total acres east of the Coachella Canal.

Text in the West Chocolate Mountains Renewable Energy Evaluation Area Final Environmental Impact Statement (Table 4-1, pgs. 4-8) is revised as follows:

Alternative 3

Wind

Indirect Impacts:
- The development cap would limit ~~solar~~ energy surface disturbance~~development~~ east of the Coachella Canal to less than 10 ~~a maximum of 10~~ percent of the BLM managed surface land (700 acres) in the REEA.

Text in the West Chocolate Mountains Renewable Energy Evaluation Area Final Environmental Impact Statement (Table 4-1, pgs. 4-9) is revised as follows:

Alternative 3

Geothermal

Indirect Impacts
- The development cap would limit ~~geothermal, solar, and wind~~ energy surface disturbance~~development~~ east of the Coachella Canal to less than 10 ~~a maximum of 10~~ percent of the BLM managed surface land (700 acres) in the REEA.

Alternative 5

Geothermal

Indirect Impacts

- The development cap would limit energy ~~geothermal and solar~~ surface disturbance~~development~~ east of the Coachella Canal to less than 10 ~~a maximum of 10~~ percent of the BLM managed surface land (700 acres) in the REEA.

Alternative 6

Geothermal

- The development cap would limit energy ~~geothermal and solar~~ surface disturbance~~development~~ east of the Coachella Canal to less than 10 ~~a maximum of 10~~ percent of the BLM managed surface land (700 acres) in the REEA.

Text in the West Chocolate Mountains Renewable Energy Evaluation Area Final Environmental Impact Statement (Table 4-1, pgs. 4-14) is revised as follows:

Alternative 5

Solar

- The stipulations to protect water resources and the development cap would limit ~~geothermal~~ energy development east of the Coachella Canal to less than 10 ~~a maximum of 10~~ percent of the BLM managed surface land (700 acres) in the REEA.

Text in the West Chocolate Mountains Renewable Energy Evaluation Area Final Environmental Impact Statement (Table 4-1, pgs. 4-16) is revised as follows:

Alternative 5

Solar

- The development cap would limit ~~geothermal~~ energy surface disturbance~~development~~ east of the Coachella Canal to less than 10 ~~a maximum of 10~~ percent of the BLM managed surface land (700 acres) in the REEA.

Text in the West Chocolate Mountains Renewable Energy Evaluation Area Final Environmental Impact Statement (Table 4-1, pgs. 4-20) is revised as follows:

Alternative 6

Solar

Direct Impacts
The development cap would limit ~~geothermal~~ energy surface disturbance~~development~~ east of the Coachella Canal to less than 10 ~~a maximum of 10~~ percent of the BLM managed surface land (700 acres) in the REEA.

Text in the West Chocolate Mountains Renewable Energy Evaluation Area Final Environmental Impact Statement (Table 4-1, pgs. 4-29) is revised as follows:

Alternative 6

Geothermal
The development cap would limit ~~solar~~ energy development east of the Coachella Canal to less than 10 ~~a maximum of 10~~ percent of the BLM managed surface land (700 acres) in the REEA.

Text in the West Chocolate Mountains Renewable Energy Evaluation Area Final Environmental Impact Statement (pgs. 4-103) is revised as follows:

Indirect Noise Impacts from Solar Energy Development
No indirect effects were identified for this resource area as a result of development consistent with the solar RFD scenario since the anticipated long-term increment in noise levels would not induce changes in the pattern of land use, population growth rate, or related effects on natural ecosystems. Potential increases in vehicle traffic on SR 111 during construction and operations could generate direct localized impacts on existing ambient sound conditions, but these effects are not expected to induce indirect impacts. Additionally, the development cap would limit ~~geothermal~~ energy surface disturbance~~development~~ east of the Coachella Canal to less than 10 ~~a maximum of 10~~ percent of the BLM managed surface land (700 acres) in the REEA, which would also minimize the amount of noise that could be generated.

Text in the West Chocolate Mountains Renewable Energy Evaluation Area Final Environmental Impact Statement (pgs. 4-157) is revised as follows:

The designation as an SEZ would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments to occur within the West Chocolate Mountains SEZ, including wind energy development which could lead to an increase in impacts to water resources from wind energy projects although the development cap would limit ~~geothermal~~ energy surface disturbance~~development~~ east of the Coachella Canal to less than 10 ~~a maximum of 10~~ percent of the BLM managed surface land (700 acres) in the REEA.

