BLM

El Centro Field Office

NOVEMBER 2012

FINAL ENVIRONMENTAL IMPACT STATEMENT AND PROPOSED CALIFORNIA DESERT CONSERVATION AREA PLAN AMENDMENT FOR THE

WEST CHOCOLATE MOUNTAINS RENEWABLE ENERGY EVALUATION AREA

BLM/CA/ES-2013-001+1793

VOLUME 1

FINAL ENVIRONMENTAL IMPACT STATEMENT AND PROPOSED CALIFORNIA DESERT CONSERVATION AREA PLAN AMENDMENT

FOR THE

WEST CHOCOLATE MOUNTAINS RENEWABLE ENERGY EVALUATION AREA

Prepared for and under the Direction of
Bureau of Land Management
El Centro Field Office

NOVEMBER 2012

BLM/CA/ES-2013-001+1793

BLM MISSION STATEMENT

It is the mission of the Bureau of Land Management to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

BLM/CA/ES-2011-13+1793

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
El Centro Field Office
1661 S. 4th Street
El Centro, CA 92243
www.ca.blm.gov/elcentro

In reply, refer to:
1610-DP-P
CA 670.31P

Dear Reader:

I am pleased to announce the availability of the West Chocolate Mountains Renewable Energy Evaluation Area (REEA) Final Environmental Impact Statement (EIS) and Proposed Amendment to the California Desert Conservation Area (CDCA) Plan. The EIS evaluates six alternatives, including the No Action and No Plan Amendment alternatives, to address the potential environmental impacts of: (1) authorizing testing for and development of solar and wind energy development facilities on approximately 18,765 acres of Bureau of Land Management (BLM) managed surface lands; and (2) leasing approximately 11,859 acres of federal mineral estate for geothermal energy exploration and development. The CDCA Plan may be amended to allow geothermal, wind, and solar energy development. The six alternatives are outlined below. Under each of the alternatives, with the exception of Alternatives 1 and 2, an existing noncompetitive geothermal lease application could be approved consistent with the terms and conditions of the current CDCA Plan and a Solar Energy Zone (SEZ) may be designated. If the lease application is approved, geothermal energy development would be assessed under a separate National Environmental Policy Act (NEPA) document.

1. Alternative 1 – No Action/No CDCA Plan Amendment. Under the No Action/No CDCA Plan Amendment Alternative, the CDCA Plan would not be amended. The West Chocolate Mountains REEA would remain under current management of the CDCA Plan, which categorizes the area as "unclassified," which makes the land provisionally available for geothermal leasing and for authorization of solar and wind projects. Any future applications for geothermal and wind or solar 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. No renewable energy development cap, or other protective stipulations/measures pertaining to the east side of the Coachella Canal would be adopted under this Alternative. An SEZ would not be designated. The BLM would deny the existing noncompetitive geothermal lease application consistent with the terms and conditions of the CDCA Plan, as amended in this way.

2. Alternative 2 – No Development/CDCA Plan Amendment. Under the No Development/CDCA Plan Amendment Alternative, the CDCA Plan would be amended to identify the West Chocolate Mountains REEA as closed to and unsuitable for geothermal leasing and development and for wind and solar energy development. No renewable energy development cap or other protective stipulations/measures pertaining to the east side of the Coachella Canal would be adopted under this Alternative. An SEZ would not be designated. Under this alternative, the BLM would deny the existing noncompetitive geothermal lease application consistent with the terms and conditions of the CDCA Plan, as amended in this way.

3. Alternative 3 – Renewable Energy Development Emphasis. Under this alternative, geothermal, solar, and wind could be developed to the maximum reasonably foreseeable development (RFD) scenario. 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, subject to constraints related to the protection of resources. If resource issues that warrant the consideration and/or imposition of additional constraints are discovered during individual project planning subsequent to this planning initiative, development-specific impacts would be assessed under a separate NEPA document prior to individual project development. If constraints are discovered during individual project planning or following further

future studies, as determined necessary by an Authorized Officer, portions of the REEA may be determined to be closed to and unsuitable for geothermal, solar, or wind energy development through future planning efforts or the project may be denied without changing the plan decision regarding site suitability. In addition, standard stipulations, as well as a stipulation related to groundwater usage to require preparation of a Water Supply Assessment under SB-610, would be followed. Lands acquired by the BLM under donation agreements for mitigation/compensation purposes and with Land and Water Conservation (LWCF) funds (including Catellus lands) would be managed as avoidance areas for land use authorizations that could result in surface-disturbing activities. Under this alternative, surface disturbance east of the Coachella Canal would have a development cap of 10 percent. The West Chocolate Mountains REEA would be designated as an SEZ. An SEZ would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments to occur within the West Chocolate SEZ, including geothermal and wind energy development. Under this alternative, the BLM would approve the existing noncompetitive geothermal lease application.

4. Alternative 4 – Geothermal Development Only. Under this alternative, the CDCA Plan would be amended to identify sites within the West Chocolate Mountains REEA as suitable for geothermal leasing and development, subject to constraints related to the protection of resources. The CDCA Plan would also be amended to identify sites within the West Chocolate Mountains REEA as closed to and unsuitable for wind and solar energy development. If constraints are discovered during individual project planning, subsequent to this planning initiative, development-specific impacts would be assessed under a separate NEPA document prior to individual project development. If constraints are discovered during individual project planning or following further future studies, as determined necessary by an Authorized Officer, portions of the REEA may be determined to be closed to and unsuitable for geothermal development through future planning efforts or the project may be denied without changing the plan decision regarding site suitability. In addition, standard stipulations, as well as a stipulation to require preparation of a Water Supply Assessment under SB-610, would be followed. The amount of surface disturbance related to geothermal energy development would be the same as Alternative 3. Lands acquired by the BLM under donation agreements for mitigation/compensation purposes and with LWCF funds (including Catellus lands) would be managed as avoidance areas for land use authorizations that could result in surface-disturbing activities. Under this alternative, surface disturbance east of the Coachella Canal would have a development cap of 10 percent. The West Chocolate Mountains REEA would not be designated as an SEZ. Under this alternative, the BLM would approve the existing noncompetitive geothermal lease application.

5. Alternative 5 – Solar Energy Development Emphasis with Moderate Geothermal Development and No Wind Development. Under this alternative, the CDCA Plan would be amended to identify sites within the West Chocolate Mountains REEA as suitable for geothermal leasing and development and solar energy development, subject to constraints related to the protection of resources. In addition, standard stipulations, as well as a stipulation to require preparation of a Water Supply Assessment under SB-610, would be followed. Additionally, if constraints are discovered during individual project planning, subsequent to this planning initiative, development-specific impacts would be assessed under a separate NEPA document prior to individual project development. If constraints are discovered during individual project planning or following further future studies, as determined necessary by an Authorized Officer, portions of the REEA may be determined to be closed to and unsuitable for geothermal or solar development through future planning efforts or the project may be denied without changing the plan decision regarding site suitability. Under this alternative, the full geothermal RFD scenario would not be developed. In addition, the CDCA Plan would also be amended to identify sites within the West Chocolate Mountains REEA as closed to and unsuitable for wind energy development. Lands acquired by the BLM under donation agreements for mitigation/compensation purposes and with LWCF funds (including Catellus lands) would be managed as avoidance areas for land use authorizations that could result in surface-disturbing activities. Under this alternative, surface disturbance east of the Coachella Canal would have a development cap of 10 percent. The West Chocolate Mountains REEA would be designated as an SEZ, which would allow other compatible renewable energy developments to occur. An SEZ would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments to occur within the West Chocolate SEZ, including geothermal

energy. Under this alternative, the BLM would approve the existing noncompetitive geothermal lease application.

6. Alternative 6 – Geothermal Development Emphasis with Moderate Solar Development and No Wind Development. Under this alternative, the CDCA Plan would be amended to identify sites within the West Chocolate Mountains REEA as suitable for geothermal leasing and development and solar energy development, subject to constraints related to the protection of resources. In addition, standard stipulations as well as a stipulation related to groundwater usage to require preparation of a Water Supply Assessment under SB-610 would be followed. If constraints are discovered during individual project planning, subsequent to this planning initiative, development-specific impacts would be assessed under a separate NEPA document prior to individual project development. If constraints are discovered during individual project planning or following further future studies, as determined necessary by an Authorized Officer, portions of the REEA may be determined to be closed to and unsuitable for geothermal development through future planning efforts or the project may be denied without changing the plan decision regarding site suitability. In addition, plants that would require high water use (i.e., solar trough and power tower) would not be allowed. The CDCA Plan would also be amended to identify sites within the West Chocolate Mountains REEA as closed to and unsuitable for wind energy development. Lands acquired by the BLM under donation agreements for mitigation/compensation purposes and with LWCF funds (including Catellus lands) would be managed as avoidance areas for land use authorizations that could result in surface-disturbing activities. Under this alternative, surface disturbance east of the Coachella Canal would have a development cap of 10 percent. The lands on the west side of the Coachella Canal would be identified as an SEZ, while the east side of the Coachella Canal would not be considered for an SEZ. Under this alternative, the BLM would approve the existing noncompetitive geothermal lease application.

This Final EIS/Proposed CDCA Plan Amendment has been prepared in accordance with the Federal Land Policy and Management Act (FLPMA) and NEPA. The document has been sent to members of the public who requested a copy and to pertinent local, state, tribal, and federal government entities.

Pursuant to BLM's planning regulations at 43 Code of Federal Regulations (CFR) 1610.5-2, any person who participated in the planning process for the CDCA Plan Amendment and has an interest that is or may be adversely affected by the proposed CDCA Plan Amendment may protest such amendment within 30 days from the date the U.S. Environmental Protection Agency (EPA) publishes its Notice of Availability (NOA) for the Final EIS/Proposed CDCA Plan Amendment in the Federal Register.

For further information on filing a protest, please see the accompanying protest regulations in the pages that follow. The regulations specify the required elements in a protest. Protesting parties should take care to document all relevant facts and, as much as possible, reference or cite the planning documents or available planning records (e.g., meeting minutes or summaries, correspondence, etc.). To aid in ensuring the completeness of the protest, a protest checklist follows this letter.

All protests must be in writing and mailed to one of the following addresses:

Regular Mail:	Overnight Mail or Other Delivery:
Director (210)	Director (210)
Attention: Brenda Hudgens-Williams	Attention: Brenda Hudgens-Williams
P.O. Box 71383	20 M Street SE, Room 2134LM
Washington, D.C. 20024-1383	Washington, D.C. 20003

Emailed and faxed protests will not be accepted as valid protests unless the protesting party also provides the original letter by either regular or overnight mail postmarked by the close of the protest period. Under these conditions, the BLM will consider the emailed or faxed protest as an advance copy and will afford it full consideration. If you wish to provide the BLM with such advance notification, please direct faxed protests to the attention of Brenda Hudgens-Williams, BLM Protest Expeditor, at (202) 912-7129, and emailed protests to bhudgens@blm.gov.

The BLM Director will make every attempt to promptly render a decision on each valid protest. The decision will be in writing and will be sent to the protesting party by certified mail, return receipt requested. The decision of the BLM Director shall be the final decision of the Department of the Interior. Responses to protest issues will be compiled in a Director's Protest Resolution Report that will be made available to the public following issuance of the decisions.

Upon resolution of a protest, the BLM may issue a Record of Decision (ROD) adopting the Proposed CDCA Plan Amendment. Copies of the ROD will be mailed or made available electronically to all who participated in this NEPA process and will be available to all parties through the "Planning" page of the BLM national website (http://www. blm.gov/planning), or by mail upon request.

Following resolution of any protests, the BLM may publish an Approved Plan Amendment and a ROD. Publication and release of the ROD would serve as public notice of BLM's decision on the geothermal lease application, which is appealable in accordance with 43 CFR Part 4.

We are pleased to provide this copy of the West Chocolate Mountains Final EIS/Proposed CDCA Plan Amendment for your reference and extend our appreciation for your cooperation and assistance during this process. We look forward to your continued participation in the management of our public lands. For additional information or clarification regarding this document or the planning process, please contact the Project Lead, Ms. Sandra McGinnis, at (916) 978-4427.

Sincerely,

M. L. Goodro

Margaret L. Goodro
El Centro Field Manager

PROTEST REGULATIONS

[CITE: 43CFR1610.5-2]

TITLE 43--PUBLIC LANDS: INTERIOR CHAPTER II--BUREAU OF LAND MANAGEMENT, DEPARTMENT OF THE INTERIOR PART 1600--PLANNING, PROGRAMMING, BUDGETING--Table of Contents Subpart 1610--Resource Management Planning Sec. 1610.5-2 Protest Procedures

(a) Any person who participated in the planning process and has an interest which is or may be adversely affected by the approval or amendment of a resource management plan may protest such approval or amendment. A protest may raise only those issues which were submitted for the record during the planning process.

(1) The protest shall be in writing and shall be filed with the Director. The protest shall be filed within 30 days of the date the Environmental Protection Agency published the notice of receipt of the final environmental impact statement containing the plan or amendment in the Federal Register. For an amendment not requiring the preparation of an environmental impact statement, the protest shall be filed within 30 days of the publication of the notice of its effective date.

(2) The protest shall contain:

(i) The name, mailing address, telephone number and interest of the person filing the protest;

(ii) A statement of the issue or issues being protested;

(iii) A statement of the part or parts of the plan or amendment being protested;

(iv) A copy of all documents addressing the issue or issues that were submitted during the planning process by the protesting party or an indication of the date the issue or issues were discussed for the record; and

(v) A concise statement explaining why the State Director's decision is believed to be wrong.

(3) The Director shall promptly render a decision on the protest.

(b) The decision shall be in writing and shall set forth the reasons for the decision. The decision shall be sent to the protesting party by certified mail, return receipt requested. The decision of the Director shall be the final decision of the Department of the Interior.

Resource Management Plan Protest
Critical Item Checklist

The following items *must* be included to constitute a valid protest whether using this optional format, or a narrative letter.
(43 CFR 1610.5-2)

BLM's practice is to make comments, including names and home addresses of respondents, available for public review. Before including your address, phone number, e-mail address, or other personal identifying information in your comment, be advised that your entire comment--including your personal identifying information--may be made publicly available at any time. While you can ask us in your comment to withhold from public review your personal identifying information, we cannot guarantee that we will be able to do so. All submissions from organizations and businesses, and from individuals identifying themselves as representatives or officials of organizations and businesses, will be available for public inspection in their entirety.

Resource Management Plan (RMP) or Amendment (RMP A) being protested:

Name:

Address:

Phone Number: ( )

Your interest in filing this protest (how will you be adversely affected by the approval or amendment of this plan?):

Issue or issues being protested:

Statement of the part or parts of the plan being protested:

Attach copies of all documents addressing the issue(s) that were submitted during the planning process by the protesting party, <u>OR an indication of the date the issue(s) were discussed for the record.</u>

Date(s):

A concise statement explaining why the State Director's decision is believed to be wrong:

Executive Summary

The Bureau of Land Management (BLM) has prepared this Final Environmental Impact Statement (EIS) and Proposed California Desert Conservation Area (CDCA) Plan Amendment to evaluate the potential environmental impacts of allocating federal mineral estate (not including acquired lands) for geothermal energy leasing, testing, and development of geothermal power generation facilities on public lands downslope from the West Chocolate Mountains near Niland, California. This Final EIS is also prepared to concurrently evaluate the potential environmental impacts of allocating BLM-administered federal surface estate in the same planning area for testing and development of solar and wind power generation facilities through rights-of-way (ROW) authorizations. BLM defines this combined renewable energy planning area and analytical scope as the West Chocolate Mountains Renewable Energy Evaluation Area (West Chocolate Mountains REEA, or the REEA).

Pursuant to the requirements of the Federal Land Policy and Management Act of 1976 (FLPMA), BLM planning regulations at 43 Code of Federal Regulations (CFR) Part 1600, the National Environmental Policy Act of 1969 (NEPA), Council on Environmental Quality (CEQ) regulations implementing NEPA at 40 CFR Parts 1500-1508, as well as Department of the Interior (DOI) regulations addressing implementation of NEPA at 43 CFR Part 46, this Final Proposed CDCA Plan Amendment/Final EIS evaluates six alternatives, including no action and no development alternatives (which includes an amendment to the CDCA Plan) to consider the suitability of the area for renewable energy development. It also identifies stipulations and best management practices (BMPs) that could be applied to future energy projects subject to site specific resource issues. Decisions made as a result of this planning effort will not authorize any specific energy development at this time which may result in environmental consequences; however, to inform decision-makers about planning, the analysis in this Final EIS focuses on the possible environmental consequences associated with future authorization of renewable energy projects that might occur consistent with the selection of one of the planning alternatives evaluated here. Additional project-specific environmental analyses would need to be conducted before on-the-ground development activities could occur.

While the current CDCA Plan allows geothermal leasing within the West Chocolate Mountains REEA, under the terms of that Plan, it must be amended to incorporate updated or missing analysis of developmental impacts for geothermal energy at a new assumed level of development for that resource, and establish appropriate terms and conditions for geothermal development, in addition to identifying sites suitable for solar or wind energy development within the CDCA. The amended plan would open those areas found suitable and make them available for solar and wind energy uses, subject to a range of terms and conditions. Thus, this document will address the suitability of the REEA for these purposes and identify appropriate stipulations and BMPs that would be applied to any future ROW authorizations.

The BLM has received one application for geothermal leasing, covering approximately 640 acres, and currently has no solar or wind energy ROW applications on file for land within

the West Chocolate Mountains REEA. This analysis will support BLM decision making regarding issuance of this lease.

Location of the West Chocolate REEA

The West Chocolate Mountains REEA, located in Imperial County, California, is within the boundaries of the CDCA. The West Chocolate Mountains REEA is south of Riverside County, north of the City of Calipatria, east of the Salton Sea, and west of the Chocolate Mountains in north-central Imperial County, California. The West Chocolate Mountains REEA (BLM and non-BLM land) consists of approximately 64,058 acres. Within the West Chocolate Mountains REEA are 38,624 acres of private lands, 3,806 acres of land managed by the California State Lands Commission (CSLC), 1,262 acres of split estate land (private surface/federal minerals), and 2,863 acres of land acquired from the Catellus Corporation by the Wildlands Conservancy using Land and Water Conservation Fund (LWCF) money and donated to the BLM. The acquired lands are not available for geothermal leasing. In addition, there are 1,480 acres of land (federal surface/federal minerals) withdrawn for use by the Bureau of Reclamation (BOR) that are also not open for surface occupancy or geothermal leasing. BLM land within the West Chocolate Mountains REEA that will be considered for renewable energy projects consists of 18,765 acres of land that contain federal surface and 20,027 acres of land with federal mineral estate and that are managed by the BLM El Centro Field Office. The 1,262 acres of surface land in the split estate are included in the 38,624 acres of private land mentioned earlier.

Purpose and Need for the Proposed Action

NEPA guidance published by the CEQ states that the EIS Purpose and Need section will "briefly specify the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action" (40 CFR 1502.13). The following discussion sets forth the purpose of and need for the action as required under NEPA.