Text in the West Chocolate Mountains Renewable Energy Evaluation Area Final Environmental Impact Statement (pgs. 4-310) is revised as follows:

> Direct adverse effects to energy and mineral resources could occur from development of up to 6,637 acres of CSP (dish engine technology only) or up to 29,758 acres of PV power, although lands acquired by BLM with LWCF funds would be managed as avoidance areas. Direct impacts to energy and minerals could occur based on the criteria outlined above. The sand and gravel mining operation near Frink Spring mentioned in Section 3.14.4 (Steward 2010) could experience short-term access effects during construction and decommissioning of solar PV or CSP facilities, depending on proximity to that mining operation. This same impact may also occur for maintenance and repair crews for existing transmission lines within the West Chocolate Mountains REEA. During operation, each solar PV facility could result in the long-term loss of approximately 450 acres of land which could be used in other forms of energy and mineral resource development in the REEA, while each CSP facility could result in approximately 2,482 acres lost. The amount of land that could be developed for solar energy could preclude development of other renewable energy sources, such as geothermal. In addition, all lands east of the Coachella Canal would have a development cap which would limit ~~geothermal~~ energy surface disturbance~~development~~ east of the Coachella Canal to less than 10 ~~a maximum of 10~~ percent of the BLM managed managed surface (700 acres) in the REEA.

INCONSISTENCIES IN VALUES USED IN REASONABLY FORESEEABLE DEVELOPMENT SCENARIOS

Text in the West Chocolate Mountains Renewable Energy Evaluation Area Final Environmental Impact Statement (Table 1 [pg. 4 of Appendix B]) is revised to indicate that **7,049** acres (instead of 15,743 acres) of BLM land have a slope of 3 percent or less and **9,066** acres (instead of 16,954 acres) of BLM land have a slope of 5 percent or less.

Text in the West Chocolate Mountains Renewable Energy Evaluation Area Final Environmental Impact Statement (pg. 17 of Appendix B) is revised as follows:

> The RFD scenario identifies a range of total disturbance of ~~13,473~~ 6,637 acres to about ~~49,864~~ 29,758 acres for PV energy. There would be approximately ~~13,480~~ 6,637 acres within the West Chocolate REEA of surface disturbance for CSP technology. This includes use of adjacent, non-BLM lands for project development; BLM land usage would be considerably smaller. Using 9 acres per MW (PV) or up to 5 acres per MW (CSP), there could be as much as ~~5,540~~ 3,306 MW (PV) or up to ~~2,696~~ 1,327 MW (CSP) energy produced within the West Chocolate planning area, assuming full build out solely for solar energy. ~~This would result in between 30 to 111~~ 15-66 PV projects of 50 MW ~~each and three to five,~~ once to two ~~500-MW CSP projects could be constructed. Thus,~~

~~under the RFD scenario there could be a minimum of three, maximum of two 500-MW projects to a maximum of 111, 66 50-MW PV projects, or a combination thereof.~~

Text in the West Chocolate Mountains Renewable Energy Evaluation Area Final Environmental Impact Statement (Table 2-6 [pg. 2-21]) is revised as follows:

Table 2-6 Surface Disturbance for Solar Power Plants in the West Chocolate Mountains REEA

Technology Type	BLM Disturbance (acres)	Total Disturbance (acres)	Size Total Output (megawatts)
Solar Trough	1,593	6,637	~~500~~ 1,327
Dish – Engine	1,593	6,637	~~500~~ 737
Power Tower	1,593	6,637	~~500~~ 737
PV			
1% Slope or less	1,593	6,637	~~50~~ 737
3% Slope or less	7,048	25,683	~~50~~ 2,857
5% Slope or less	9,066	29,758	~~50~~ 3,306

Text in the West Chocolate Mountains Renewable Energy Evaluation Area Final Environmental Impact Statement (Appendix J, Comment FA 2-41) is revised as follows:

- Table 2-7 is now Table 2-6;
- Table 2-10 is now Table 2-9; and
- Table 2-15 is now Table 2-13.