The purpose of the proposed action is to facilitate appropriate development of geothermal, solar, and wind energy in the West Chocolate Mountains 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 plan decisions regarding the location, development, and management of those 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. In this way, the concerns and interests of all participants can be incorporated to achieve the DOI's "Smart from the Start" renewable energy goals: Developing the greatest energy potential and getting that power quickly to the grid with the fewest environmental impacts.

Resources to be addressed include, but are not limited to, vegetation, wildlife (including special status species), cultural and historic resources, hydrology, water and air quality, soils, visual resources, recreation, global climate change, and other land uses.

The BLM's purpose in proposing to approve a lease for federal geothermal resources on public lands with a pending noncompetitive lease application in the West Chocolate Mountains REEA is to facilitate development of federal geothermal resources in a manner consistent with its obligations to manage the public land resources in the CDCA.

The need for the proposed planning action arises from pending renewable energy applications, national policy, and Congressional direction. The BLM has identified a need to respond in a more efficient manner to the high interest in siting renewable energy projects on public lands, including geothermal plants and utility-scale solar and wind projects, and to ensure consistent application of measures to mitigate the adverse impacts of such development.

The BLM has also identified a need to respond to a pending noncompetitive lease application, filed in 2002, for geothermal resources in the West Chocolate Mountains REEA. Section 1.6.2 of the EIS discusses applicable federal guidance and policy requirements related to responding to existing noncompetitive geothermal lease applications and including geothermal uses in planning actions.

Decisions to be Made

This Final EIS addresses potential environmental impacts from development of geothermal, wind, and solar resources so that the following key decisions can be made which will guide future siting of projects:

1. Whether to amend the CDCA Plan to identify:
   a. All or parts of the BLM-managed lands within the West Chocolate Mountains REEA as suitable for geothermal leasing and development, subject to constraints discussed in Chapter 2.
   b. All or parts of the BLM-managed lands within the West Chocolate Mountains REEA as suitable for solar energy development, subject to the constraints discussed in Chapter 2.
   c. All or parts of BLM-managed lands within the West Chocolate Mountains REEA as suitable for wind energy development, subject to the constraints discussed in Chapter 2.
2. Which stipulations will be identified to be applied as appropriate to solar, wind, or geothermal energy development.
3. To manage lands acquired by BLM under donation agreements for mitigation/compensation purposes and with Land and Water Conservation (LWCF) funds (including Catellus lands) as avoidance/exclusion areas for land use authorizations that could result in surface-disturbing activities.
4. To designate all or a portion of the REEA as a Solar Energy Zone (SEZ).
5. To approve or deny the existing noncompetitive federal geothermal lease application (CACA 047196) consistent with the terms and conditions of the current CDCA Plan.

Subsequent proposals for development of that lease would be assessed under future NEPA documents.

It should be noted that this Final Proposed CDCA Plan Amendment/Final EIS addresses whether or not to approve an existing noncompetitive geothermal lease application, which is an implementation decision and, therefore, is appealable to the Interior Board of Land Appeals. The other decisions, whether to allocate certain BLM-managed lands within the West Chocolate Mountains REEA as suitable for geothermal leasing and wind and solar ROW applications, and the appropriate stipulations to be adopted for each resource, are considered planning decisions and would be protestable to the BLM Director. Details will be found in the Record of Decision (ROD) that will be issued following this Final Proposed CDCA Plan Amendment/Final EIS.

Public Participation

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 scoping period commenced with publication of the Notice of Intent (NOI) in the Federal Register (FR) on February 10, 2010. The NOI announced a period for public scoping of alternatives, issues, impacts, and planning criteria. The NOI also requested the views of other agencies as to the scope and content of the environmental information that was relevant to the statutory responsibilities or areas of expertise for those agencies. Federal, state, and local agencies, as well as individuals or organizations that were interested or may be affected by the BLM's decision, were invited to participate in the scoping process and, if eligible, could request or be requested by the BLM to participate as a cooperating agency.

Scoping Meeting

The BLM held one public scoping meeting near the project location, at the Calipatria Inn and Suites (700 North Sorensen Avenue, Calipatria, California) on March 4, 2010. There were 19 people in attendance. An open house was held for 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 environmental consulting firm preparing the EIS on behalf of the BLM, Ecology and Environment, Inc. (E & E), explained its role as the third-party consultant, described opportunities for public involvement, and provided an overview of the environmental issues to be addressed in the Draft EIS.

The meeting concluded with a facilitated public comment session where the BLM invited the public to provide verbal comments on the Proposed Action. A court reporter recorded the scoping meeting and prepared a transcript of the presentations and public comments. In addition to having the opportunity to provide verbal comments at the scoping meeting, participants were also given the opportunity to provide written comments or to take a comment form to fill out and mail in at a later date. All meeting materials also contained a project-specific email address to facilitate collection of electronic comments.

In addition to verbal comments and written comments received during the scoping meeting, the BLM received nine written comments (seven letters, one comment card, and one

e-mail), and three verbal comments from private citizens, government agencies, non-governmental organizations (NGOs), and business associations by March 19, 2010, the conclusion of the scoping period.

The BLM also used the NEPA commenting process to assist in satisfying the public involvement process for Section 106 of the National Historic Preservation Act (NHPA).

Scoping Response

A verbatim transcript of the public scoping meeting was recorded, and written electronic comments received during the scoping period were compiled in a scoping report. During the scoping period, 179 comments were received from 12 individuals: one electronic comment was received from the Aqua Caliente Indian Tribe; three comment letters were received from agencies; three comment letters, one comment card, and two verbal comments were received from NGOs; and one comment letter and one verbal comment were received from individuals at the public scoping meeting.

Issues Identified During Scoping

This section provides a summary of issues identified during scoping, organized by issue category. Some statements summarize multiple comments, while others summarize only one comment.

Some comments indicate misunderstanding of the current action, which is the consideration of allowing energy via issuance of development leases and ROW grants in the West Chocolate Mountains REEA. The current action and analysis is at the planning level, not approval of any project-level permits. Since the alternatives do not involve actual development of energy facilities, specific impacts of specific projects cannot be determined or analyzed but have been addressed in the EIS for this action by assuming a certain eventual level of development for these resources at a general landscape level. Comments summarized below may reflect inaccurate use of terms such as “project” or “project area” for this particular action. The issues included the following topics:

- Project Alternatives
- Project Description
- Purpose and Need
- Aesthetics/Visual Resources
- Air Quality
- Biological Resources
- Climate Change
- Cultural Resources
- Cumulative Impacts
- Energy and Minerals
- Environmental Justice

- Growth Inducement
- Hazards and Public Health and Safety
- Hydrology, Water Quality, and Water Resources
- Lands and Realty
- Noise
- Recreation
- Socioeconomics and Economics
- Soils and Geology
- Waste

Public Comment Period

A 90-day Draft EIS public comment period for the Proposed Action was held from June 30 to September 30, 2011, to allow for review and comment following release of the Draft EIS on July 1, 2011.

Comment Meeting

The BLM held one public comment meeting near the project location, at the Fairfield Inn and Suites, 503 East Danenberg Road, El Centro, California, from 6:30 p.m. to 8:30 p.m. on September 1, 2011. There were five members of the public at the meeting. An open house was held for 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 environmental consulting firm preparing the EIS on behalf of the BLM, E & E, explained its role as the third-party consultant, described the project, and discussed the findings in the Draft EIS.

The meeting concluded with a question and answer session. In addition to having the opportunity to ask questions, participants were also given the opportunity to provide written comments or to take a comment form to fill out and mail in at a later date. All meeting materials also contained a project-specific email address to facilitate collection of electronic comments.

The BLM received comment letters on the Draft EIS/Draft Proposed CDCA Plan Amendment from 26 federal, state, and local agencies, Native American tribes, companies and organizations, and individuals. The comments received and the BLM’s responses to those comments can be found in Appendix J. Additionally, Table 1-3 lists the commenter, the topic of their comment, and the location of the BLM's response to those comments in the text of the Draft EIS/Draft Proposed CDCA Plan Amendment.

Summary Description of the Alternatives

The EIS analyzed six alternatives, including the No Action Alternative (with no amendment to the CDCA Plan); the No Development Alternative (with an amendment to the CDCA Plan), and four development alternatives (which included an amendment to the CDCA

Plan), and other alternatives that were considered but eliminated from detailed analysis. The No Action Alternative is required under the NEPA and implementing CEQ regulations (40 CFR 1500-1508).

To support the development of the alternatives, reasonably foreseeable development (RFD) scenarios for development of geothermal, solar, and wind energy within the West Chocolate Mountains REEA were prepared to estimate the potential level of development for each energy resource over time. The RFD scenarios were developed based on a number of factors:

- The potential for energy development within the West Chocolate Mountains REEA based on the known or estimated resource potential (i.e., presence of a geothermal reservoir, solar insolation, wind speed);
- The presence of known or estimated constraints to energy development (e.g., topography [slope], critical habitat for threatened and endangered [T&E] species, proximity to hydrologic features; groundwater resources); and
- Prohibited (i.e., land not available for surface occupancy).

Alternative 1 – No Action/No CDCA Plan Amendment

Under the No Action/No CDCA Plan Amendment Alternative, the proposed CDCA Plan Amendment would not be approved. The West Chocolate Mountains REEA would remain under current management of the CDCA Plan, which categorizes the area as "unclassified," which makes the land provisionally available for geothermal leasing and for authorization of solar and wind projects. Any future applications for wind or solar 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.

No renewable energy development cap or other protective stipulations/measures pertaining to the east side of the Coachella Canal would be adopted under this alternative. An SEZ would not be designated. The existing noncompetitive geothermal lease application would be denied.

Alternative 2 – No Development/CDCA Plan Amendment

Under the No Development/CDCA Plan Amendment Alternative, the CDCA Plan would be amended to identify the West Chocolate Mountains REEA as closed to and unsuitable for geothermal leasing and development. The CDCA Plan would also be amended to identify the West Chocolate Mountains REEA as closed to and unsuitable for wind and solar energy development.

No renewable energy development cap or other protective stipulations/measures pertaining to the east side of the Coachella Canal would be adopted under this alternative, because no development would be approved, and none would take place. An SEZ would not be designated. The BLM would deny the existing noncompetitive geothermal lease consistent with the terms and conditions of the CDCA Plan, as amended in this way.

Alternative 3 – Renewable Energy Development Emphasis

Under this alternative, geothermal, solar, and wind could be developed to the maximum extent as defined in the geothermal, solar, and wind RFD scenarios. The CDCA Plan would be amended to identify sites within the West Chocolate Mountains REEA as suitable for geothermal leasing and development and for solar and wind energy development, subject to constraints related to the protection of resources. Standard stipulations, as well as a stipulation to require preparation of a Water Supply Assessment under SB-610, would be followed (Appendix G). SB-610 is a statute that requires detailed information regarding water availability be provided to the city and county decision-makers prior to approval of specified large development projects. It also requires this detailed information be included in the administrative record that serves as the evidentiary basis for an approval action by the city or county on such projects. Both measures recognize local control and decision making regarding the availability of water for projects and the approval of projects. If resource issues that warrant the consideration and/or imposition of additional constraints are discovered during individual project planning subsequent to this planning initiative, development-specific impacts would be assessed under a separate NEPA document prior to individual project development. If constraints are discovered during individual project planning or following further future studies, as determined necessary by an Authorized Officer, portions of the REEA may be determined to be closed to and unsuitable for geothermal or solar or wind energy development through future planning efforts or the project may be denied without changing the plan decision regarding site suitability.

Lands acquired by BLM under donation agreements for mitigation/compensation purposes and with LWCF funds (including Catellus lands) would be managed as avoidance areas for land use authorizations that could result in surface-disturbing activities.

Under this alternative, surface disturbance east of the Coachella Canal would have a development cap of 10 percent. The REEA would be designated as an SEZ. An SEZ would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments to occur within the SEZ, including geothermal and wind energy development. Under this alternative, the BLM would approve the existing noncompetitive geothermal lease application, subject to standard geothermal lease stipulations and any constraints resulting from the required Water Supply Assessment. The geothermal lease would also be subject to the Endangered Species Act and stipulations and constraints found in Section 2.2.6.5.

Geothermal

For this alternative, it is assumed that up to 1,026 acres of land could be disturbed from geothermal energy development, contributing to a total anticipated development that could occur on up to 34,998 acres of both private and BLM land from all renewable energy development within the West Chocolate REEA. The ratio of 33 percent leasing (11,859 acres BLM/34,998 acres total) as developed in the geothermal RFD (Appendix A) was used to estimate the percentage of surface disturbance that could occur on BLM-managed land versus private or state land. Within this 1,026 acres of disturbance, up to three 50-megawatt (MW) geothermal power plants could be constructed.

Solar

For this alternative, it is assumed that the maximum development scenario defined in the solar RFD scenario, up to 6,637 acres of land for concentrated solar power (CSP) development and up to 29,758 acres of land for PV development, could occur on BLM and non-BLM land. The ratio (for CSP: 24 percent [1,574 acres BLM/6,638 acres total]; for PV: 30 percent [9,066 acres BLM/29,758 acres total]) as developed in the solar RFD (Appendix B) was used to estimate the percentage of surface disturbance that could occur on BLM land versus private or state land. Within this area of anticipated surface disturbance, the following solar energy could be developed:

Concentrated Solar Power Technology

Trough – 1,327 MW

Dish – 737 MW

Power Tower – 737 MW

Photovoltaic Technology

5% Slope or Less – 3,306 MW

Wind

For this alternative, it is assumed that up to 76 acres of land could be disturbed and total anticipated development could occur on 29,929 acres of both private and BLM land within the West Chocolate REEA. The ratio of 31 percent (9,162 acres BLM/29,929 acres total) as developed in the wind RFD (Appendix C) was used to estimate the percentage of surface disturbance that could occur on BLM-managed land versus private or state land. Within the 76 acres of disturbance, one 45-MW wind farm could be developed.

Alternative 4 – Geothermal Development Only

Under this alternative, the CDCA Plan would be amended to identify sites within the West Chocolate Mountains REEA as suitable for geothermal leasing and development, subject to constraints related to the protection of resources. The CDCA Plan would also be amended identify the West Chocolate Mountains REEA as closed to and unsuitable for utility-scale wind or solar energy development. In addition, standard stipulations, as well as a stipulation to require preparation of a Water Supply Assessment under SB-610, would be followed. If constraints are discovered during individual project planning, development-specific impacts would be assessed under a separate NEPA document prior to individual project development. If constraints are discovered during individual project planning or following further future studies, as determined necessary by an Authorized Officer, portions of the REEA may be determined to be closed to and unsuitable for geothermal development through future planning efforts or the project may be denied without changing the plan decision regarding site suitability.

Lands acquired by BLM under donation agreements for mitigation/compensation purposes and with LWCF funds (including Catellus lands) would be managed as avoidance areas for land use authorizations that could result in surface-disturbing activities. Under this alternative, the amount of surface disturbance related to geothermal energy development would be the same as Alternative 3. Surface disturbance east of the Coachella Canal would have a

development cap of 10 percent. The West Chocolate Mountains REEA would not be designated as an SEZ. Under this alternative, the BLM would approve the existing noncompetitive geothermal lease application, subject to only standard geothermal lease stipulations and any constraints resulting from the required Water Supply Assessment.

Alternative 5 – Solar Energy Development Emphasis with Moderate Geothermal Development and No Wind Development

Under this alternative, the CDCA Plan would be amended to identify sites within the West Chocolate Mountains REEA as suitable for geothermal leasing and development, subject to constraints related to the protection of resources. Under this alternative, the full geothermal RFD scenario would not be developed. The CDCA Plan would also be amended to identify sites within the West Chocolate Mountains REEA as suitable for solar energy development, subject to constraints related to the protection of resources. Solar projects may also be constrained by the setback requirements around riparian or drainage features. In addition, the CDCA Plan would be amended to identify sites within the West Chocolate Mountains REEA as closed to and unsuitable for wind energy development.

In addition, standard stipulations, as well as a stipulation to require preparation of a Water Supply Assessment under SB-610, would be followed. If constraints are discovered during individual project planning subsequent to this planning initiative, development-specific impacts would be assessed under a separate NEPA document prior to individual project development. If constraints are discovered during individual project planning or following further future studies, as determined necessary by an Authorized Officer, portions of the REEA may be determined to be closed to and unsuitable for geothermal development through future planning efforts or the project may be denied without changing the plan decision regarding site suitability.

Lands acquired by BLM under donation agreements for mitigation/compensation purposes and with LWCF funds (including Catellus lands) would be managed as avoidance areas for land use authorizations that could result in surface-disturbing activities.

Under this alternative, surface disturbance east of the Coachella Canal would have a development cap of 10 percent. The West Chocolate Mountains REEA would be designated as an SEZ. Under this alternative, the BLM would approve the existing noncompetitive geothermal lease application, subject to only standard geothermal lease stipulations and any constraints resulting from the required Water Supply Assessment.

Geothermal

For this alternative, it is assumed that up to 342 acres of land could be disturbed from geothermal energy development. Within the 342 acres of disturbance, one 50-MW geothermal power plant could be constructed.

Solar

The amount of solar energy development would be the same as Alternative 3.

Alternative 6 – Geothermal Development Emphasis with Moderate Solar Development and No Wind Development

Alternative 6 has been identified as the BLM's preferred alternative. Under this alternative, the CDCA Plan would be amended to identify sites within the West Chocolate Mountains REEA as suitable for geothermal leasing and development, subject to constraints related to the protection of resources. The CDCA Plan would also be amended to identify sites within the West Chocolate Mountains REEA as suitable for solar energy development, subject to constraints related to the protection of resources. In addition, thermal plants that would require high water use (i.e., solar trough and power tower) would not be allowed. The CDCA Plan would also be amended to identify sites within the West Chocolate Mountains REEA as closed to and unsuitable for wind energy development.

Standard stipulations, as well as a stipulation related to groundwater usage to require preparation of a Water Supply Assessment under SB-610, would be followed. If constraints are discovered during individual project planning subsequent to this planning initiative, development-specific impacts would be assessed under a separate NEPA document prior to individual project development. If constraints are discovered during individual project planning or following further future studies, as determined necessary by an Authorized Officer, portions of the REEA may be determined to be closed to and unsuitable for geothermal development through future planning efforts or the project may be denied without changing the plan decision regarding site suitability.

Lands acquired by BLM under donation agreements for mitigation/compensation purposes and with LWCF funds (including Catellus lands) would be managed as avoidance areas for land use authorizations that could result in surface-disturbing activities.

Under this alternative, surface disturbance east of the Coachella Canal would have a development cap of 10 percent. The west side of the Coachella Canal would be identified as an SEZ, while the east side of the Coachella Canal would not be considered for an SEZ. Under this alternative, the BLM would approve the existing noncompetitive geothermal lease application, subject to only standard geothermal lease stipulations and any constraints resulting from the required Water Supply Assessment.

Geothermal

The amount of geothermal energy development under Alternative 6 would be the same as Alternative 3.

Solar

Of the 64,058 acres within the West Chocolate REEA, modeling performed by the National Renewable Energy Laboratory (NREL) revealed that only a maximum of 29,758 acres was developable for solar energy. Of the 29,758 acres, only 9,066 acres of BLM land was discovered to be developable for solar energy. The foreseeable development described herein uses a simple ratio of 30 percent (9,066 acres BLM/29,758 acres total) to estimate the percentage of surface disturbance that could occur on BLM land versus private or state land.

Under this alternative, development of solar energy projects would be constrained by water usage and potential conflicts to military airspace operations in the vicinity of the Chocolate Mountains Aerial Gunnery Range (CMAGR). Solar energy technologies that require high water use (solar trough and power tower) would not be approved, nor would technologies with large heat signatures or with structures exceeding 200 feet in height.

Given current technology, these constraints would allow for the development of dish engine and photovoltaic (PV) projects over other solar technologies. However, no particular technology is precluded from consideration in the competitive process. If a given technology evolves to reduce impacts on water resources or military airspace, the BLM could consider it through the competitive process at a later date. Within this area of surface disturbance, the following solar energy could be developed:

Concentrated Solar Power Technology

Dish Engine – 737 MW

Photovoltaic Technology

5% Slope or Less – 3,306 MW

Environmental Impacts Associated with Renewable Energy Projects

Air Quality and Climate

Intensive renewable energy development would be allowed on all lands within the West Chocolate Mountains REEA. The development cap would limit geothermal and solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (706 acres). The designation as an SEZ would allow project-specific consideration, processing, and potential approval of compatible geothermal and wind energy developments in addition to solar renewable energy development to occur within the West Chocolate SEZ, which could lead to a potential increase in air emissions and air quality effects.

Air quality effects include temporary, moderate, adverse impacts from fugitive dust, particulate matter with a mean aerodynamic diameter of 10 microns or less (PM_{10}), carbon monoxide (CO), and ozone precursors which might contribute to ongoing exceedences of National Ambient Air Quality Standards (NAAQS) for which the area has been designated as non-attainment by the U.S. Environmental Protection Agency (EPA). Direct and indirect air emissions are not expected to exceed *de minimis* levels to trigger a Federal Conformity Determination. Construction and operation air quality impacts would be greatest under Alternative 3 (full renewable energy development); however, these would off-set air pollutants caused by fossil fuel burning power plants that would be needed to accommodate expected increased energy needs. However, best management practices (BMPs) discussed in Appendices I-A and I-B would reduce or avoid these impacts.

Noise

Intensive renewable energy development would be allowed on all lands within the West Chocolate Mountains REEA. The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (706 acres). The designation as an SEZ would allow project-specific consideration, processing, and potential approval of compatible geothermal and wind energy developments in addition to solar renewable energy development to occur within the West Chocolate SEZ, which could lead to a potential short-term increase in ambient noise levels related to construction. Long-term increases in noise would occur from operations and maintenance (O&M) activities related to any projects built as a result of the CDCA Plan Amendment. Construction and operation noise impacts would be greatest under Alternative 3 (full renewable energy development). Any damage caused by permitted use would require mitigation.

Topography, Geology, and Geologic Hazards

Intensive renewable energy development would be allowed on all lands within the West Chocolate Mountains REEA. The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (706 acres). The designation as an SEZ would allow project-specific consideration, processing, and potential approval of compatible geothermal and wind energy developments in addition to solar renewable energy development to occur within the West Chocolate SEZ, which could lead to potential adverse impacts to geologic resources from construction and operation of renewable energy projects. There is some evidence that geothermal energy development can cause minor seismic events. Although wind and solar energy developments can affect geologic structures, the primary impact would be to the developments from landslides, soil liquefaction, changes in surface hydrology or from earthquakes. However, BMPs discussed in Appendices I-A and I-B, as well as resource-specific stipulations, where possible, discussed in Section 2.2.6.5 would reduce or avoid these impacts.

Soils

Intensive renewable energy development would be allowed on all lands within the West Chocolate Mountains REEA. The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). The designation as an SEZ would allow project-specific consideration, processing, and potential approval of compatible geothermal and wind energy developments in addition to solar renewable energy development to occur within the West Chocolate SEZ, which could lead to potential adverse impacts to soil resources, such as increased erosion rates and fugitive dust emissions. Land disturbance and impervious surfaces may result in increased stormwater runoff velocity and volume which could degrade water quality of affected downstream surface water bodies. Development could reduce soil productivity by compaction or soil mixing to a level that would prevent successful rehabilitation and eventual reestablishment of vegetative cover to the recommended or preconstruction composition and density. There could also be increased exposure of human or ecological receptors to potentially hazardous levels of chemicals or explosives due to the disturbance of contaminated soils or to the discharge or disposal into soils of hazardous materials. Given the potential for large scale clearing and grading, soils impacts would be greatest under Alternative 3 (full renewable energy development). However, BMPs

discussed in Appendices I-A and I-B, as well as resource-specific stipulations, where possible, as discussed in in Section 2.2.6.5 would reduce or avoid these impacts.

Water Resources

Intensive renewable energy development would be allowed on all lands within the West Chocolate Mountains REEA. The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (706 acres) under all of the development alternatives. The designation as an SEZ would allow project-specific consideration, processing, and potential approval of compatible geothermal and wind energy developments in addition to solar renewable energy development to occur within the West Chocolate SEZ, which could lead to potential adverse impacts to water resources by the contamination or overuse of limited surface and groundwater sources, and exacerbating flooding through changes in surface topography from grading or placement of impermeable surfaces (e.g., solar panels, buildings, etc.). Considerable amounts of water are needed during construction for all types of renewable energy development for dust suppression. Water is also needed in some solar energy technologies for cleaning, as well as for cooling and make-up water in geothermal energy projects. Given the potential for the largest number of projects, water resource impacts would be greatest under Alternative 3 (full renewable energy development). However, BMPs discussed in Appendices I-A and I-B, as well as resource-specific stipulations, where possible, discussed in Section 2.2.6.5 would reduce or avoid these impacts.

Vegetation

Intensive renewable energy development would be allowed on all lands within the West Chocolate Mountains REEA. The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (706 acres). The designation as an SEZ would allow project-specific consideration, processing, and potential approval of compatible geothermal and wind energy developments in addition to solar renewable energy development to occur within the West Chocolate SEZ, which could lead to potential adverse impacts to vegetation. Such impacts include changes to the diversity or substantial alteration of the numbers of a local population of any plant, or interference with the survival, growth, or reproduction of affected plant populations, substantial long-term loss of existing habitat, introduction of new invasive plant species to an area, or increased existing populations of invasive plant species, destruction of or extensive alteration to habitats or vegetation communities in such a way that they would be unfavorable to native species, or creation of a potential health hazard or involvement in the use, production, or disposal of materials that pose a hazard to plant populations. Given the potential for the largest number of projects, impacts to vegetation resource would be greatest under Alternative 3 (full renewable energy development). However, BMPs discussed in Appendices I-A and I-B, as well as resource-specific stipulations, where possible, discussed in Section 2.2.6.5would reduce or avoid these impacts.

Fish and Wildlife

Intensive renewable energy development would be allowed on all lands within the West Chocolate Mountains REEA. The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (706 acres). The designation as an SEZ would allow project-specific consideration, processing, and potential

approval of compatible geothermal and wind energy developments in addition to solar renewable energy development to occur within the West Chocolate SEZ, which could lead to potential adverse impacts to fish and wildlife. These impacts could result in changes to the diversity or substantial alteration of the numbers of a local population of any fish or wildlife species, or interference with the survival, growth, or reproduction of affected fish and wildlife populations; substantial interference with the seasonal or daily movement or range of migratory birds and other wildlife; substantial long-term loss of existing wildlife habitat; destruction of or extensive alteration to habitats in such a way that would render them unfavorable to native fish and wildlife species; creation of a potential health hazard or involvement in the use, production, or disposal of materials that pose a hazard to wildlife populations in the West Chocolate REEA. Impacts to fish and wildlife would be greatest under Alternative 3 (full renewable energy development). However, BMPs discussed in Appendices I-A and I-B, as well as resource-specific stipulations, where possible, discussed in Section 2.2.6.5would reduce or avoid these impacts.

Special Status Species

Intensive renewable energy development would be allowed on all lands within the West Chocolate Mountains REEA. The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (706 acres). The designation as an SEZ would allow project-specific consideration, processing, and potential approval of compatible geothermal and wind energy developments in addition to solar renewable energy development to occur within the West Chocolate SEZ, which could lead to potential adverse impacts to special status species. These impacts include changes to the diversity or substantial decrease of the numbers of a special status species population, or interference with the survival, growth, or reproduction of affected special status species populations; direct or indirect impacts on special status species populations or habitat that would contribute to or result in the federal or state listing of the species (e.g., by substantially reducing species numbers, or by resulting in the permanent loss of habitat essential for the continued existence of a species); any "take" of a state or federal listed species or other special status species is considered significant; reduced designated critical habitat of a listed species; substantial long-term loss of existing habitat for special status species populations; destruction of or extensive alteration to habitats in such a way that would render them unfavorable to special status species; introduction of new invasive plant species to an area, or the increase of existing populations of invasive plant species that alter or degrade habitat for special status species populations; or creation of potential health hazards or involvement in the use, production, or disposal of materials that pose a hazard to special status species populations in the West Chocolate Mountains REEA. Impacts to special status species would be greatest under Alternative 3 (full renewable energy development). However, BMPs discussed in Appendices I-A or I-B, as well as resource-specific stipulations, where possible, discussed in Section 2.2.6.5would reduce or avoid these impacts.

Cultural Resources

Intensive renewable energy development would be allowed on all lands within the West Chocolate Mountains REEA. The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (706 acres). The designation as an SEZ would allow project-specific consideration, processing, and potential approval of compatible geothermal and wind energy developments in addition to solar renewable energy development to occur within the West Chocolate SEZ, which could lead to potential

adverse impacts to cultural resources. These impacts include degradation of important resources, including the elimination of important examples of the major periods of California history or prehistory; adverse change in the significance of a historical resource as defined in Public Resources Code Section 15064.5; adverse change in the significance of an archaeological resource as defined in Public Resources Code Section 15064.5; disturbance of any human remains, including those interred outside of formal cemeteries; physical destruction of or damage to all or part of the property; changes in the character of the property's use or of physical features within a property's setting that contribute to its historic significance (for example, by isolating the property from its setting); or introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features.

Impacts to cultural resources would be greatest under Alternative 3 (full renewable energy development). However, BMPs discussed in Appendices I-A and I-B, as well as resource-specific stipulations, where possible, discussed in Section 2.2.6.5would reduce or avoid these impacts.

Paleontological Resources

Intensive renewable energy development would be allowed on all lands within the West Chocolate Mountains REEA. The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (706 acres). The designation as an SEZ would allow project-specific consideration, processing, and potential approval of compatible geothermal and wind energy developments in addition to solar renewable energy development to occur within the West Chocolate SEZ, which could lead to potential adverse impacts to paleontological resources. These impacts could occur if the actions isolate the property or alter the character of the property’s paleontological setting when that character contributes to the property’s paleontological qualifications for special status; result in the transfer, lease, or sale of a property without adequate provisions to protect the property’s paleontological integrity; or result in the modification or destruction of significant paleontological resources as a result of any process of energy development. Potential impacts to paleontological resources would be greatest under Alternative 3 (full renewable energy development). However, BMPs discussed in Appendices I-A and I-B, as well as resource-specific stipulations, where possible, discussed in Section 2.2.6.5 would reduce or avoid these impacts.

Visual Resources

Intensive renewable energy development would be allowed on all lands within the West Chocolate Mountains REEA. The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (706 acres). The designation as an SEZ would allow project-specific consideration, processing, and potential approval of compatible geothermal and wind energy developments in addition to solar renewable energy development to occur within the West Chocolate SEZ, which could lead to potential adverse impacts to visual resources. These impacts include introduction of contrast into the environment that would alter the visual resource management (VRM) classification or creation of visual contrasts which exceed the allowable levels associated with the corresponding interim visual resources management (iVRM) class objectives. Potential impacts to visual resources

would be greatest under Alternative 3 (full renewable energy development). However, BMPs discussed in Appendices I-A and I-B would reduce or avoid these impacts.

Lands and Realty

Intensive renewable energy development would be allowed on all lands within the West Chocolate Mountains REEA. The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). The designation as an SEZ would allow project-specific consideration, processing, and potential approval of compatible geothermal and wind energy developments in addition to solar renewable energy development to occur within the West Chocolate SEZ, which could lead to potential adverse impacts on land uses. These impacts could include a conflict with existing federal, state, and local land uses, plans, and policies; conflicts with existing BLM land use authorizations; changes in public land disposition; restriction of the land use authorizations of the BLM; restriction of land tenure adjustments; or restrictions on livestock and grazing management. Potential impacts to land and realty would be greatest under Alternative 3 (full renewable energy development). There are no BMPs specific to lands and realty, although future projects would be subject to valid, existing rights.

Human Health and Safety/Hazardous Materials

Intensive renewable energy development would be allowed on all lands within the West Chocolate Mountains REEA. The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (706 acres). The designation as an SEZ would allow project-specific consideration, processing, and potential approval of compatible geothermal and wind energy developments in addition to solar renewable energy development to occur within the West Chocolate SEZ, which could lead to potential adverse impacts to human health and safety/hazardous materials. These impacts involving human health and safety/hazardous materials could include creation of a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials; creation of a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment; or exposure of people or structures to a significant risk of loss, injury, or death. The greatest potential for impacts to human health and safety/hazards would be under Alternative 3 (full renewable energy development). However, BMPs discussed in Appendices I-A and I-B, are included to reduce or avoid these impacts.

Energy and Minerals

Intensive renewable energy development would be allowed on all lands within the West Chocolate Mountains REEA. The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (706 acres). The designation as an SEZ would allow project-specific consideration, processing, and potential approval of compatible geothermal and wind energy developments in addition to solar renewable energy development to occur within the West Chocolate SEZ, which could lead to potential adverse impacts to energy and minerals. These impacts could include loss of availability of a known mineral resource that would be of value to the region and the residents of the state; loss or availability of a locally important mineral resource recovery site delineated on a local general

plan, specific plan, or other land use plan; or if the action does not comply with applicable goals of the CDCA Plan Geologic-Energy-Minerals resources. The greatest potential for impacts to energy and mineral resources would be under Alternative 3 (full renewable energy development). There are BMPs specific to energy and minerals resources, although future projects would be subject to valid, existing rights.

Recreation Resources

Intensive renewable energy development would be allowed on all lands within the West Chocolate Mountains REEA. The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (706 acres). The designation as an SEZ would allow project-specific consideration, processing, and potential approval of compatible geothermal and wind energy developments in addition to solar renewable energy development to occur within the West Chocolate SEZ, which could lead to potential adverse impacts on recreation. These impacts could include conflicts with existing federal, state, and local recreation management plans and policies; changes in access to existing recreation areas or sites; changes in levels of use of existing recreation areas or sites; or substantial overcrowding caused by "spill over" effects to other recreation areas. The greatest potential for impacts to recreation would be under Alternative 3 (full renewable energy development). There are no BMPs specific to recreation.

Special Management Areas

Intensive renewable energy development would be allowed on all lands within the West Chocolate Mountains REEA. The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (706 acres). The designation as an SEZ would allow project-specific consideration, processing, and potential approval of compatible geothermal and wind energy developments in addition to solar renewable energy development to occur within the West Chocolate SEZ, which could lead to potential adverse impacts on special management areas (SMAs). These impacts could include potential changes in air quality or other air clarity evaluations that could occur within SMAs due to construction and operation activities; potential changes in ambient noise levels that could occur within SMAs due to construction and operation activities; visible project components from SMAs or portions of SMAs; changes to the darkness of the night sky dome as viewed from SMAs due to construction and operation activities; or changes in erosion or sedimentation rates within SMAs. The greatest potential for impacts to SMAs would be under Alternative 3 (full renewable energy development). There are no BMPs specific to SMAs.

Social and Economic Conditions

Intensive renewable energy development would be allowed on all lands within the West Chocolate Mountains REEA. The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (706 acres). The designation as an SEZ would allow project-specific consideration, processing, and potential approval of compatible geothermal and wind energy developments in addition to solar renewable energy development to occur within the West Chocolate SEZ, which could lead to potential adverse impacts to social and economic conditions. These impacts could include a permanent or temporary change in the amount of economic activity in the regional economy; a permanent or

temporary population increase larger than local services, infrastructure, or population could accommodate; a tax burden to local residents that is not compensated by the project; or a disproportionate share of an adverse impact to any racial, ethnic, or socioeconomic group. The greatest potential for impacts to social and economic conditions would be under Alternative 3 (full renewable energy development); however, these would be largely beneficial in nature.

Transportation and Traffic

Intensive renewable energy development would be allowed on all lands within the West Chocolate Mountains REEA. The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (706 acres). The designation as an SEZ would allow project-specific consideration, processing, and potential approval of compatible geothermal and wind energy developments in addition to solar renewable energy development to occur within the West Chocolate SEZ, which could lead to potential adverse impacts to traffic and transportation conditions. These impacts could include a permanent or temporary increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system; an exceedence, either individually or cumulatively, of a level of service (LOS) standard established by the local county congestion management agency; degradation of existing road conditions as a result of construction; inadequate emergency access; loss of access to private land parcels; or loss of access to historically important recreation access points or staging areas. Potential impacts to traffic and transportation would be greatest under Alternative 3 (full renewable energy development). However, BMPs discussed in Appendices I-A and I-B, are included to reduce or avoid these impacts.

Cumulative Impacts

The cumulative impacts assessment includes projects within the same geographic and temporal scope as the actions envisioned under the West Chocolate Mountains REEA EIS. The geographic scope varies for each resource area depending on the nature of the resource and the timing and intensity of activities. For example, the geographic scope for cumulative impacts to air quality may extend much further than traffic. Generally, this cumulative impact analysis is confined to a maximum 40-mile buffer surrounding the exterior boundaries of the REEA.

The analysis identifies all projects that could contribute to the overall cumulative impacts for a particular resource, including renewable and non-renewable energy projects, transportation projects, infrastructure improvement projects, electric transmission, and other projects that meet these criteria, such as:

- Projects that are closely related and completed past projects;
- Projects approved and under construction;
- Projects approved, but not yet under construction; or
- Projects that have been proposed and reasonably expected to move forward assuming their approval.

The following section briefly describes cumulative impacts to resources that are likely be affected cumulatively by the potential projects under the alternatives.

Air Quality and Climate

It is expected that development would lead to a short-term, localized increase in particulates and emissions. Along with current and reasonably expected levels of air emissions in the cumulative effects study area, there could be a corresponding short-term increase in cumulative air emissions generated by implementation of any of the action alternatives.

The largest increase in air emissions, primarily occurring during construction, would take place under Alternative 3. Whether these emissions would trigger federal conformity or otherwise degrade air quality to cause a change in attainment status is speculative at this time, however, some projects are likely to exceed *de minimis* levels and trigger a federal Conformity Determination. It is reasonable to assume, however, that if full build-out were to occur within a four-year period, there would be substantial dust and other emissions that could significantly degrade air quality in the two regulated basins. Construction would generate emissions of CO, oxides of nitrogen (NO_X), volatile organic compounds (VOCs), sulfur dioxide (SO_2), respirable particulate matter with particulates equal to or less than 2.5 microns in diameter ($PM_{2.5}$), and PM_{10}.