Text in the West Chocolate Mountains Renewable Energy Evaluation Area Final Environmental Impact Statement (Table 4-1 [pgs. 4-9]) is revised as follows:

Solar

Direct Impacts

- ~~30 to 111~~ Development of solar PV projects of 50 MW each could occur, resulting in short-term impacts such as clearing and grading activities.

Text in the West Chocolate Mountains Renewable Energy Evaluation Area Final Environmental Impact Statement (Table 2-7 [pgs. 2-22]) is revised as follows:

> This ratio is based on the percentage of land within the REEA that is managed by the BLM for ~~geothermal leasing~~ wind energy (31 percent [~~10,597~~ 9,162 acres BLM/~~33,738~~ 29,929 acres total]). Thus, 31 percent of any given wind project in the REEA would be developed on BLM land and 69 percent would occur on non-BLM land.

Table 2-7. Land Available for Wind Energy Development

Landowner	Acreage
BLM	~~10,597~~ 9,162
State	~~1,090~~ 1,061
Private	~~22,050~~ 19.704
Total	**~~33,738~~ 29,929**

Text in the West Chocolate Mountains Renewable Energy Evaluation Area Final Environmental Impact Statement (Appendix C [pgs. 2]) is revised as follows:

> ….based on the percentage of land within the REEA that is managed by the BLM for ~~geothermal leasing~~ wind energy (31 percent [9,162 acres BLM/29,929 acres total]).

Text in the West Chocolate Mountains Renewable Energy Evaluation Area Final Environmental Impact Statement (pg. 4-370), regarding Alternative 6, is revised as follows:

> The partial build-out for the solar RFD scenario is assumed to be the construction and operation of one ~~15~~ 50 MW solar PV power plant and one ~~150~~ 500 MW solar dish ~~trough~~ power plant.

Text in the West Chocolate Mountains Renewable Energy Evaluation Area Final Environmental Impact Statement (pg. 4-160), regarding Alternative 6, is revised as follows:

> The FEIS states each 500 MW CSP plant could result in land disturbance of ~~2,500~~ 4,500 acres.

MISCELLANEOUS COMMENTS AND EDITS

Text in the West Chocolate Mountains Renewable Energy Evaluation Area Final Environmental Impact Statement (Table 1-1 [pg. 1-7), is revised as follows:

Table 1-1 Surface and Mineral Ownership

Land Owner	Land Interest	Acres
BLM	Federal surface/federal minerals	18,765
Bureau of Reclamation (BOR)	Federal surface/federal minerals	1,480
California State Lands Commission (CSLC)	State surface/state subsurface	3,806
Private Land	Private surface/private subsurface[3]	38,624
Catellus Corporation (acquired lands)	Federal surface/private subsurface	2,863
Split Estate[1]	Private surface/federal minerals	~~1,262~~[2] 1,782
	Total	**64,058**[4]

Notes:

[1] Split Estate lands are defined as lands where the surface land owner does not own the underlying mineral estate. In the case of the West Chocolate Mountains REEA, 1,782 surface acres are privately owned and the same underlying mineral estate acreage is owned by the BLM.

[2] Of the ~~1,262~~ 1,782 acres of split estate; 1,182 acres are all minerals, 520 acres are oil and gas only, and 80 acres are geothermal only. This means there are 1,262 acres of split estate available for geothermal leasing. The 1,782 acres of private surface are included in the 38,624 acres of private land listed in the table.

[3] Includes split estate.

[4] Total does not include 1,480 acres of BOR lands and 1,782 acres of Split Estate.

Text in the West Chocolate Mountains Renewable Energy Evaluation Area Final Environmental Impact Statement (pg. 1-27), is revised as follows:

> The ~~Supplement to the Solar~~ Final PEIS (DOE 201~~4~~2) defined variance areas and a variance application process for approximately ~~1.4~~ 19 million acres.

Text in the West Chocolate Mountains Renewable Energy Evaluation Area Final Environmental Impact Statement (pg. 4-144), regarding Hydrology/Floodplains, is revised as follows:

> Developing solar energy on almost ~~84~~ 45 percent of the project acreage could adversely impact floodplain function.

Text in the West Chocolate Mountains Renewable Energy Evaluation Area Final Environmental Impact Statement (Appendix J, Comment FA 2-15) is revised as follows:

> Change the reference to Table 3.1-1 from the "Supplemental Draft" to the "Final" Solar PEIS (BLM 2012) in the Response to Comments (FA2-15).