Daily construction emission rates under the alternatives are based on the assumption that all construction activities would occur concurrently and that all equipment for each activity would be operating on the same day. This assumption is expected to produce a conservative estimate of the maximum daily emissions during construction. The emissions would be localized to those locations under construction.

Construction of the reasonably foreseeable projects within the same cumulative effects study area as the West Chocolate Mountains REEA would generate similar types of emissions and could contribute cumulatively to impacts to air quality. Individually, the foreseeable projects could exceed the daily construction emission thresholds for the same or different criteria pollutants as the project.

Noise

Noise impacts are limited to locations where there are receptors to hear noise. There are no regulated noise receptors within the West Chocolate Mountains REEA and, therefore, no direct, indirect, or cumulative impacts would occur.

Topography, Geology, and Geologic Hazards

Cumulative impacts on geologic resources or seismic characteristics from geothermal exploration, drilling and development are expected to be minor. Any impacts from development that might occur would be minimal and largely limited to the REEA. The construction of new access roads, improvements to existing roads and bridges, and installation of wells and facilities would involve cut and fill operations. If large amounts of fill material would be necessary, increased demands on off-site supplies of sand, gravel, and crushed rock could occur. If multiple construction projects were developed within a single area, local supplies of required fill material, particularly gravel or crushed rock, could be reduced to the point of impacting the needs of roadways and other construction projects. Local changes in topography could be caused by construction of roads, well pads, pipelines, and the power plants. Seismic events related to

geothermal reservoir injection could cumulatively contribute to seismic events triggered by other geothermal development.

Soils

Construction of the energy projects under the alternatives would involve grading certain areas to level the sites and to construct flood control structures if necessary to mitigate impacts from large storm events. Erosion could occur in these areas due to the removal of vegetation and soil exposure. Developers would implement an erosion control plan to minimize the amount of any soil erosion during construction.

Due to the potential for water-driven erosion at some project locations, such as alluvial fans, developers would be required to construct an erosion control and stormwater flow system. Erosion would occur during flash flood events, but the potential adverse effects of erosion would be addressed and minimized by the erosion control design to slow flow or impound high water for later release. Some control structures would allow sheet flow to on- and off-site drainages, thereby minimizing downcutting of soils. Drainage plans may improve existing natural washes by reinforcing their banks and allowing the remaining stormwater flow to pass through the site naturally. Construction of the erosion control and stormwater detention system would reduce water erosion susceptibility within project sites and to downgradient lands.

To further ensure that effects related to soil erosion are minimized, applicants may use BMPs in their plans of development (PODs) to reduce localized soil impacts resulting from wind and water erosion; however, they would not eliminate all soil loss within project sites. Wind erosion would be exacerbated due to the removal and maintenance of vegetation within the project site, likely resulting in a localized loss of topsoil. Also, placement of impervious surfaces (primarily solar arrays, but also other energy infrastructure) may alter the drainage characteristics of the site, limiting the effectiveness of stormwater detention systems during monsoonal precipitation events.

As with construction, there would be the potential for erosion and topsoil loss during decommissioning, but the legally required erosion control measures would be implemented. Therefore, decommissioning of projects would not contribute to substantial soil erosion or loss of topsoil in the area.

Construction of the reasonably foreseeable projects within the same cumulative effects study area as the West Chocolate Mountains REEA would also be required by law to implement similar control measures to prevent erosion. However, the acreage affected by the other foreseeable projects would contribute to an overall cumulative impact to soil resources over the life of a project.

To reduce effects on soil production, applicants may be required to salvage native soil where flood control berms are built. After construction of the berms, salvaged soil would be replaced to provide a homogenous appearance as well as preserve sensitive soils and seed banks. Implementation of this type of measure would likely be expected the reasonably foreseeable projects within the same cumulative effects study area for soils. On a local scale, the cumulative effects could be large, given the amount of vegetation clearing and grading.

Water Resources

Other projects within the geographic extent of the cumulative analysis would use water for dust suppression during construction, and to a lesser degree, operations. These include agriculture (irrigation), commercial and residential development, and other proposed renewable energy projects as well as other water users such as golf courses, pools, and similar types of water intensive recreational amenities. Geothermal power plants use groundwater for cooling and to make up a loss of geothermal reservoir water over time. Solar projects also use water to clean panels, with CSP generally requiring more cleaning than solar PV facilities. Wind farm operations do not require any water for the life of the project. The water for renewable energy projects could possibly be purchased from the Imperial Irrigation District (IID) in accordance with its Integrated Regional Water Management Plan (IRWMP). Additionally, water could be purchased from current water users under some circumstances. Some water rights to be purchased from landowners are not located within IID's water service area. IID holds water rights in trust within its water service area.

Vegetation

Cumulative impacts to vegetation from projects within the geographic extent of the cumulative analysis can be additive, that is, directly proportional in severity to the quantity of the resource affected (such as vegetation loss or wetland fill), or exponential. For exponential impacts, increasing levels become disproportionately more substantial if they affect biological features that are critical to the survival of a species. Additionally, cumulative impacts on vegetation could be exacerbated as a result of project schedules. Construction of multiple projects within the same time period can result in greater impacts from construction equipment and vehicle traffic, and overall habitat degradation and loss. If projects were to be constructed consecutively, project impacts would be reduced in intensity but prolonged in duration, and given the number of projects planned in the Imperial Valley and Coachella Valley region, it is likely that concurrent construction would occur.

Projects within the West Chocolate Mountains REEA would remove cover and forage vegetation. Of particular concern would be loss to habitat and food sources used by sensitive species, such as the desert tortoise, burrowing owl, flat-tailed horned lizard, Nelson's bighorn sheep, and several bird species. The alternatives, in conjunction with other projects, would result in cumulative impacts on native vegetation communities, including spiny shrubs, cacti, ephemeral annuals, and hard grasses. Vegetation would be cleared for construction activities and, while vegetation would be allowed to repopulate areas where there would not be permanent project features, the area would be maintained via regular mowing. Additionally, washing of the solar panels would introduce new sources of water and the solar panels would introduce new areas of shading, which would adversely affect native vegetation. Drainage and berms would also alter the topography of the REEA, which could impact native vegetation. It is anticipated that other planned renewable projects in Imperial and Riverside counties would have similar impacts to vegetation and existing habitat to the REEA.

BMPs incorporated as part of all of the development alternatives would lessen the impact of developments in the West Chocolate Mountains REEA on vegetation communities (including rare and endemic species). These measures, which would also be required for other federal projects within the REEA, could include pre-construction surveys and BMPs to minimize

impacts to native vegetation. While these measures would minimize impacts to sensitive vegetation species, development would cumulatively result in a long-term, adverse impact to vegetation communities due to vegetation loss. Even with the implementation of BMPs, the alternatives would contribute to unavoidable adverse impacts to vegetation.

Fish and Wildlife

Cumulative impacts to fish and wildlife can be additive or exponential. For exponential impacts, increasing levels become disproportionately more substantial if they affect vegetation or habitat that is critical to the survival of a species. An example of an exponential impact is habitat fragmentation, where the result of the construction of multiple projects in a particular area results in fragmentation of areas that formerly provided contiguous habitat into separate areas too small to support dependent species such as mule deer.

Additionally, cumulative impacts on fish and wildlife could be exacerbated as a result of project schedules. Construction of multiple projects within the same time period can result in greater impacts from emissions, noise, construction equipment, and vehicle traffic, and overall habitat degradation and loss. If projects were to be constructed consecutively, project impacts would be reduced in intensity but prolonged in duration, resulting in adverse impacts on the life cycles of species and/or resulting in prolonged or permanent displacement of fish and wildlife from critical habitats. Given the number of projects planned in the Imperial Valley and Coachella Valley region, it is likely that concurrent construction would occur.

Projects within the West Chocolate Mountains REEA would fragment and degrade habitat, and remove cover and forage vegetation. Of particular concern would be loss to habitats used by fish and wildlife, such as mule deer and several bird species. Habitat loss of up to about 50,000 acres within the REEA and additional lands within a 40-mile radius of the REEA would result in a substantial permanent conversion of desert habitat to industrial/commercial uses. This could have a considerable impact on a variety of fish and wildlife species through direct habitat loss and/or habitat fragmentation.

Special Status Species

Projects envisioned within the West Chocolate Mountains REEA would have adverse impacts on special status species both during construction and operation. Cumulative impacts to special status species can be additive or exponential. For exponential impacts, increasing levels become disproportionately more substantial if they affect vegetation or habitat that is critical to the survival of a species. An example of an exponential impact is habitat fragmentation, where the result of the construction of multiple projects in a particular area results in fragmentation of areas that formerly provided contiguous habitat into separate areas too small to support dependent species.

Additionally, cumulative impacts on special status species could be exacerbated as a result of project schedules. Construction of multiple projects within the same time period can result in greater impacts from emissions, noise, construction equipment, and vehicle traffic, and overall habitat degradation and loss. If projects were to be constructed consecutively, project impacts would be reduced in intensity but prolonged in duration, resulting in adverse impacts on the life cycles of species and/or resulting in prolonged or permanent displacement of these

species from critical habitats. Given the number of projects planned in the Imperial Valley and Coachella Valley region, it is likely that concurrent construction would occur.

Projects within the West Chocolate Mountains REEA would fragment and degrade habitat, and remove cover and forage vegetation. Of particular concern would be loss to habitats used by sensitive species, such as the desert tortoise, burrowing owl, flat-tailed horned lizard, Nelson's bighorn sheep, and several bird species. These species are known to inhabit the REEA, but no critical habitat has been designated at this time. Other projects outside of the REEA could also contribute to a cumulative impact to these species, especially for any individuals that must be relocated or translocated prior to construction. Habitat loss of up to about 64,000 acres within the REEA and additional lands within a 40-mile radius of the REEA would result in a substantial permanent conversion of desert habitat to industrial/commercial uses. This could have a considerable impact on a variety of special status species through direct habitat loss and/or habitat fragmentation

The West Chocolate REEA also contains eight special status plant species. These species are known to inhabit other nearby locations within a 40 mile radius of the REEA and would, thus, be similarly affected by other projects in the cumulative effects study area.

BMPs would minimize impacts to fish and wildlife species and their habitat. While these measures would minimize impacts, development would cumulatively result in long-term, adverse impacts, such as habitat loss, fragmentation, and degradation. Even with the implementation of BMPs, the alternatives would contribute to unavoidable adverse impacts to these resources.

BMPs incorporated as part of all of the action alternatives would lessen the impact of developments in the West Chocolate Mountains REEA on special status species. These measures, which would also be required for other federal projects within the REEA, could include pre-construction surveys to identify special status plant and wildlife species on site, BMPs to minimize impacts to these species, biological monitors to ensure that impacts on special status species would be avoided to the fullest extent possible, and other measures to avoid or minimize impacts. While these measures would minimize impacts, development would cumulatively result in a long-term, adverse impact to special status species due to habitat loss, fragmentation, and degradation.

Cultural Resources

Cumulative impacts to cultural resources from renewable energy development are not expected. All projects proposed currently or in the future under Alternatives 1, 3, 4, 5, and 6, and any of the cumulative projects would be required to provide avoidance and mitigation for any potential impacts to known or unanticipated cultural resources to reduce impacts. Because the cultural resources within the geographic scope are important for their potential contribution to knowledge of history, BMPs to collect scientific value from archaeological cultural resources, including systematic data recovery, would be imposed. With the implementation of BMPs, there would be a reduction in the net loss of the cumulative value or context of the cultural resources within the geographic scope. No cumulative loss or displacement of known cultural resources resulting from proposed projects and the projects within the same geographic context is expected due to avoidance of known resources and implementation of BMPs.

Paleontological Resources

All current or future projects proposed under the various alternatives and any of the identified cumulative projects would be required to provide avoidance and mitigation for any potential impacts to known or unanticipated paleontological resources to reduce impacts. Because the paleontological resources within the geographic scope are important for their potential contribution to knowledge of paleoclimatic evolution of the Imperial Valley, BMPs to collect scientific value from paleontological resources, including fossil recovery, would be imposed. With the implementation of BMPs, there would be a reduction in the net loss of the cumulative value or context of the paleontological resources within the geographic scope. No cumulative loss or displacement of known paleontological resources resulting from proposed projects, and the projects within the same geographic context, is expected due to avoidance of known resources and implementation of mitigation measures.

Visual Resources

The action alternatives in this Final EIS would result in changes in the scenic landscape. The area is designated, however, to allow the greatest change in the natural landscape, the cumulative impact. Plumes from dust emissions caused by construction activities could extend beyond the one-mile cumulative effects study area buffer. These would be limited to the construction phase and only on days with favorable meteorological conditions and construction activity. Long-term intermittent, visual impacts could occur from vapor plumes from geothermal power plants. Again, these would be limited to the rare cold days in the Lower Colorado Desert. Any one of these projects could result in an alteration to the visual character and an introduction of contrast that would be consistent with the applicable iVRM Class IV.

Lands and Realty

There are no currently pending ROW applications that would be affected by the alternatives and, therefore, there would be no direct, indirect, or cumulative impacts to the lands and realty program. Other existing land use authorizations would not be affected because future applications would be subject to valid, existing rights.

Human Health and Safety/Hazardous Materials

Construction and operational activities associated with the West Chocolate Mountains REEA EIS study area could result in releases of hazardous materials in localized areas in the REEA. Applicants would implement a number programs and measures to reduce the potential for a spill and to address spills that occur. Given the small quantities of materials to be used during construction and operation, any spill would be small and would be readily cleaned up using the applicant's plans. Since any spills would be small, localized, and cleaned up, there would not be the potential for impacts of the projects to combine with impacts of other projects, and there would not be a considerable cumulative impact.

There is currently no evidence to suggest that on-site soils or groundwater are contaminated, but the soils have not been sampled and characterized and mining activity has been reported within the site boundaries. The West Chocolate Mountains REEA is currently undeveloped and vacant, and there is no evidence of previous commercial or agricultural activity.

Wildfire risks from construction and operations are associated with combustion of native materials due to smoking, refueling, sparks from welding, and operating vehicles and other equipment off roadways. Applicants would develop and implement a Fire Management Plan that would establish standards and practices to minimize the risk of fire danger and, in case of fire, provide for immediate suppression and notification. Concurrent construction of the foreseeable projects could increase the fire risks; however, each project could implement its own fire management program to reduce the potential risk of fires. Therefore, this would not be a significant cumulative impact.

Energy and Minerals

There were no direct or indirect impacts identified to energy and minerals, and no cumulative impacts have been identified.

Recreation Resources

Up to about 50,000 acres of land could ultimately be developed for renewable energy at the West Chocolate Mountains REEA. In addition, tens of thousands of other acres of other BLM and non-BLM land could be developed in the foreseeable future. If all of these projects were to be developed, they would cause a cumulative impact to recreational use in the region. None of these areas, however, are specifically managed for recreation (that is, they are not Special Recreation Management Areas), but rather managed for extensive recreation.

Special Management Areas

There are no SMAs within the West Chocolate Mountains REEA; therefore, no cumulative impacts would occur.

Social and Economic Conditions

The potential impact of the proposed plan, when added to other past, present, and reasonably foreseeable future actions, would constitute the cumulative effects from renewable energy development. During construction of the potential projects, local spending would increase in Imperial and Riverside counties. This would benefit the local and regional economy through expenditures on goods and services.

While all of the projects considered in the cumulative impacts analysis would be expected to have some influence on socioeconomic resources, a number of major renewable energy construction projects are planned which would be expected to have a particular influence on socioeconomic conditions. Collectively, these foreseeable projects would require large numbers of laborers during construction, but would have a smaller labor force for operations.

The addition of the foreseeable projects would likely draw on the unemployed work force, but also could draw workers from other regions, especially for scarce technical skills. Local construction workers for projects or any of the foreseeable projects would receive additional income for the duration of their employment. These local workers as well as non-local workers would also likely spend locally. Construction crews would use local accommodations for lodging, which would have a beneficial impact on the service industry in the area. Projects would also draw on locally procured materials, goods, and services; and some regional suppliers

would be stimulated by these purchases. As more clean energy projects are permitted over time to meet renewable portfolio standard mandates, key regional suppliers to providers would benefit in the future from retooling and inventory replenishment related to the clean energy infrastructure transformation in the area. The concurrent construction of the foreseeable projects would result in a beneficial cumulative impact on the local and regional economy and tourism, and could decrease unemployment for the periods of construction.

The cumulative socioeconomic impacts would take place within a setting characterized by trade-offs between desert habitat/ecological resources and alternative land uses in addition to energy development. The main theme would be managing how renewable energy generation comes on line within a fragile desert community ecosystem in a sustainable manner. Cumulative socioeconomic impacts can arise from the increased competition for remaining land (following build-out to reach renewable portfolio standards targets) and desert scarcity that may arise from the cumulative effects of permitting multiple projects and their related mitigation and purchased land offset requirements to preserve habitats elsewhere. Competing against these mitigation and conservation uses will be other commercial, industrial, and residential developments proposed by municipalities. The competing pressures from collective energy developments may potentially contribute to social conflicts and dissension related to differing views concerning the best use of remaining lands within municipal borders.

It is possible that some forms of tourism involving the natural appreciation of the desert and off-highway vehicle (OHV) use of this open space area would be impacted by the action alternatives, but mitigation can address this potential small effect. Collectively, however, cumulative effects from multiple renewable projects to recreation may adversely affect economic conditions and the sense of social well-being of historical recreational users of the area.

Further, given that many people live in the area because of its rural character, projects approved under the West Chocolate Mountains REEA EIS, combined with other changes in the landscape, may permanently alter the rural feel of the community.

Transportation and Traffic

Up to 1,000 personally operated vehicles, supply vehicles, and large trucks with construction equipment and materials could use the local road network to access renewable energy projects in the West Chocolate REEA. About four other foreseeable projects could also be built during the same timeframe, with an additional traffic load. Together, these activities would not cause a permanent cumulative impact to the transportation network, but could cause intermittent traffic disruptions during peak construction periods if all projects are built concurrently. Traffic increases during operations would be significantly lower and would, therefore, not exceed the LOS for State Route (SR) 111.

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List of Acronyms

B.P.	Before Present
°C	degrees Celsius
°F	degrees Fahrenheit
$\mu g/m^3$	micrograms per cubic meter
AB	Assembly Bill
ACEC	Area of Critical Environmental Concern
ACHP	Advisory Council on Historic Preservation
ADT	average daily traffic
AF	acre-feet
AICUZ	Air Installation Compatible Use Zone
AML	Appropriate Management Level
ANSI	American National Standards Institute
APLIC	Avian Power Line Interaction Committee
APS	Arizona Public Service Company
APZ	Accident Potential Zone
AQAP	Air Quality Attainment Plan
AQMP	Air Quality Management Plan
ARPA	Archaeological Resources Protection Act
AST	aboveground storage tank
ATV	all-terrain vehicle
BA	Biological Assessment
BACM	best available control measures
BEA	United States Bureau of Economic Analysis
BGEPA	Bald and Golden Eagle Protection Act
bgs	below ground surface

BLM	Bureau of Land Management
BMP	Best Management Practice
BNSF	Burlington Northern Santa Fe Railway
BO	Biological Opinion
BOR	United States Bureau of Reclamation
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CAFR	Comprehensive Annual Financial Report
CAISO	California Independent System Operator
Cal/EMA	California Emergency Management Agency
CalEPA	California Environmental Protection Agency
CalFire	California Department of Forestry and Fire Protection
Caltrans	California Department of Transportation
CARB	California Air Resource Board
CBC	California Building Code
CCAA	California Clean Air Act
CCR	California Code of Regulations
CDC	California Department of Conservation
CDCA	California Desert Conservation Area
CDFG	California Department of Fish and Game
CDOGGR	California Department of Oil, Gas and Geothermal Resources
CEC	California Energy Commission
CEPA	California Environmental Protection Agency
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation and Liability Information System
CESA	California Endangered Species Act

CFC	chlorofluorocarbon
CFR	Code of Federal Regulations
CGS	California Geological Survey
CH_4	methane
CIPC	California Invasive Plan Council
CLT	commercial low temperature
CMAGR	Chocolate Mountains Aerial Gunnery Range
CNDDB	California Natural Diversity Database
CNEL	Community Noise Equivalent Level
CNPS	California Native Plant Society
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
CORRACTS	Resource Conservation and Recovery Act Corrective Action Sites
CPCN	Certificate of Public Convenience and Necessity
CPUC	California Public Utilities Commission
CREZ	California Renewable Energy Zone
CRMMP	Cultural Resources Management and Mitigation Plans
CSLC	California State Lands Commission
CSP	concentrated solar power
CSU	controlled surface use
CUP	Conditional Use Permit
CUPA	Certified Unified Program Agency
CVAG	Coachella Valley Association of Governments
CVWD	Coachella Valley Water District
CWA	Clean Water Act
dB	decibel
dBA	A-weighted decibel

DOD	United States Department of Defense
DOE	United States Department of Energy
DOF	United States Department of Finance
DOI	United States Department of the Interior
DPC	Desert Protective Council
DRECP	Desert Renewable Energy Conservation Plan
DTC	Desert Training Center
DTSC	Department of Toxic Substances Control
DWMA	Desert Wildlife Management Area
DWQ	Department of Water Quality
DWR	Department of Water Resources
E & E	Ecology and Environment, Inc.
EA	Environmental Assessment
EDD	Employment Development Department
EGS	enhanced geothermal systems
EIS	Environmental Impact Statement
EMI	electromagnetic interference
ENVIROSTAR	Environmental Safety Training and Resources
EO	Executive Order
EPA	United States Environmental Protection Agency
EPCRA	Emergency Planning and Community Right to Know Act
ERNS	Emergency Response Notification System
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FD	full diameter
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FINDS	Facility Index System
FLPMA	Federal Land Policy and Management Act

FLTFA	Federal Land Transaction Facilitation Act
FMMP	Farmland Mapping and Monitoring Program
FR	*Federal Register*
FTA	Federal Transit Administration
FTHL	flat-tailed horned lizard
FUDS	Formerly Used Defense Sites
GDP	gross domestic product
GEM	geology, energy, and mineral
Geothermal PEIS	*Final Programmatic Environmental Impact Statement for Geothermal Leasing in the Western United States* (2008)
GHG	greenhouse gases
GLO	United States General Land Office
GPS	Global Positioning System
GWP	global warming potential
HA	Herd Area
HCP	Habitat Conservation Plan
HFCs	hydrofluorocarbons
HMA	Herd Management Area
HMRR	Hazard Management and Resource Restoration
hp	horsepower
HPHT	high pressure high temperature
HSWA	Hazardous and Solid Waste Act
HTF	heat transfer fluid
HUD	Housing and Urban Development
HWCL	Hazardous Waste Control Law
Hz	hertz
IACC	Interagency Air Cartographic Committee
IBLA	Interior Board of Land Appeals
ICAPCD	Imperial County Air Pollution Control District

IID	Imperial Irrigation District
IM	Instructional Memorandum
IRWMP	Integrated Regional Water Management Plan
ISDRA	Imperial Sand Dunes Recreation Area
ISO	Independent System Operator
IVAG	Imperial Valley Association of Governments
IVAPCD	Imperial Valley Air Pollution Control District
IVEDC	Imperial Valley Economic Development Corporation
iVRM	Interim Visual Resources Management
IVSG	Imperial Valley Study Group
IVVGA	Imperial Valley Vegetable Growers Association
IWSP	Interim Water Supply Policy
JEDI	Jobs and Economic Development Impact Model
KGRA	known geothermal resource area
kV	kilovolt
kVA	kilovolt ampere
$kWh/m^2/day$	kilowatt hour(s) per square meter per day
LADWP	Los Angeles Department of Water and Power
Ldn	Day-Night Level
Leq	Sound Equivalent Level
LOS	level of service
LPG	liquefied petroleum gas
LWCF	Lands and Water Conservation Fund
MBTA	Migratory Bird Treaty Act
MET	meteorological
mg/L	milligram(s) per liter
MHMP	Multi-Jurisdictional Hazard Mitigation Plan
MOA	Memorandum of Agreement; *also* Military Operations Area
MOU	Memorandum of Understanding

msl	mean sea level
MU	multiple use
MUC	Multiple Use Classification
MW	megawatt(s)
MWD	Metropolitan Water District
MWH	megawatt hour(s)
N_2O	nitrous oxide
NAA	non-attainment area
NAAQS	National Ambient Air Quality Standards
NAF	Naval Air Field
NASMOD	Naval Aviation Simulation Model
NASS	National Agricultural Statistics Service
NCCP	Natural Communities Conservation Plan
NCG	noncondensible gas
NCP	National Contingency Plan
NEC	National Electrical Code
NECO	Northern and Eastern Colorado
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NFRAP	No Further Remedial Action Planned
NFS	National Forest System
NGO	non-governmental organization
NHD	National Hydrography Dataset
NHPA	National Historic Preservation Act
NLCS	National Landscape Conservation System
NO_2	nitrogen dioxide
NOI	Notice of Intent
NO_X	oxides of nitrogen
NPDES	National Pollutant Discharge Elimination System

NPL	National Priorities List
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NREL	National Renewable Energy Laboratory
NRHP	National Register of Historic Places
NSO	no surface occupancy
NSR	new source review
NSW	Naval Special Warfare
NWI	National Wetlands Inventory
O&M	operations and maintenance
O_3	ozone
OA	Operational Area
OATT	Open Access Transmission Tariff
OES	Office of Emergency Services
OHV	off-highway vehicle
OHWM	ordinary high water mark
OPLA	Omnibus Public Land Management Act
OPR	Office of Planning and Research
OSHA	Occupational Safety and Health Administration
PEIR	Programmatic Environmental Impact Report
PEIS	Programmatic Environmental Impact Statement
PFCs	perfluorocarbons
PFYC	Potential Fossil Yield Classification
PM	respirable particulate matter
PM_{10}	respirable particulate matter with particulates less than 10 microns in diameter
$PM_{2.5}$	respirable particulate matter with particulates equal to or less than 2.5 microns in diameter
POD	plan of development
ppm	parts per million

PRPA	Paleontological Resources Preservation Act
PSD	Prevention of Significant Deterioration
Pub. L.	Public Law
PV	photovoltaic
PWR	Public Water Reserve
QSA	Quantification Settlement Agreement
RCRA	Resource Conservation and Recovery Act
RCRIS	Resource Conservation and Recovery Act Information System
REAT	Renewable Energy Action Team
REEA	(West Chocolate Mountains) Renewable Energy Evaluation Area
REPP	Renewable Energy Policy Project
RETI report	The Renewable Energy Transmission Initiative Phase 1B Final Report
RFD	reasonably foreseeable development
RMP	Resource Management Plan
ROD	Record of Decision
ROG	Reactive organic gases
ROW	right-of-way
RPS	Renewables Portfolio Standard
RTP	Regional Transportation Plan
RV	recreational vehicle
RWMG	Region Water Management Group
RWQCB	Regional Water Quality Control Board
S.O.	Secretarial Order
SARA	Superfund Amendments and Reauthorization Act
SB	Senate Bill
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SCE	Southern California Edison

SCEDC	Southern California Earthquake Data Center
SDAPCD	County of San Diego Air Pollution Control District
SDCWA	San Diego County Water Authority
SDG&E	San Diego Gas and Electric
SDSU	San Diego State University
SDWA	Safe Drinking Water Act
SEAL	Sea, Air, and Land
SEZ	Solar Energy Zone
SF_6	sulfur hexafluoride
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SLIC	Spills, Leaks, Investigations and Cleanups
SMA	special management area
SMARA	State Surface Mining and Reclamation Act
SO_2	sulfur dioxide
Solar PEIS	*Draft Programmatic Environmental Impact Statement for Solar Energy Development in Six Southwestern States* (2010)
SPCC	Spill Prevention, Control, and Countermeasures
SPRR	Southern Pacific Railroad
SR	State Route
SRMA	Special Recreation Management Area
SSAB	Salton Sea Air Basin
SUA	special use airspace
Supplement to the Draft Solar PEIS	*Supplement to the Draft Programmatic Environmental Impact Statement for Solar Energy Development in Six Southwestern States* (2011)
SWAT	Sea, Air, and Land (SEAL) Weapons and Tactics
SWEEPS	Statewide Environmental Evaluation and Planning System
SWF	Solid Waste Facility
SWPL	Southwest Powerlink

SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
SWRCY	Solid Waste Recycling Facility
T&E	threatened and endangered
TAC	toxic air contaminants
TCLP	Toxicity Characteristic Leaching Procedure
TDS	total dissolved solids
TG	temperature gradient
TLS	timing limitation stipulation
TMDL	Total Maximum Daily Load
TSD	transportation, storage, disposal
U.S.C.	United States Code
UIC	Underground Injection Control
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USDOT	United States Department of Transportation
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UST	Underground Storage Tank
VCP	Voluntary Cleanup Properties
VdB	vibration velocity level in decibels
VMT	vehicle miles traveled
VOC	volatile organic compound
VRI	Visual Resources Inventory
VRM	visual resource management
WAPA	Western Area Power Administration
WBWG	Western Bat Working Group
WEAP	Worker Environmental Awareness Program

WECO	Western Colorado
WEG	Wind Erodibility Group
WEM	waiver, exception, and/or modification
Wind PEIS	*Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-Administered Lands in the Western United States* (2005)
WRCC	Western Regional Climate Center
WSA	Wilderness Study Area
WTG	wind turbine generator
WWEC	West Wide Energy Corridor

1 Introduction and Purpose and Need

The Bureau of Land Management (BLM) has prepared this Final Environmental Impact Statement (EIS) and Proposed California Desert Conservation Area (CDCA) Plan Amendment to evaluate the potential environmental impacts of the proposed action of allocating federal mineral estate for geothermal energy leasing, exploration, and development of geothermal power generation facilities on public lands downslope from the West Chocolate Mountains near Niland, California. This EIS also evaluates the potential environmental impacts of the proposed action of allocating BLM-administered federal surface estate in the same planning area for testing and development of solar and wind power generation facilities through right-of-way (ROW) authorizations. The BLM defines this combined renewable energy planning area and analytical scope as the West Chocolate Mountains Renewable Energy Evaluation Area (REEA). The Proposed CDCA Plan Amendment also provides that lands within the REEA acquired under donation agreements for mitigation/compensation purposes and/or with Land and Water Conservation Funds (LWCF) would be managed as avoidance areas to offset and mitigate the impacts of land use authorizations that could result in surface-disturbing activities.

This Final EIS/Proposed CDCA Plan Amendment analyzes six alternatives, including a no action alternative and a no development alternative, to consider the suitability of the area for renewable energy development. The EIS also identifies stipulations, waivers, exceptions, modifications and best management practices (BMPs) that could be applied to future energy projects. Decisions made as a result of this planning effort will not authorize any specific energy developments. Additional project-specific National Environmental Policy Act (NEPA) analyses would need to be conducted before on-the-ground development activities could occur. In order to inform the planning process, the analysis in this Final EIS focuses on the possible environmental consequences associated with future authorization of renewable energy projects that might occur consistent with the selection of one of the planning alternatives evaluated here. This EIS will serve as planning level guidance from which site-specific NEPA analysis would tier. As a proposed land use plan amendment, this document includes stipulations with which future projects will need to conform. This is a planning document; with the exception of the existing noncompetitive lease application, there are no other lease applications or ROW applications under consideration for support by this analysis. Each project proposal will be evaluated and the appropriate NEPA document will be prepared per 40 CFR 1508.21 and 1508.28 before on-the-ground development activities could occur.

In the CDCA Plan, geothermal leasing is allowed in the West Chocolate Mountains REEA, but the Plan must be amended to identify sites suitable for solar or wind energy development. This proposed plan amendment will determine suitability of the REEA for solar, wind, and geothermal development and identify appropriate stipulations and BMPs that would be applied to any future ROW authorizations. Areas determined unsuitable for geothermal development also would be determined unavailable for geothermal leasing. This planning process and associated NEPA analysis pertains (with the exception of the existing

noncompetitive geothermal lease application) only to this suitability determination, and the establishment of protective measures generally applicable to the planning area. In areas determined suitable, individual renewable energy projects would be subject to site-specific NEPA analysis and could be denied, in whole or in part, or approved with modifications, in light of particular resource management reasons. Projects proposed in areas determined unsuitable would not be considered.

Section 201 of the Federal Land Policy and Management Act (FLPMA) directs the Secretary of the Interior to inventory public lands and the resources on those lands. In Section 202, in Land Use Planning actions, the FLPMA provides that the Secretary will rely, to the extent it is available, on the inventory of the public lands, their resources, and other values to consider present and potential uses of the public lands and consider the relative scarcity of the values involved and the availability of alternative means (including recycling) and sites for realization of those values.

This meets the plan amendment requirement under the CDCA Plan for "sites associated with power generation or transmission." The CDCA Plan (BLM 1980), under the Energy Production and Utility Corridors Element, addresses future power generation sites under a section on implementation states that "[s]ites associated with power generation or transmission not identified in the Plan will be considered through the Plan Amendment process."

This requirement was intended to provide guidance on how the BLM must consider applications for power generation and transmission within the context of the CDCA Plan, assuming that: (1) these potential future sites could not be identified at the time the CDCA Plan was approved; and (2) the Multiple Use Classes (MUCs) in the CDCA Plan provide general guidance for what types of proposals could be approved in each MUC, but that the lands within each MUC were not further refined to identify which lands within that MUC area were suitable or unsuitable for various kinds of activities. In addition, the CDCA Plan requires that MUC land designations be reviewed when completing programmatic-level land allocation documents. The lands contained within the West Chocolate Mountains REEA are currently considered "unclassified" lands. The land use classification is addressed in each alternative.

The CDCA Plan's requirement for a plan amendment to consider a proposed project for power generation or transmission assumed that this would be carried out simultaneously but separately from any site-specific environmental analysis. To improve analysis and predictability with respect to the BLM's management of the public lands in the REEA for potential renewable energy projects, as well as to facilitate management efficiencies, however, the planning initiative herein is intended to fulfill the CDCA Plan requirement for a plan amendment process for electricity generation sites. That is, while all of the action alternatives considered here under which lands would be considered suitable for such development and specific development projects would undergo separate NEPA review prior to a decision to allow or reject the applications, no plan amendment would be necessary at subsequent stages for geothermal, wind, or solar energy activities. Site-specific proposals for subsequent activities associated with the three renewable energy types would continue to require analysis and public participation under NEPA and other statutes (e.g., the NHPA and the Endangered Species Act [ESA]) and could be denied in whole or in part, for resource management reasons, even in areas identified as suitable during this planning process.

To clarify how this planning initiative fulfills these CDCA Plan requirements, each alternative that proposes suitability for geothermal leasing (assuming subsequent authorizations for development) and suitability for ROW issuance also includes a statement that the requirement for a plan amendment at the site development stage for the West Chocolate Mountains REEA has been met through the decision process on this planning effort. No additional plan amendment is required to meet the Plan requirement cited above.

The BLM has received one application for geothermal leasing, covering approximately 640 acres, and has no solar or wind energy ROW applications in the West Chocolate Mountains REEA. The adjacent Salton Sea geothermal field currently generates at least 377 megawatts (MW) of electrical energy. It is anticipated that a portion of the Salton Sea geothermal resource underlies the REEA. For commercial electrical generation, geothermal resources are leased competitively. Lands to be included in competitive lease sales are nominated to the BLM, which then adjudicates the parcels to identify the lands' availability and any stipulations that would be attached to leases. Lease sales occur about four times per year. Individual projects are analyzed under NEPA.

The U.S. Department of Energy (DOE) conducted research in 2010 that shows the West Chocolate Mountains REEA as also having a significant potential for solar development. (Appendix B). A wind energy assessment performed by the National Renewable Energy Laboratory (NREL) in support of the "Final Programmatic EIS on Wind Energy Development on BLM-Administered Lands in the Western United States" (BLM 2005; referred to herein as the Wind PEIS) indicates that there may be limited wind resources in this area of the Imperial Valley. The specific potential acreage for wind energy development in the REEA is currently unknown.

1.1 Regulatory Framework

The BLM considers competitive geothermal energy leases under the Geothermal Steam Act of 1970, as amended (30 United States Code [U.S.C.] 1001-1025), and the Energy Policy Act of 2005 (Public Law [Pub. L.] 109-58). Wind and solar energy testing and development under ROW grants are considered under the FLPMA of 1976 (43 U.S.C. 1701 et seq.). Lands for geothermal energy development that are nominated for leasing by geothermal developers and solar and wind energy ROWs must first be identified as suitable for these purposes in a land use plan prepared according to Section 202 of the FLPMA.

If renewable energy development projects are proposed in the future for the non-federal lands within the West Chocolate Mountains REEA, subsequent environmental documentation that complies with the California Environmental Quality Act (CEQA) may be required.

1.1.1 Leasing Geothermal Resources

On May 2, 2007, the BLM issued new regulations governing geothermal resources (Federal Register [FR], May 2, 2007, Volume 72, Number 84, Part II). The new rule states that State Offices that received nominations or expressions of interest filed before August 8, 2005 (the "date of enactment" of the Energy Policy Act), may offer those lands, if available, for competitive leasing under the revised geothermal regulations. Future competitive leases would be regulated under the new rule. IM 2009-022, issued on October 9, 2009, provided additional guidance on implementing the new rule. For noncompetitive applications and nominations that were pending on August 8, 2005, see 43 CFR 3200.8 for an explanation of which regulatory provisions would apply in the absence of an election by the lessee to have the lease be subject to all of the Energy Policy Act geothermal regulations. Leases issued under the old rule could be converted to the new rule, if so desired by the lessees.

Under the new rule, geothermal leases would be granted for a primary term of ten years, with two extensions of up to five years each (43 CFR 3206.17 and 3208.10). The terms of the lease require the lessee to show a certain level of diligence toward developing the geothermal resources within the lease area or the lease may be terminated. Once an area is developed for productive use of geothermal energy, the lease allows the lessee use of the resource for 40 years (43 CFR 3207.10), with a right of renewal for up to another 40 years (43 CFR 3207.11). Geothermal exploration and production on federal land conducted through leases is subject to terms and stipulations to comply with all applicable federal and state laws pertaining to various considerations for sanitation, water quality, wildlife, safety, cultural resource protection, and reclamation. Lease stipulations may be site-specific and are derived from the environmental analysis process (BLM 2002).