ATTACHMENT A

Text in the West Chocolate Mountains Renewable Energy Evaluation Area Final Environmental Impact Statement (Page 4-154, Alternative 3) is revised as follows:

> Construction water needs for PV could be up to ~~2.26~~ 1.35 AF/year/acre and CSP (dry cooling) could be up to ~~1.484~~ 0.45 AF/year/acre. The operational water needs (primarily for panel ~~and~~ or mirror cleaning) are estimated to be up to 0.~~05~~22 AF/year/MW for PV and ~~4.5 to 14.5~~ 0.80 AF/year/MW for CSP. If all facilities became operational simultaneously, the total operational water demand could be up to ~~33~~ 6,547 AF/year for PV and ~~10,875~~ 5,310 AF/year for CSP (trough and tower). Over the 30-year lifespan of these facilities, the total cumulative operational water demand could be up to ~~362,250~~ 196,400 AF.
>
> The annual operational water requirements could thus be up to 24 percent of the current IID allocation for non-industrial projects.

Text in the West Chocolate Mountains Renewable Energy Evaluation Area Final Environmental Impact Statement (Page 4-158, Alternative 5-partial geothermal) is revised as follows:

> Water demand for dust suppression is approximately ~~0.01~~ 0.1 to 0.28 AF ~~(3,225 32,585 to 65,170 gallons/acre)~~, for a total potential demand of ~~3.42~~ 33.3 to 96.6 AF ~~(1,090,050 10,850,838 gallons)~~, a relatively small quantity of water, depending on the time of use.

Text in the West Chocolate Mountains Renewable Energy Evaluation Area Final Environmental Impact Statement (Pg. 4-160, Alternative 6) is revised as follows:

> It is estimated that each 50-MW solar PV plant could result in 450 acres of land disturbance and each 500-MW CSP plant (dish technology only) could result in land disturbance of ~~2,500~~ 4,500 acres.
>
> Assuming construction water needs are 0.01 0.16 AF/acre for PV, the total construction water demand could range between approximately ~~134 to 199~~ 1,105 to 4,559 AF.
>
> The operational water needs for one 50 MW PV facility and one 500 MW CSP project (dish engine technology only) are estimated to be up to 0.05 AF/year/MW for the PV facility and ~~4.5 to 14.5~~ 0.5 AF/year/MW for CSP dish technology. If all PV facilities became operational simultaneously, the total operational water demand could be up to

~~1,665~~ 165.3 AF/yr~~/MW~~. Over the 30 years lifespan of these facilities, the total cumulative operational water demand could be ~~49,950~~ 4,959 AF~~/yr/MW~~. If all dish facilities became operational simultaneously, the total operational water demand could be up to 368.5 AF/yr. Over the 30 year lifespan of these facilities, the total cumulative operational water demand could be 11,055 AF.

Text in the West Chocolate Mountains Renewable Energy Evaluation Area Final Environmental Impact Statement (Pg. 4-161, Alternative 6) is revised as follows:

The annual operational water requirement could be ~~43~~ 0.6 to 1.5 percent of the current allocation for non-industrial projects.

WEST CHOCOLATE MOUNTAIN GEOTHERMAL LEASING AREA

LEGAL DESCRIPTION – BLM "GAP" BETWEEN AREA AND GUNNERY RANGE

The "Gap" area is not listed in the FEIS, however, it is shown in Figure 2-1 and in all figures in the Final EIS. The gap is that area that is southwest of the canal, but not in the original REEA. Some of the Federal subsurface mineral only (split estate) is identified as Federal surface lands in the FEIS. The sections of Bureau of Reclamation lands within the REEA are not identified in the FEIS, or they are erroneously identified as BLM managed lands.

(a) PUBLIC LANDS

San Bernardino Meridian

T. 9 S., R. 12 E.,
sec. 12, NE¼NE¼ southwest of the Coachella Canal.

T. 9 S., R. 13 E.,
sec. 18, NE¼NE¼ southwest of the Coachella Canal, SW¼NE¼, and SE¼NE¼ southwest of the Coachella Canal;
sec. 20, N½NE¼ southwest of the Coachella Canal, SE¼NE¼ , and NE¼NW¼;
sec. 22, N½SW¼ southwest of the Coachella Canal and S½SE¼ southwest of the Coachella Canal;
sec. 26, S½NE¼ southwest of the Coachella Canal, N½NW¼ southwest of the Coachella Canal, SE¼NW¼ southwest of the Coachella Canal, and N½SE¼ southwest of the Coachella Canal.