This document includes references to, but is not an exhaustive list of, applicable federal, state, and local laws and regulations regarding management of geothermal resources. A comprehensive list of the stipulations that would be applied, as appropriate, to newly issued geothermal leases is included in Appendix G.

Certain lands are designated as known geothermal resource areas (KGRAs) and are offered only through a competitive bid process. KGRAs are areas with a competitive interest in geothermal resource development and where the BLM has identified, via geologic and technical evidence, as capable of commercial production of geothermal fluids. There is no single criterion for KGRA designation. Until the passage of the Energy Policy Act, lands outside KGRAs could be leased noncompetitively.

Pending Geothermal Lease Application

The lease application in the West Chocolate Mountains REEA (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.

Two existing leases in the West Chocolate Mountains REEA (CACA 43965 and CACA 46142) were considered under the "Final Programmatic Environmental Impact Statement for Geothermal Leasing in the Western United States" (BLM 2008; referred to herein as the Geothermal PEIS) and were authorized under that ROD. These two existing leases will be

unaffected by the lease stipulations in Appendix G. No specific areas within the West Chocolate Mountains REEA were closed to geothermal leasing or solar or wind ROW grant applications in the CDCA Plan. The analysis in this EIS may identify timing and location restrictions for future surface use within leased areas.

Lease applications, in accordance with provisions of the Geothermal Steam Act, are generally submitted for at least one full section of land, which is a mapped area of 1 square mile, or 640 acres. As a result, while lease applications may be submitted for more than one section, and while applications may be approved for less than one section, the section is the basic geographic unit that is used for analysis in this EIS.

1.1.2 Rights-of-Way Management of Solar Energy Projects

The Energy Policy Act encourages the development of renewable energy resources, including solar energy. BLM IM No. 2007-097, issued on April 4, 2007, establishes the policy for processing ROW applications for solar energy projects on BLM-managed public lands. Secretarial Order (S.O.) 3283 was issued on January 16, 2009, to help facilitate this action. S.O. 3283 authorized the BLM to establish coordination offices that will expedite the permitting of wind, solar, biomass, and geothermal projects, along with needed electrical transmission facilities, on BLM-managed lands. S.O. 3285 was issued on March 11, 2009, and amended as S.O. 3285A1 on February 21, 2010. S.O. 3285 made production and transmission of renewable energy on public lands a priority for the DOI.

Applications for commercial solar energy facilities will be processed as ROW authorizations under Title V of the FLPMA and 43 CFR Part 2800. Both commercial concentrating solar power (CSP) facilities and photovoltaic (PV) electricity-generating facilities are required to comply with the BLM's planning, environmental, and ROW application requirements.

The BLM has further considered the issue of competitive procedures for processing solar ROW applications and has determined that the issue is not germane to this land use planning process. On December 29, 2011, the BLM published an Advanced Notice of Proposed Rulemaking regarding the possibility of engaging in rulemaking to establish a competitive process for leasing public lands for solar and wind energy development (76 FR 81906). References to competitive leasing for solar projects have therefore been removed from this FEIS.

1.1.3 Right-of-Way Authorizations for Solar Energy

ROW applications for solar energy development projects will be identified as a high priority for BLM field offices, and the applications will be processed in a timely manner. This priority is consistent with the Energy Policy Act and S.O. 3283 and S.O. 3285A1. The applicant must submit a complete and acceptable application and provide a cost recovery payment before the BLM will initiate processing of a ROW application. It is anticipated that most ROW applications for solar energy development will be Category 6, full cost-recovery applications. The BLM will use a ROW grant (Form 2800-14) to authorize all facilities held by the holder of the grant on the public lands related to a commercial solar energy development project. This authorization will include all infrastructure related to the solar project. The lands involved in the

ROW grant will be defined by aliquot legal land descriptions and be configured to minimize the amount of land involved.

The ROW authorization will contain appropriate stipulations relating to all aspects of project development, including road construction and maintenance; vegetation removal; natural, cultural, and biological resources mitigation and monitoring; and site reclamation. An approved plan of development for construction and operation of the solar facility must be completed before beginning construction. The term (or length of time) of the ROW authorization is specific and is primarily dependent upon a reasonable period needed to accomplish the purpose of the authorization. All grants issued for three years or less (2805.11(b)(2)) shall have a termination date of December 31. Except as provided below, no term should exceed 30 years:

a. Grants for state and local government highways and roads may be perpetual.
b. Reciprocal grants must have equal terms and may be perpetual.
c. Grants or portion of grants involved in lands being transferred out of federal ownership (see 2807.15).

The grantee of a ROW authorization pays an annual rent established by the BLM Director using land value data from the National Agricultural Statistics Service (NASS) and megawatt capacity fees based on average prices per kilowatt hour. These rental fees are outlined in BLM IM No. 2010-141, issued June 10, 2010, and conform to 43 CFR 2806.10(a). The megawatt capacity portion of the rental payment is implemented over a five-year period to permit additional data collection and facilitate the phased construction of solar energy facilities. The megawatt capacity for each project phase will begin at 20 percent for the first year and will increase at intervals of 20 percent for each year thereafter.

1.1.4 Right-of-Way Applications for Wind Energy

The BLM Land Use Planning Handbook (H-1601-1) requires that land use plans address existing and potential development areas for renewable energy projects, including wind energy (see H-1601-1, Appendix C, II. Resource Uses; Section E, Lands and Realty). IM No. 2009-043 updates and replaces the Wind Energy Development Policy (IM 2006-216), issued August 24, 2006, and the Interim Wind Energy Development Policy (IM 2003-020), issued October 16, 2002. In addition, it clarifies BLM wind energy development policies and BMPs published in the Wind PEIS in June 2005. Wind energy site testing and monitoring activities typically conform to existing land use plans, and thus, land use plan amendments are not likely to be necessary. However, in cases where wind energy projects do not conform to existing land use plans, it may be appropriate to amend the land use plan concurrently, using the same analysis for the wind energy projects. Field offices with land use plans that were not amended by the Wind PEIS ROD may amend their plans at any time by following the requirements under 43 CFR 1610.5-5.

As noted above, the BLM has determined that the issue of competitive processing of wind energy ROW applications is not germane to this land use planning process and is not further discussed. For further information, reference should be made to the BLM's Advanced Notice of Proposed Rulemaking (76 FR 81906, December 29, 2011).

1.2 Location of the Proposed Action

The West Chocolate Mountains REEA, located in Imperial County, California, is within the boundaries of the CDCA. The REEA is south of Riverside County, north of the City of Calipatria, east of the Salton Sea, and west of the Chocolate Mountains in north-central Imperial County (Figure 1-1). The REEA (BLM and non-BLM land) consists of approximately 64,058 acres (Table 1-1). Within the West Chocolate Mountains REEA are 38,624 acres of private lands, 3,806 acres of land managed by the California State Lands Commission (CSLC), 1,262 acres of split estate land where there is privately owned surface estate and federally owned minerals estate, and 2,863 acres of land acquired from the Catullus Corporation in conjunction with the Wildlands Conservancy using LWCF money donated to the BLM.

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]
	Total	**64,058**

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 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.

All acquired Catellus lands were conveyed to the U.S. by S.F. Pacific Properties, Inc. a Delaware corporation, by Grand Deed for valuable consideration ($), or by donation (gift). Lands were acquired with LWCF appropriations by Congress and by funds from the Wildlands Conservancy, a non-profit corporation. Catellus sold lands to the BLM at a bulk discount / per acre value below appraised value. Wildlands funded all transactions which were a donation to the BLM. Wildlands was not paid any LWCF money since the lands were owned by S.F. Pacific Properties. Wildlands lobbied Congress for LWCF money and contributed money from donors to fund the purchases. Later acquisition phases involved the transfer of all mineral and oil and gas rights from S.F. Pacific to Wildlands prior to the transfer of the surface rights to the BLM. These rights are currently held by Wildlands (split estate) and the BLM owns the surface only on some properties. The acquired lands are managed following guidance in IM No. CA-2009-020CH1 and the Proposed Plan incorporates this guidance by providing that they be managed as exclusion/avoidance zones for land use authorizations that could result in surface-disturbing activities. In addition, there are 1,480 acres of land (federal surface/federal minerals) withdrawn for use by the Bureau of Reclamation (BOR) that are not open for solar or wind energy ROWs or

geothermal leasing. BLM land within the REEA consists of 18,765 acres of land that contain federal surface and 20,027 acres of land with federal mineral estate and that are managed by the BLM El Centro Field Office. The 1,262 acres of surface land in the split estate are included in the 38,624 acres of private land mentioned earlier. The legal description for the West Chocolate Mountains REEA is provided in Appendix H.

1.2.1 West Chocolate Mountains Boundary Area

To foster development of renewable energy on public lands as required by federal policies and laws and to fulfill the provisions in the Memorandum of Agreement (MOA) between the BLM and the State of California, the BLM El Centro Field Office was tasked with developing a plan to allocate the lands within the eastern portion of Imperial County for renewable energy leasing, ROW authorization, exploration and development. This plan would require amending the current CDCA Plan.

To define the area of study, the BLM El Centro Field Office determined that the boundaries of an REEA now considered as the current REEA, would reach to the limits of its jurisdiction to the north which is the Imperial-Riverside county line. To the east, the boundary of the study area was identified as the western boundary of the Chocolate Mountains Aerial Gunnery Range (CMAGR) and/or the Coachella Canal. The boundary was identified to be the Imperial Sand Dunes Special Recreation Management Area and approximately to the Salton Sea to the west. This created a well-defined and manageable area of public land for study and allocation through the current planning process and anticipated plan amendment.

1.2.2 Comparison of Other Lands

The West Chocolate Mountains Boundary Planning document complies with the CDCA direction to evaluate neighboring lands because it incorporates or will be incorporated in the national-level and regional-level renewable energy planning documents (i.e., the Wind and Geothermal PEISs, and the “Final Programmatic Environmental Impact Statement for Solar Energy Development in Six Southwestern States” [DOE 2012; referred to herein as the Solar PEIS]), and the Desert Renewable Energy Conservation Plan [DRECP]).

1.2.2.1 National Planning

The 1980 CDCA plan as amended, the Wind PEIS, the Geothermal PEIS, and the Solar PEIS have all evaluated lands throughout the CDCA and desert southwest through the NEPA process and support the REEA designation as defined in this document. The lands within the CDCA were identified in these programmatic documents as having high value resources for each type of renewable energy which could lend itself to the maximum energy per unit of land.

The 1980 CDCA plan created or identified four Multiple Use Classes (MUCs) (C, L, M, and I) for lands within the CDCA (more detail is provided in Section 1.6.1.2) for management and land allocation purposes. This was the primary component used in designing the plan. This classification strategy 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.

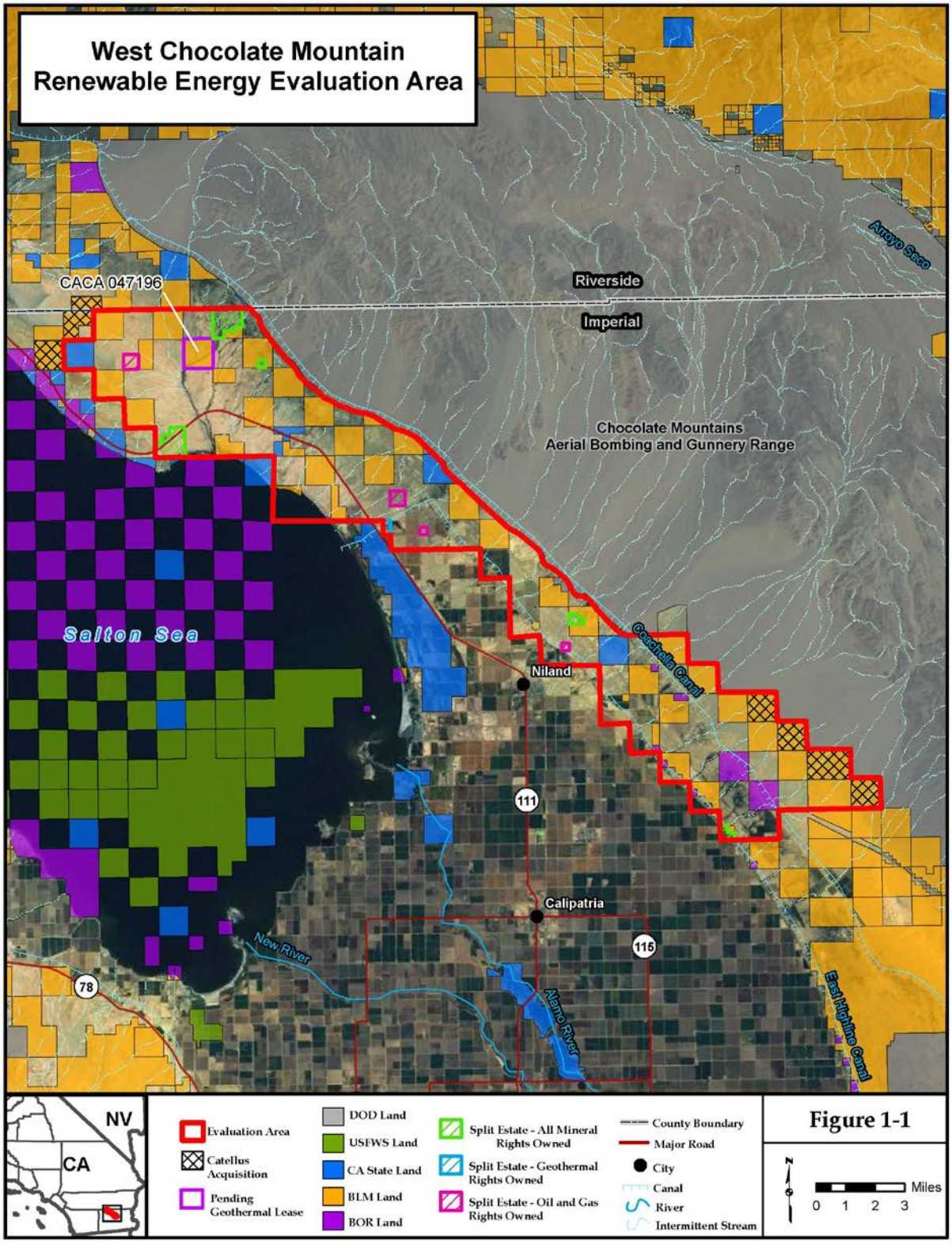
West Chocolate Mountain
Renewable Energy Evaluation Area
CACA 047196
Riverside
Imperial
Chocolate Mountains
Aerial Bombing and Gunnery Range
Arroyo Seco
Salton Sea
Coachella Canal
Niland
111
Calipatria
115
New River
78
Alamo River
East Highline Canal
NV
CA
Evaluation Area
Catellus Acquisition
Pending Geothermal Lease
DOD Land
USFWS Land
CA State Land
BLM Land
BOR Land
Split Estate - All Mineral Rights Owned
Split Estate - Geothermal Rights Owned
Split Estate - Oil and Gas Rights Owned
County Boundary
Major Road
City
Canal
River
Intermittent Stream
Miles
0 1 2 3

Figure 1-1

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The final designations of lands were those remaining unclassified. These were scattered and isolated public lands that had not yet been assigned a use class designation. These lands were intended to be managed on a case-by-case basis. This management process was explained in the Land Tenure Adjustment Element of the plan. In the Land Tenure Adjustment section of the plan (page 121), 300,000 acres of lands were listed as unclassified or were not assigned to one of the MUCs. The lands within the West Chocolate Mountains REEA 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 in order to protect resource values. Lands with known mineral values were to be selectively retained by the BLM.

Also, the REEA has existing infrastructure such as railroads, power transmission lines, and major highways; contains previously designated transmission line corridors; and meets other criteria found to be favorable to renewable energy development. For example, much of the land has been previously disturbed by mining, agricultural, and military activities, so using this land for renewable energy development would reduce the amount of intact desert lands that would be disturbed.

1.2.2.2 Regional Planning

California Senate Bill No. 2X , signed into law by Governor Brown on April 12, 2011, increased California’s renewable energy portfolio standard to 33 percent of all retail electricity sales by 2020 and Executive Order # S-14-08 mandated the development of the Desert Renewable Energy Conservation Plan (DRECP) , a major component of California's renewable energy planning efforts. The DRECP is intended to further these objectives and provide binding, long-term endangered species permit assurances while facilitating the review and approval of renewable energy projects in the Mojave and Colorado deserts in California.

To oversee the implementation of the DRECP, a Renewable Energy Action Team (REAT) was formed consisting of the California Energy Commission (CEC), the California Department of Fish and Game (CDFG), the BLM, and the U.S. Fish and Wildlife Service (USFWS). Memoranda of Understanding (MOUs) were signed by the participating agencies. Others joining the team include the California Public Utilities Commission (CPUC), California Independent System Operator, National Parks Service, U.S. Environmental Protection Agency, and the Department of Defense (DOD).

The DRECP and West Chocolate Mountains EIS are anticipated to be compatible, and the DRECP is expected to adopt the decisions stemming from the West Chocolate Mountains EIS.

Lands within and adjacent to the REEA were included in those lands designated by the REAT as a California Renewable Energy Zone or CREZ. The 1980 CRDA Management Plan had left the public lands within the REEA as unclassified with authorization that renewable energy projects were to be done on a case-by-case basis. The 1980 plan requires classification of lands within the CDCA prior to allocation for a specific purpose, under one of four multiple use categories.

1.3 Purpose of the Proposed Action

The purpose of the proposed action is to facilitate appropriate development in the West Chocolate Mountains REEA of geothermal, solar, and wind energy and to foster a consistent and predictable process for renewable energy development there. Key components in developing this process involve identifying the existing resources associated with the land in the REEA and making appropriate land use plan decisions regarding the location, development, and management of those resources. Other critical efforts include the identification of reasonable stipulations and measures to avoid potential resource conflicts to the extent practicable and to mitigate the potential impacts associated with geothermal, solar, and wind energy testing and development. Additionally, this programmatic planning effort will address MUCs for lands contained in the West Chocolate Mountains REEA (CDCA, as amended 1999). MUCs are explained in more detail in Section 1.7.1.2. In this way, the concerns and interests of all participants can be incorporated to achieve the U.S. Department of the Interior's (DOI's) "Smart from the Start" renewable energy goals: Developing the greatest energy potential and getting that power quickly to the grid with the fewest environmental impacts.

Resources to be addressed include, but are not limited to, vegetation, wildlife (including special status species), cultural and historic resources, hydrology, water and air quality, soils, visual resources, recreation, global climate change, and other land uses.

The BLM's purpose in proposing to approve a lease for federal geothermal resources on public lands with a pending noncompetitive lease application in the West Chocolate Mountains REEA is to facilitate development of federal geothermal resources in a manner consistent with its obligations to manage the public land resources in the CDCA.