T. 10 S., R. 14 E.,
sec. 6, lots 4,5,9,10, and 11, southwest of the Coachella Canal, lots 8 and 12, and NE¼SE¼;
sec. 8, NE½ NE¼ southwest of the Coachella Canal, NW¼NE¼ southwest of the Coachella Canal, and SE¼NE¼ southwest of the Coachella Canal.

The areas described aggregate 1,200 acres, more or less, in Imperial County.

(b) NON FEDERAL

San Bernardino Meridian

T. 9 S., R. 12 E.,
sec. 1, lots 1 and 2 southwest of the Coachella Canal, SW¼, and W½SE¼ southwest of the Coachella Canal, and SE¼SE¼ southwest of the Coachella Canal.

T. 9 S., R. 13 E.,
sec. 7, lots 3-6, inclusive, southwest of the Coachella Canal, E½SW¼ southwest of the Coachella Canal, and SW¼SE¼ southwest of the Coachella Canal.
sec. 17, SW¼ southwest of the Coachella Canal;
sec. 21, SW¼SW¼NE¼ southwest of the Coachella Canal, SW¼NW¼NW¼ southwest of the Coachella Canal, and S½NW¼ southwest of the Coachella Canal, SW¼, and SE¼ southwest of the Coachella Canal.

T. 9 S., R. 14 E.,
sec. 31, lot 12 and 13 southwest of the Coachella Canal.

T. 10 S., R. 14 E.,
sec. 5, lot 14 southwest of the Coachella Canal, NE¼SW¼ southwest of the Coachella Canal, NW¼SW¼ southwest of the Coachella Canal, SW¼SW¼, SE¼SW¼ southwest of the Coachella Canal, and SW¼SE¼ southwest of the Coachella Canal;
sec. 9, SW¼SE¼NW¼ southwest of the Coachella Canal, SW¼NW¼ southwest of the Coachella Canal, NE¼SW¼ southwest of the Coachella Canal, NW¼SW¼, SW¼SW¼, SE¼SW¼, SW¼NW¼SE¼ southwest of the Coachella Canal, SW¼SE¼ southwest of the Coachella Canal, and SE¼SE¼ southwest of the Coachella Canal;
sec.15, N½SW¼ southwest of the Coachella Canal, S½SW¼, W½SE¼ southwest of the Coachella Canal;
sec. 23, W½NW¼ southwest of the Coachella Canal, N½SW¼ southwest of the Coachella Canal, S½SW¼, W½SE¼ southwest of the Coachella Canal, SE¼SE¼ southwest of the Coachella Canal;
sec. 25, W½NW¼ southwest of the Coachella Canal, SE¼NW¼ southwest of the Coachella Canal, SE¼SW½, NE¼SW¼ southwest of the Coachella Canal, W½SE¼ southwest of the Coachella Canal, and SE¼SE¼ Southwest of the Coachella Canal.

The areas described aggregate 3,020 acres, more or less, in Imperial County.

(c) STATE LANDS

T. 9 S., R. 13 E.,
sec. 36, E½NE¼ southwest of the Coachella Canal, NW¼ southwest of the Coachella Canal, SW¼, and SE¼ southwest of the Coachella Canal.

The areas described aggregate 560 acres, more or less, in Imperial County

(d) MILITARY

T. 9 S., R. 13 E.,
sec. 17, SW¼SW¼NW¼ southwest of the Coachella Canal and SW¼SW¼SE¼ southwest of the Coachella Canal, and SW¼ southwest of the Coachella Canal;
sec. 25, W½SW¼ southwest of the Coachella Canal and SW¼SE¼SW¼ southwest of the Coachella Canal.

T. 10 S., R. 14 E.,
sec. 22, NE¼NE¼ southwest of the Coachella Canal, NW¼NE¼, and SE¼NE¼.

The areas described aggregate 390 acres, more or less, in Imperial County

The areas described aggregate 5,170 acres, more or less, in Imperial County.

WEST CHOCOLATE REEA

SURFACE AND SUBSURFACE OWNERSHIP

IMPERIAL COUNTY, CALIFORNIA

San Bernardino Meridian

a) PUBLIC LANDS

T.9 S., R., 12 E.,
sec. 2, E½SE¼SW¼, S½NE¼SE¼, and S½SE¼;
sec. 4, lots 1 and 2 and S½;
sec. 6, lots 1 and 2 and SE¼;
sec. 8, E½;
sec. 10;
sec. 12, W½NE¼, SE¼NE¼, W½, N½SE¼, and SE¼SE¼;
sec. 14, W½NE¼ and NW¼;
sec. 18, lots 1 and 2 and E½;
sec. 20;
sec. 24;
sec. 26, S½NW¼ and S½.

T. 9 S., R. 13 E.,
sec. 18, lots 3-6, inclusive, E½NW¼, E½SW¼, and SE¼;
sec. 20, SW¼NE¼, NW¼NW¼, S½NW¼, SW¼, and SE¼;
sec. 22, S½SW¼ southwest of the Coachella Canal;
sec. 26, SW¼NW¼, SW¼, and S½SE¼;
sec. 28;
sec. 30, E½SW¼ and S½SE¼;
sec. 32;
sec. 34.

T. 10 S. R. 13 E.,
sec. 4, lots 6, 7, and 14 and SW¼;
sec. 6, lots 2 to 15, inclusive, E½SW¼, and SE¼.

T. 10 S., R. 14 E.,
sec. 6, lots 6, 7, and lots 13 to 16, inclusive, E½SW¼, W½SE¼, and SE¼SE¼;
sec. 8, SW¼NE¼, NW¼, SW¼, and SE¼;
sec. 22, SW¼NE¼, NW¼, SW¼, and SE¼;
sec. 26, NE¼, N½NW¼, N½SE¼NW¼, S½N½SW¼, S½SW¼, and SE¼.
sec. 28, NE¼SE¼.

T. 10 S., R. 15 E.,
sec. 32.

T. 11 S., R. 14 E.,
sec. 12, NE¼NE¼.

T. 11 S., R. 15 E.,
sec. 4, lots 3-6 inclusive, S½NE¼, S½NW¼, SW¼, and SE¼;
sec. 6, lots 4-9 inclusive, S½NE¼, SE¼NW¼, E½SW¼, and SE¼;
sec. 8, S½NE¼, NW¼, SW¼, SE¼;
sec. 10;
sec. 11;
sec. 13;
sec. 14;
sec. 18, E½NE¼ and NE½SE¼;
sec. 20, NE¼, N½NW¼, SE¼NW¼, N½SE¼, and SE¼SE¼;
sec. 24;
sec. 28, NE¼, N½NW¼, SE¼NW¼, N½SE¼, and SE¼SE¼;
sec. 34, NE¼SW¼.

T. 11 S., R. 16 E.,
sec. 19, lots 3-18 inclusive, NE¼, and SE¼;
sec. 29;
sec. 30, lots 3-18 inclusive, NE¼, and SE¼.

The areas described aggregate 21,233 acres, more or less, in Imperial County.

(b). FEDERAL- Bureau of Reclamation

T. 11 S., R. 15 E.,
sec. 6, lot 3;
sec. 8, N½NE¼;
sec.18, SE¼SE¼;
sec. 20, SW¼NW¼;
sec. 22;
sec. 26;
sec. 28. SW¼NW¼.

The areas described aggregate 1,520 acres, more or less, in Imperial County.

(c). NON-FEDERAL SURFACE AND FEDERAL MINERAL ESTATE

San Bernardino Meridian

(1). Non-Federal Surface and Federal Mineral

San Bernardino Meridian

T. 9 S., R. 12 E.,
sec. 2, lot 1, and lots 3 to 18, inclusive, N½SW¼, SW¼SW¼, W½SE¼SW¼, N½N½SE¼, and S½NW¼SE¼;
sec. 12, SW¼SE¼;
sec. 28, E½, SE¼NW¼, and SW¼.