Proposed revisions of the MUC or their boundaries, guidelines, objectives, or decision criteria and major revisions of Plan elements, including significant changes in use levels or facility locations will be decided by the BLM California State Director under the amendment procedures outlined in this section.

1.4 Need for the Proposed Action

The need for the proposed planning action arises from pending renewable energy applications, national policy, and Congressional direction. The BLM has identified a need to respond in a more efficient manner to the high interest in siting renewable energy projects on public lands, including geothermal plants and utility-scale solar and wind projects, and to ensure consistent application of measures to mitigate the adverse impacts of such development. The CDCA requires that programmatic-level planning efforts address MUCs for land contained within their planning area (CDCA, as amended 1999).

The BLM has also identified a need to respond to a pending noncompetitive lease application, filed in 2002, for geothermal resources in the West Chocolate Mountains REEA. The Energy Policy Act made significant changes to the Geothermal Steam Act of 1970, as amended, to encourage the leasing and development of geothermal resources on public lands (see Energy Policy Act sections 211 and 222(d)(1)). It also set a goal for up to 10,000 MW of

renewable energy to be sited on public lands. There are no ROW grant applications for solar or wind energy projects in the West Chocolate Mountains REEA.

As stated in Section 1.1.2, S.O. 3283 authorized the BLM to establish coordination offices that will expedite the permitting of wind, solar, biomass, and geothermal projects, along with needed electrical transmission facilities, on BLM-managed lands. S.O. 3285A1 made production and transmission of renewable energy on public lands a priority for the DOI. Although this is a federal action that would apply to federal land, the proposed action would also support one of California's Renewables Portfolio Standard (RPS) Program goals, which calls for 33 percent of California's energy to be from renewable sources by 2020. By comparison, as of 2009, 15.4 percent of California's electric production came from renewable energy sources (CPUC 2010).

1.5 Decisions to be Made

This EIS addresses potential environmental impacts from development of geothermal, wind, and solar resources, so that the following key decisions can be made, which will guide future siting of projects:

1. Whether to amend the CDCA Plan to identify:
    a. All or parts of the BLM-managed lands within the West Chocolate Mountains REEA as suitable for geothermal leasing and development, subject to constraints discussed in Chapter 2;
    b. All or parts of the BLM-managed lands within the West Chocolate Mountains REEA as suitable for solar energy development, subject to the constraints discussed in Chapter 2; and
    c. All or parts of BLM-managed lands within the West Chocolate Mountains REEA as suitable for wind energy development, subject to the constraints discussed in Chapter 2.
2. Which stipulations will be identified to be applied as appropriate to solar, wind, or geothermal energy development.
3. To manage lands acquired by the BLM under donation agreements for mitigation/compensation purposes and with LWCF funds (including Catellus lands) as avoidance areas for land use authorizations that could result in surface disturbing activities.
4. To designate all or a portion of the REEA as a Solar Energy Zone (SEZ).
5. To approve or deny the existing noncompetitive federal geothermal lease application (CACA 047196) consistent with the terms and conditions of the current CDCA Plan. Subsequent proposals for development of that lease would be assessed under future NEPA documents.

It should be noted that this Final EIS/Proposed CDCA Plan Amendment addresses whether or not to approve an existing noncompetitive geothermal lease application, which is an implementation decision and, therefore, is appealable to the Interior Board of Land Appeals (IBLA). The other decision, whether to allocate certain BLM-managed lands within the West Chocolate Mountains REEA as suitable for geothermal leasing and wind and solar ROW applications, and the appropriate stipulations to be adopted for each resource, is considered a planning decision and would be protestable to the BLM Director. Details can be found in the Administrative Remedies section (Section 5.3) of this EIS and in the ROD that will be issued following this Final EIS/Final Proposed CDCA Plan Amendment.

1.6 Relationship of the Proposed Action to Applicable Federal Policies, Plans, and Programs

1.6.1 Bureau of Land Management/Department of the Interior Guidance

The DOI's policy, consistent with Section 2 of the Mining and Mineral Policy Act of 1970 and Sections 102(a)(7), (8), and (12) of the FLPMA, encourages the development of mineral resources, including geothermal resources, on federal lands. Section 211 of the Energy Policy Act, discussed in Section 1.1.2, encourages the approval of at least 10,000 MW of non-hydropower renewable energy projects on public lands by 2015.

1.6.1.1 Federal Land Policy and Management Act

The FLPMA is important in several key ways. It provides the BLM's overarching mandate to manage the public lands and resources under its stewardship under 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)). Sustained yield is defined as "the achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the public lands consistent with multiple use" (FLPMA Section 103(h)). The FLPMA directs the BLM to manage sustained yield consistent with multiple use. Section 202 of the FLPMA also requires the BLM to manage the public lands consistent with land use plans developed through a public process (FLPMA Section 202(f)). In addition, Title V of the FLPMA authorizes the BLM to grant ROWs over, upon, under, or through the public lands, for uses such as solar and wind energy projects, and transmission lines (FLPMA Section 501(a)).

1.6.1.2 California Desert Conservation Area Plan

The CDCA encompasses 25 million acres in Southern California designated by Congress in 1976 through the FLPMA. Congress directed the BLM to prepare and implement a comprehensive, long-range plan for the management, use, development, and protection of public lands within the CDCA. The 1980 CDCA Plan (BLM 1980), as amended, is based on the concepts of multiple use, sustained yield, and maintenance of environmental quality. The CDCA Plan provides overall regional guidance for management of the public lands in the CDCA and establishes long-term goals for protection and use of the California desert.

The CDCA Plan establishes a Plan Amendment process which requires that the BLM address MUCs for programmatic planning efforts; therefore, the Final EIS will address the MUCs for land contained within the West Chocolate Mountains REEA.

Summary of CDCA Multiple Use Classes in the Planning Area

The 1980 CDCA plan created or identified four MUCs (C, L, M, and I) for lands within the CDCA (Chapter 3, page 13) for management and land allocation purposes. This was the primary component used in designing the Plan. This classification strategy 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.

- **Class C (Controlled Use):** Class C had two purposes. The first was, to show those areas being "preliminarily recommended" as suitable for wilderness by Congress (Wilderness Study Areas [WSAs]). This process was further explained in the Wilderness Element in the Plan. The second purpose was for Class C to be used in the future to show those areas formally designated as Wilderness by Congress. There are no WSAs or Wilderness areas within the REEA, this MUC will be eliminated from further consideration in the current EIS process.
- **Class L (Limited Use):** Class L (Limited Use) was intended to protect sensitive natural, scenic, ecological and cultural resources. Lands identified as Class L were to be managed to provide for low-intensity, carefully controlled multiple use of resources, while ensuring the sensitive values were not diminished.
- **Class M (Moderate Use):** Class M (Moderate) aimed to provide a controlled balance between higher intensity use and protection of public lands. The class provided for a wide variety of existing and anticipated uses including mining, livestock grazing, recreation, energy and utility development. A Class M designation was designed to conserve resource and mitigate damages to resource resulting from authorized uses.
- **Class I (Intensive Use):** MU-I was designated as an Intensive Use Class. The purpose was to allow concentrated use of lands and resources to meet human needs while providing reasonable protections for sensitive natural and cultural values. This use category called for mitigation of impacts on resources and rehabilitation of impacted areas "insofar as possible."
- **Unclassified:** The final designations of lands were those remaining unclassified. These were scattered and isolated public lands that had not yet been assigned a use class designation. It was intended that these lands were to be managed on a case-by-case basis. This management process was explained in the Land Tenure Adjustment Element of the Plan. In the Land Tenure Adjustment section of the Plan (page 121), 300,000 acres of lands were listed as unclassified or were not assigned to one of the MUCs. The lands within the West Chocolate Mountains REEA 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 in order to protect resource values. Lands with known mineral values were to be selectively retained by the BLM.

Parcels not containing sensitive resource were to be considered for disposal by completive bid at market value. Exchanges, leases, or permits for these parcels would be considered if found economically sound and in the interest of the people of the U.S. Access to these parcels was to be by way of public roads or by obtaining easements over private lands, if necessary.

The Geology, Energy, and Mineral (GEM) Resources Element of the CDCA Plan contains "Special provisions for the Salton Sea: While the area surrounding the Salton Sea is unclassified due to the sensitive nature of the Salton Sea, the guidelines for Class L will apply to all mineral leasing activities (oil, gas, geothermal, sodium, and potash) on public land in and under the Salton Sea." The CDCA Plan did not specifically identify areas for wind and solar ROW grants in Imperial County, California.

Acquired lands within the CDCA are unclassified unless the plans amending the CDCA Plan expressly state otherwise (e.g., West Mohave [WEMO] Plan, Northern and Eastern Colorado [NECO] Desert Coordinated Management Plan, etc.).

1.6.1.3 Western Colorado Routes of Travel Designation Plan Amendment

In 2002, the Western Colorado (WECO) Routes of Travel Designation Plan Amendment to the California CDCA Plan, amended previous route designations and existing routes on approximately 475,000 acres of public lands designated as limited-use areas for off-highway vehicle (OHV) use. 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.

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. The WECO Plan Amendment encompasses all lands within the West Chocolate Mountains REEA.

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

Appendix I of the EIS outlines BMPs applicable to wind, solar, and geothermal energy development projects in the REEA. These will apply to all proposed alternatives and subsequent projects, if approved. The REAT agencies (CEC, CDFG, BLM, and USFWS) jointly prepared the *Best Management Practices and Guidance Manual: Desert Renewable Energy Projects.* The guidance manual fulfills agency commitments in State of California Executive Order (EO) S-14-08, Secretary of the Interior S.O. No. 3285, and related memoranda between the State of California and the DOI, and between the REAT agencies (signed in 2008 and 2009). The BMPs proposed in the guidance manual have been adopted for this EIS and form the basis for Section

2.2.7; however, they have been modified to the extent practicable to be specific to the West Chocolate Mountains REEA. Appendix I contains additional BMPs that were used in the development of the Wind PEIS (BLM 2005), Geothermal PEIS (BLM 2008), and the Solar PEIS (DOE 2012). The Solar PEIS was completed before this West Chocolate Mountains EIS/Proposed CDCA Plan Amendment was finalized. Thus, BMPs from the Solar PEIS have been incorporated.

1.6.1.4 Interim Policy on Management of Donated Lands and Lands Acquired with Land and Water Conservation Funds

The interim policy, IM No. CA-2009-020, is adopted in this Final EIS/Final Proposed CDCA Plan Amendment analysis to apply to all subject lands within the REEA. Under IM No. CA-2009-020, lands acquired by the BLM under donation agreements, acquired for mitigation/compensation purposes and with LWCF funds, are to be managed as avoidance areas for land use authorizations that could result in surface-disturbing activities. If BLM-California managers have use authorization applications pending, or receive new applications on lands that meet the above criteria, they are required to notify the State Director and set up a briefing to address how to respond to those applications. If managers have inquiries related to pre-application activities for any land use authorizations on lands that meet the above criteria, they will notify applicants regarding the location of these lands as soon as possible and advise them to avoid these lands or provide details on how they would plan to operate or mitigate their project in a manner consistent with the values of the lands donated or acquired for conservation purposes. The intent of this interim policy has been reaffirmed by a memorandum, dated April 10, 2012, from the Director of the U.S. BLM to the State Director of the California BLM.

1.6.2 National Guidance

1.6.2.1 National Environmental Policy Act

NEPA requires federal agencies to review the effects of their actions on the quality of the human environment prior to taking action. The review process helps not only federal officials but also the public understand the environmental consequences of major projects as well as actions to protect, restore, and enhance the environment. This law requires all federal actions that could result in a significant impact on the environment to be subject to review by federal, tribal, state, and local environmental authorities, as well as by affected parties and interested citizens.

1.6.2.2 Clean Air Act

The Clean Air Act (CAA), as amended, regulates air pollution to improve air quality. This act regulates air emissions from area, stationary, and mobile sources. This law also authorizes the U.S. Environmental Protection Agency (EPA) to establish National Ambient Air Quality Standards (NAAQS) to protect public health and the environment.

1.6.2.3 Clean Water Act

The Federal Water Pollution Control Act (33 U.S.C. §§ 1251-1387), otherwise known as the Clean Water Act (CWA), is a comprehensive statute intended to restore and maintain the chemical, physical, and biological integrity of the nation's waters. The CWA was signed into law in 1972. The EPA has primary authority for implementation and enforcement of the CWA.

The 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. Discharges of material generally include fill that is necessary for construction. Also included are requirements to set water quality standards for all contaminants in surface waters. 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 U.S. must be certified by the California State Water Resources Control Board (SWRCB) as administered by the Regional Water Quality Control Boards (RWQCBs). This certification ensures that an action does not violate state and/or federal water quality standards. The proposed West Chocolate Mountains REEA area is located in the jurisdiction of the Colorado River RWQCB.

1.6.2.4 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.

1.6.2.5 Enhancing Renewable Energy Development on the Public Lands

S.O. 3283, issued January 16, 2009, enhances the DOI's efforts to achieve the goal Congress established in Section 211 of the Energy Policy Act to approve non-hydropower renewable energy projects on public lands with a generation capacity of at least 10,000 MW of electricity by 2015. Based on these federal policies, the BLM is obligated to consider the proposal expeditiously in order to accommodate the potential increase in power generation that, if approved, would come on line on or before 2013.

1.6.2.6 Renewable Energy Development by the Department of the Interior

S.O. 3285A1, issued on February 22, 2010, made production and transmission of renewable energy on public lands a priority for the DOI. It established a DOI-wide approach for applying scientific tools to increase understanding of climate change and to coordinate an effective response to its impacts on tribes and on the land, water, ocean, fish and wildlife, and cultural heritage resources that are managed within the DOI. The order also established an energy and climate change task force that identifies specific zones on U.S. public lands where the DOI can facilitate a rapid and responsible move to large-scale production of solar, wind, geothermal, and biomass energy.

1.6.2.7 Energy Policy Act

The Energy Policy Act established a comprehensive, long-range, national energy policy that included a goal for the Secretary of the Interior to approve 10,000 MW of renewable energy on public lands by 2015. It provides incentives for traditional energy production as well as newer, more efficient energy technologies and conservation. It contains several provisions related to geothermal energy to make it more competitive with traditional methods of energy

production. It also amended the Geothermal Steam Act in several ways, which are discussed throughout the EIS.

1.6.2.8 Endangered Species Act

The Endangered Species Act (ESA) of 1973, as amended, provides for the federal protection of threatened plants, insects, fish, and wildlife. The USFWS administers the ESA on behalf of the United States. The major components of the act include:

1. Provisions for listing threatened and endangered species;
2. A requirement for consultation with the USFWS on federal projects;
3. Prohibitions against the "taking" of listed species; and
4. Provisions for permits to allow the incidental taking of threatened and endangered species.

Under Section 7 of the ESA, "each federal agency shall, in consultation with and with the assistance of the Secretary [of the Interior, in this case, acting through the USFWS], insure that any action authorized, funded, or carried out by such agency … is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species." Therefore, if the proposed action involves a federal agency, federal permit, or federal funding, under Section 7 of the ESA, the federal agency must consult with the USFWS to determine if an endangered or threatened species "may be present" in the area. If the USFWS determines that a protected species may be present, and the federal agency cannot determine that the proposed action will not affect any listed species or designated critical habitat, the agency must submit a Biological Assessment (BA) to the USFWS, and the USFWS will, in turn, issue a Biological Opinion (BO) stating whether the action will "jeopardize" a protected species and will issue an incidental take permit, allowing a certain amount of take incidental to implementation of the proposed action.

1.6.2.9 Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. 668-668c), enacted in 1940, and amended several times since then, prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald eagles, including their parts, nests, or eggs (USFWS 2010). The Act provides criminal penalties for persons who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle … [or any golden eagle], alive or dead, or any part, nest, or egg thereof" (USFWS 2010). The Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb" (USFWS 2010).

For purposes of these guidelines, "disturb" means: "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior" (USFWS 2010).

The USFWS has new regulations (FR 74:46835-46879; 11 September 2009) that allow the USFWS to issue permits to take eagles under the BGEPA in compliance with the terms and conditions of a Section 7 incidental take statement under the ESA (16 U.S.C. 1531 et seq.; 50 CFR 402, Subpart B) issued prior to the effective date of 50 CFR 22.26. (Eagle Act) (50 CFR 22.26). However, as described in the cited documents, there are currently limits on the issuance of such permits.

1.6.2.10 Flat-Tailed Horned Lizard Range-Wide Management Strategy

In California, the flat-tailed horned lizard (FTHL) was designated a sensitive species by the BLM in 1980. In 1988, a petition was submitted to the California Fish and Game Commission (CFGC) to list the species as endangered. In 1989, the commission voted against the proposed listing. In 1993, the USFWS published a proposed rule to list the FTHL as a threatened species. In 2006, the USFWS withdrew its proposal. On March 2, 2010, USFWS re-instated the 1993 proposed listing of the FTHL as federally threatened. On March 15, 2011, the USFWS again withdrew its proposal to list the FTHL under the federal ESA (USFWS 2011).

This USFWS decision was in part due to the measures taken by a group of state and federal agencies formed to address the conservation of the species. The “Flat-tailed Horned Lizard Rangewide Management Strategy, 2003 Revision, An Arizona-California Conservation Strategy” (USFWS 2003) was released in May 2003. The purpose of this strategy is to provide a framework for conserving sufficient habitat to maintain four viable populations of the flat-tailed horned lizard throughout the species’ range. Planning actions and prescriptions that guide the management of lands within the designated management areas are designed primarily to reduce new surface disturbance and to promote reclamation of disturbed sites. The Strategy provides mitigation measures (Appendix 3) and a compensation formula (Appendix 4), to be incorporated into all authorized surface-disturbing projects where applicable. A CDCA Plan Amendment to incorporate the Management Areas and Research Areas identified in this strategy was released in 2005.

1.6.2.11 Protecting Wilderness Characteristics on Lands Managed by the BLM

Section 603 of the FLPMA provides the BLM with its authority to manage lands under wilderness study in a manner so as not to impair the suitability of such areas for preservation as wilderness. Only Congress, with Presidential approval, may designate areas as wilderness. Once an area has been designated for preservation as wilderness, the provisions of the Wilderness Act apply with respect to the administration and use of such designated area. Areas not designated as wilderness and Wilderness Study Areas released from further consideration are managed in accordance with land management plans adopted under Section 202 of the FLPMA.

The designated Wilderness Areas are managed according to the Wilderness Act of 1964, FLPMA of 1976, the legislation which designated these areas, and the BLM Wilderness Regulations published in 43 CFR Part 6300. The BLM implements these laws through its Wilderness Management Regulations, published as a final rule in 43 CFR Parts 6300 and 8560.

The BLM manages the designated Wilderness Areas, as well as WSAs, for the public’s use and enjoyment in a manner that will leave the area unimpaired for future use and enjoyment as wilderness by providing for the protection of the area, the preservation of its wilderness

character, and the dissemination of information about its use and enjoyments as wilderness. The BLM is directed by the Wilderness Act, the FLPMA, the designating legislation, and the BLM Wilderness Regulations published in 43 CFR Part 6300 to manage all activities conducted in Wilderness Areas and WSAs in a manner that preserves their wilderness character.