T. 10 S., R. 14 E.,
sec. 26, SW¼NW¼, S½SE¼NW¼, and N½N½SW¼.

The areas described aggregate 1,182 acres, more or less, in Imperial County.

(2). NON-FEDERAL SURFACE and FEDERAL OIL & GAS, only

San Bernardino Meridian

T. 9 S., R. 12 E.,
sec. 8, SW¼.

T. 10 S., R. 13 E.,
sec. 2, lots 7, 8, 13, and 14;
sec. 12, SW¼NW¼.

T. 10 S., R 14 E.,
sec. 34, SW¼NE¼.

T. 11 S., R 15 E.,
sec. 34, W½SW¼ and SE¼SW¼.

The areas described aggregate 520 acres, more or less, in Imperial County.

(3). NON-FEDERAL SURFACE and FEDERAL GEOTHERMAL, only

San Bernardino Meridian

T. 10 S., R. 13 E.,
sec. 10, E½NE¼.

The areas described aggregate 80 acres in Imperial County.

(4). NON-FEDERAL

San Bernardino Meridian

T. 9 S., R. 12 E.,
sec. 2, lot 1, lots 3-18 inclusive, N½SW¼, SW¼SW¼, W½SE¼SW¼, N½NE¼SE¼, and NW¼SE¼;
sec. 3, lots 1 and 2 and S½;
sec. 5, lots 1 and 2 and S½;
sec. 7, lots 1 and 2 and E½;
sec. 8, W½;
sec. 9;
sec.11;
sec.12, SW¼SE¼;
sec.13;
sec. 14, E½NE¼, SW¼, and SE¼;
sec.15;
sec.16;
sec.17;
sec. 21;
sec. 22;
sec. 23;
sec. 25;
sec. 26, NE¼ and N½NW¼;
sec. 27;
sec. 28.

T. 9 S., R. 13 E.,
sec. 19;
sec. 27;
sec. 29;
sec. 30, lot 4, S½NE¼, and N½SE¼;
sec. 31, lots 3-6, inclusive, NE¼, E½NW¼, E½SW¼, and SE¼;
sec. 33;
sec. 35.

T. 10 S., R. 13 E.,
sec. 1, lots 3-14, inclusive, SW¼, and SE¼;
sec. 2, lots 3-14, inclusive, SW¼, and SE¼;
sec. 3, lots 3-14, inclusive, SW¼, and SE¼;
sec. 4, lots 3-5, inclusive, lots 8-13, inclusive, and SE¼;
sec. 5, lots 3-14, inclusive, SW¼, and SE¼;
sec. 10, E½NE¼;
sec. 11;
sec. 12.

T. 10 S., R. 14 E.,
sec. 7, lots 3-6, inclusive, NE¼, E½NW¼, E½SW¼, and SE¼.
sec. 16;
sec. 17;
sec. 21;
sec. 26, SW¼NW¼, S½SE¼NW¼, and N½N½SW¼;
sec. 27;
sec. 28, NE¼, NW¼, SW¼, W½SE¼, and SE¼SE¼;
sec. 34,
sec. 35.

T. 10 S., R. 15 E.,
sec. 31.

T. 11 S., R. 14 E.,
sec. 1;
sec. 12, W½NE¼, SE¼NE¼, W½, and SE¼.

T. 11 S., R. 15 E.,
sec. 5;
sec. 7;
sec. 9;
sec. 15;
sec. 16;
sec. 17;
sec. 18, lots 3-6, inclusive, W½NE¼, E½NW¼, E½SW¼, and W½SE¼;
sec. 20, SW¼ and SW¼SE¼;
sec. 21;
sec. 23;
sec. 25;
sec. 27;
sec. 28, SW¼ and SW¼SE¼;
sec. 34, NE¼, NW¼, NW¼SW¼, S½SW¼, and SE¼;
sec. 35.

The areas described aggregate 35,871 acres in Imperial County.

(5). STATE LANDS

San Bernardino Meridian

T. 9 S., R. 11 E.,
sec., 12.

T. 9 S., R. 13 E.,
sec. 30, lots 3, 5, and 6, N½NE¼, and E½NW¼.

T. 10 S., R. 14 E.,
sec. 36.

The areas described aggregate 1,584 acres in Imperial County.

The total areas described, including public lands, private and public minerals, aggregate 61,990 acres, more or less, in Imperial County.