Wilderness Areas and WSAs provide a contrast to lands where human activities dominate the landscape. No buffer zones are created around wilderness to protect them from the influence of activities on adjacent land.

1.6.2.12 National Historic Preservation Act

The National Historic Preservation Act (NHPA) of 1966 (Pub. L. 89-665, as amended by Pub. L. 96-515 [16 U.S.C. 470 et seq.]) provides for the establishment of the National Register of Historic Places (NRHP) to include historic properties such as districts, sites, buildings, structures, and objects that are significant in American history, architecture, archaeology, and culture. Section 106 of the act requires federal agencies with jurisdiction over a proposed federal project to take into account the effect of any undertaking on cultural resources listed or eligible for listing in the NRHP, and afford the relevant State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation (ACHP) an opportunity to comment regarding the undertaking. The NRHP eligibility criteria have been defined by the Secretary of the Interior's Standards for Evaluation (36 CFR 60).

1.6.2.13 Public Water Reserve 107

Established by Executive Order in 1926, this order creates a public water reserve by withdrawing every smallest legal subdivision of the public land surveys which is vacant, unappropriated, and unreserved public land containing a spring or water hole, as well as all lands within 0.25 mile of every spring or water hole located on unsurveyed public lands, from settlement, location, sale, or entry and reserved for public use and in aid of legislation.

1.7 Relationship of the Proposed Action to Applicable State Plans, Policies, and Programs

1.7.1 California Environmental Quality Act

CEQA requires state and local agencies to identify projects/activities that may have significant environmental effects and to either avoid or mitigate those effects, where feasible. This law requires all actions that could result in a significant impact on the environment to be subject to review by state and local environmental authorities as well as by affected parties and interested citizens.

1.7.2 California Endangered Species Act

The California Endangered Species Act (CESA) allows the CDFG to authorize project proponents to "take" state-listed threatened, endangered, or candidate species if certain conditions are met. Under the CESA, "take" is defined as an activity that would directly or indirectly kill an individual of a species, but the definition does not include "harm" or "harass," which are terms found in the federal ESA. As a result, the threshold for a take under the CESA is

higher than that under the ESA. The permitting program administers the incidental take provisions of CESA to ensure regulatory compliance and statewide consistency.

1.7.3 California Fish and Game Code

The following regulatory codes, published by the CDFG, are applicable to biological resources, particularly the fully protected species, found within the West Chocolate REAA.

California Fish and Game Code 3503.5. Raptors (birds of prey) and active raptor nests are protected by the California Fish and Game Code 3503.5, which states that it is "unlawful to take, possess, or destroy any birds of prey or to take, possess, or destroy the nest or eggs of any such bird" unless authorized.

California Fish and Game Code 3503. Bird nests and eggs are protected by the California Fish and Game Code 3503, which states "it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto."

California Fish and Game Code 3513. California's migratory birds are protected by California Fish and Game Code 3513 by making it unlawful to take or possess any migratory nongame bird as designated in the Migratory Bird Treaty Act (MBTA) or any part of such migratory nongame birds.

State of California Fully Protected Species. The classification of 'fully protected' was the state's initial effort in the 1960s to identify and provide additional protection to those animals that were rare or faced possible extinction. Lists were created for fish, mammals, amphibians and reptiles, birds and mammals. Not all fully protected species have been listed as threatened or endangered species under the ESA and/or the California ESA, for example: burrowing owl. Fully protected species may not be taken or possessed at any time, and no licenses or permits may be issued for their take except for collecting these species for necessary scientific research and relocation of the bird species for the protection of livestock.

1.7.4 State Historic Preservation Officer

The California SHPO has responsibilities under Section 101(b)(3) of the NHPA including to "advise and assist as appropriate, federal and state agencies and local governments in carrying out their historic preservation responsibilities," and to "consult with the appropriate federal agencies in accordance with the NHPA on federal undertakings that may affect historic properties, and the content and sufficiency of any plans developed to protect, manage, or to reduce or mitigate harm to such properties."

1.7.5 State of California Lake and Streambed Alteration Program

The CDFG is responsible for conserving, protecting, and managing California's fish, wildlife, and native plant resources. To meet this responsibility, the Fish and Game Code (Section 1602) requires an entity to notify the CDFG of any proposed activity that may substantially modify a river, stream, or lake.

Notification is required by any person, business, state or local government agency, or public utility that proposes an activity that will substantially divert or obstruct the natural flow of

any river, stream, or lake; substantially change or use any material from the bed, channel, or bank of any river, stream, or lake; or deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground-up pavement where it may pass into any river, stream, or lake. The notification requirement applies to any work undertaken in or near a river, stream, or lake that flows at least intermittently through a bed or channel. This includes ephemeral streams, desert washes, and watercourses with a subsurface flow. It may also apply to work undertaken within the floodplain of a body of water. If the CDFG determines that the activity may substantially adversely affect fish and wildlife resources, a Lake or Streambed Alteration Agreement will be prepared. The agreement includes reasonable conditions necessary to protect those resources and must comply with CEQA. The entity may proceed with the activity in accordance with the final agreement.

1.7.6 State of California Renewables Portfolio Standard Program

There is a need in California for additional renewable energy capacity. Applicable state laws pertaining to California RPS mandates include:

- Senate Bill (SB) 1078, passed in September 2002, set an RPS mandate of 20 percent by 2020;
- SB 107, passed in September 2006, accelerated the established RPS mandate of 20 percent by 2020 to an RPS mandate of 20 percent by 2010 (State of California 2009); and
- SB X1 2, signed into law on April 12, 2011, set an RPS mandate of 33 percent by 2020.

1.7.7 Imperial Valley Final State Implementation Plan for Particulate Matter Less Than 10 Microns in Aerodynamic Diameter (PM_{10})

On April 26, 2010, the California Air Resource Board (CARB) issued a staff report named "Status Report on Imperial County Air Quality and Approval of the State Implementation Plan Revision for PM_{10}." CARB staff found that the State Implementation Plan (SIP) meets all applicable CAA requirements and recommended the Board adopt it, including upgraded transportation conformity budgets, and emissions inventory, as a revision to the California SIP for submittal to EPA. However, due to an EPA comment letter received on May 2010, the CARB staff changed their recommendation to the Board to hold the particulate matter less than 10 microns in aerodynamic diameter (PM_{10}) SIP. Since EPA did not concur on the high wind events analysis, it was not feasible to revise the existing SIP and develop an attainment demonstration due to an uncontrollable event.

The 2009 SIP for PM_{10} meets the elements required under the CAA, as amended for areas classified as "serious" non-attainment of the NAAQS. The elements of the plan are as follows:

- Air quality data analysis for the years 2006 through 2008 including exceptional events;
- An updated emissions inventory;
- A determination of significant sources of PM_{10} and classification of these sources;

- Best available control strategies along with an impact analysis (Imperial County Air Pollution Control District [ICAPCD] 2009).

1.7.8 Imperial Valley Study Group Development Plan for the Phased Expansion of Transmission to Access Renewable Resources in the Imperial Valley

In September 2005, the Imperial Irrigation District (IID), San Diego Gas and Electric (SDG&E), Southern California Edison (SCE), Los Angeles Department of Water and Power (LADWP), and the CEC studied what long-range transmission improvement would be necessary to export renewable energy from the Imperial Valley. "The Imperial Valley Study Group (IVSG) was formed to recommend a phased plan for the development of transmission necessary to export 2,200 MW of renewable generation from the region" (IVSG 2005). The report included recommendations for IID's internal system upgrades to interconnect new generation and upgrades to transport the energy (wheel) from IID's Balancing Authority area to other parts of California.

There are currently five major transmission lines in Imperial Valley that connect to control areas outside of IID:

1. **Midway to Blythe or F Line (161 kilovolts [kV]).** Starts at the Midway Substation and goes east over the CMAGR to the Blythe Substation where it interconnects to the Western Area Power Administration (WAPA) Balancing Authority.
2. **Highline to Mirage or KN/KS-Line (230 kV).** Travels north into Riverside County and interconnects to the SCE system at the Mirage Substation, in the California Independent System Operator (ISO) Balancing Authority.
3. **Midway to Coachella Valley or N-Line (92 kV).** Starts at the Midway Substation and connects through IID's Coachella Valley Substation to the SCE Mirage Substation.
4. **Southwest Powerlink (SWPL) (500 kV).** Connects IID to SDGE and the ISO at the Imperial Valley Substation to the west and the Arizona Public Service Company (APS) to the east at North Gila Substation in Arizona.
5. **Blythe to Knob/Pilot Knob Department of Energy (161 kV).** Connects IID to the WAPA Balancing Authority and the APS Balancing Authority at the Pilot Knob Substation.

IID has already initiated work on many of the internal upgrades identified in the IVSG report and will be adding additional capacity with new upgrades while SDG&E proceeds to develop a 500-kV transmission line, the Sunrise Powerlink. A generator must apply under IID's Open Access Transmission Tariff (OATT) to interconnect to IID's system. The OATT study allows IID to determine the most effective manner to wheel power out of the area. The OATT study is not a capacity study, but will determine how much transmission is available and what upgrades, if any, would be necessary for the existing system to export the generators' requested megawatts. Generators that apply are considered on a "first come, first served basis." Once approved, the generator is placed in the transmission queue, the project can be built, and the generator will receive transmission capacity on the system. Once the capacity is used up, the next

generator in the queue may have to pay for transmission line upgrades to wheel additional electricity out of the IID Balancing Authority.

Based on the work of the IVSG, the IID transmission planning group, and regional transmission planning efforts, renewable energy generators seeking transmission from the proposed renewable leasing area will have access to transmission options and a system established under the IID OATT to request transmission. The IVSG report, among others, has documented a plan to enable the export of renewable energy generation from the Imperial Valley. The limit on transmission availability is the willingness of prospective generators to pay for any required upgrades to the existing system (a system which was designed to service the existing residential and business customers in the Balancing Authority).

1.8 Relationship of the Proposed Action to Applicable County Plans, Policies, and Programs

The West Chocolate Mountains REEA is situated within an unincorporated area of Imperial County, California. Imperial County has an adopted General Plan (County of Imperial 2006), which is a comprehensive, long-range declaration of purposes, policies, and programs for future development of the area. The General Plan also addresses geothermal energy development.

The Imperial County Land Use Ordinance (Section 91701.09) includes the Geothermal Overlay ("G") Zone, which permits minor geothermal projects and wells and, by Conditional Use Permit, allows major and intermediate geothermal projects, geothermal test facilities, and major geothermal exploratory wells. There are presently four designated Geothermal Overlay Zones throughout Imperial County totaling 147,444 acres: Salton Sea (111,444 acres); North Brawley (14,000 acres); South Brawley (15,000 acres); and Heber (7,000) acres. The West Chocolate Mountains REEA is in County Geothermal “G” Zone A, called the Salton Sea Geothermal Zone (County of Imperial 2006).

Imperial County is the local governmental entity that has jurisdiction over geothermal development on private and state lands outside of incorporated cities. The county is the lead permitting agency for all exploratory and test projects and for power plant production projects generating less than 50 MW (net capacity). The CEC regulates all power plants over 50 MW (net) (County of Imperial 2006).

Imperial County Air Pollution Control District

The West Chocolate Mountains REEA lies within the ICAPCD. The ICAPCD reviews the plans and specifications for construction in the REEA. Emissions and possible air contamination resulting from construction activities (e.g., operational road dust, wind-blown contaminants, and emissions from construction activities) will be assessed.

1.9 Other BLM Actions Considered in Relation to the Proposed Action

1.9.1 BLM Land Withdrawals

A withdrawal of federal land withholds the land from settlement, sale, location, or entry under some or all public land laws. Withdrawals are accomplished through Public Land Orders for the purpose of:

- Limiting activities to maintain other public values;
- Reserving an area for a particular public purpose or program; or
- Transferring administrative jurisdiction/responsibility for an area from one department, bureau, or agency to another.

The Secretary of the Interior has withdrawal authority, which can be delegated to agency officials in the Office of the Secretary who are appointed by the President and confirmed by the Senate. The BLM sought and received permission from the Secretary of the Interior to issue a notice of proposed withdrawal for the West Chocolate Mountains REEA (public notice forthcoming in the *Federal Register*). In effect as of the date of publication, the proposed withdrawal would segregate 22,562 acres of public lands in the REEA for up to two years from surface entry and mining while various studies and analyses are conducted to support a final decision on withdrawing the land from uses that would conflict with renewable energy development. The required withdrawal studies and analyses will be completed as part of a separate environmental document, and the Secretary's decision regarding the proposed withdrawal will be made separately from the BLM's ROD for the West Chocolate Mountains REEA.

On September 24, 2010, the DOD published a Notice of Intent to Prepare a Legislative EIS for the Proposed Extension of the CMAGR Land Withdrawal. This Legislative EIS would address the proposed extension of the withdrawal of approximately 226,711 acres of public land in Imperial and Riverside counties, California, for continued military use of the CMAGR. The public scoping period was from September to December 2010. The Draft Legislative EIS was released to the public on August 31, 2012.

1.9.2 West-Wide Energy Corridor Programmatic EIS

The DOE, the BLM, the U.S. Department of Agriculture (USDA) Forest Service, the DOD, and the USFWS prepared the "Programmatic Environmental Impact Statement, Designation of Energy Corridors on Federal Land in the 11 Western States," termed the West-Wide Energy Corridor PEIS (DOE and BLM 2008), which evaluated potential impacts associated with the designation of corridors on federal land in 11 western states for oil, gas, and hydrogen pipelines, and electricity transmission and distribution facilities. Based on the information and analyses developed in the PEIS, in 2008, the BLM signed a ROD amending 92 land use plans in support of the designation of more than 6,000 miles of energy transport corridors on federal lands in the 11 western states. However, in response to a 2009 lawsuit, the BLM has agreed to review and revise this plan. There are no corridors within the West Chocolate Mountains REEA. Nearby corridors include a corridor running along Interstate 10 to the north

and a corridor running near Interstate 8 to the south. One of these corridors would accommodate electric transmission lines that would bring electricity produced at the West Chocolate Mountains REEA to market.

1.9.3 Programmatic EIS for Solar Energy Development

To facilitate orderly development of solar energy on the public lands, the BLM and the DOE developed a joint PEIS (DOE 2012) to assess the environmental, social, and economic impacts associated with solar energy development on BLM-managed public land in six western states: Arizona, California, Colorado, Nevada, New Mexico, and Utah. Although the study area for the Solar PEIS is larger than for the West Chocolate Mountains EIS, the Solar PEIS focuses its analysis on SEZs located in these states. According to the Solar PEIS, the BLM proposes to amend land use plans in the to designate and make certain provisions regarding SEZs and, to some degree, pertaining to the wider study area, to allocate lands as appropriate for solar energy development and to establish stipulations and a standard set of mitigation measures for development and operation of utility-scale solar energy projects, as well as to identify lands that are unsuitable for such development.

The Solar PEIS also describes a process for accepting future applications, possibly through a competitive process, which is likely to attract companies with the experience and resources necessary to quickly deploy solar energy projects. The Draft Solar PEIS was published in December 2010 and was open for public comments until May 2011. In consideration of public comments received, it was determined that a Supplemental NEPA analysis was required to address issues brought forth by the public, including a solar energy program alternative that defines a standard process for screening and evaluating applications for utility-scale solar energy development (greater than 20 MW) outside of SEZs.

The Supplement to the Solar PEIS (DOE 2011) defined variance areas and a variance application process for approximately 1.4 million acres. The Supplement to the Solar PEIS was open for public comment through January 27, 2012. The Final Solar PEIS was released in July 2012 and a Record of Decision was signed in October 2012. Although the Solar PEIS includes lands within Imperial County, the West Chocolate Mountains REEA is not within any SEZ addressed in the Solar PEIS. Rather, the West Chocolate Mountains REEA is defined in the Solar PEIS as a solar variance area, potentially available for solar energy development.

This West Chocolate Mountains REEA Final EIS/Proposed CDCA Plan Amendment identifies those areas most suitable for renewable energy development, including solar energy, within the planning area and encompasses a portion of potential variance areas, as defined for California within the Solar PEIS. The proposed Plan Amendment is designed to be consistent with BMPs defined in the Solar PEIS. The West Chocolate Mountains REEA Final EIS/Proposed CDCA Plan Amendment land allocation for solar energy partially fulfills the variance process requirements proposed through the Supplement to the Solar PEIS (DOE 2011). Specifically, for utility-scale solar development, the West Chocolate Mountains REEA Final EIS/Proposed CDCA Plan Amendment serves as a step-down analysis to a portion of potential 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 final

proposed pre-screening variance process for most resources and, therefore, could qualify for priority processing.

1.9.4 Programmatic EIS for Wind Energy Development

The BLM issued a ROD in December 2005 for approval of a comprehensive Wind Energy Development Program to administer the development of wind energy resources on BLM-administered public lands in 11 western states: Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming. The decision established policies, BMPs, and mitigation measures for wind energy projects, as well as amended BLM land use plans in all states addressed in the report, except Arizona and California. The Wind PEIS was used to determine the wind potential in the REEA as well as to identify potential impacts from energy development and BMPs.

1.9.5 Programmatic EIS for Geothermal Energy Development

The BLM issued a ROD in December 2008 for approval of a comprehensive Geothermal Energy Development Program to administer the development of geothermal energy resources on BLM-administered public lands in 12 western states: Alaska, Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming. The decision established policies, BMPs, and mitigation measures for geothermal energy projects, as well as amended BLM land use plans in all states addressed in the report.

The decision included approximately 143 million acres of land administered by the BLM and 104 million acres within the National Forest System (NFS) administered by the USDA Forest Service. Geothermal leases are issued for the earth's heat resource where there is federal mineral estate, and the BLM was delegated authority to issue geothermal leases on federal mineral estate, such as underlying lands administered by the USDA Forest Service. The Geothermal PEIS was used to identify impacts from geothermal energy development and potential BMPs.

1.9.6 Desert Renewable Energy Conservation Plan

The Governor's E.O. # S-14-08 mandated the development of the DRECP, a major component of California's renewable energy planning efforts. The DRECP, when completed, is expected to further the objectives of the State of California's RPS and provide binding, long-term endangered species permit assurances while facilitating the review and approval of renewable energy projects in the Mojave and Colorado deserts in California. The West Chocolate Mountains REEA is located within the Development Focus Area within the DRECP. A REAT was formed consisting of the CEC, the CDFG, the BLM, and the USFWS. Under the direction of the REAT, four major products have been developed or proposed:

- Best Management Practices and Guidance Manual for Desert Renewable Energy Projects;
- Draft Conservation Strategy that clearly identifies and maps areas for renewable energy project development and areas intended for long-term natural resource conservation as a foundation for the DRECP;

- Desert Renewable Energy Conservation Plan: A joint state and federal Natural Communities Conservation Plan (NCCP) and part of one or more Habitat Conservation Plans (HCPs); and
- DRECP Draft and Final joint Environmental Impact Report/EIS.

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2 Alternatives

This chapter discusses a range of reasonable alternatives for the proposed planning action pertaining to the West Chocolate Mountains REEA. Based on issues, concerns, and opportunities identified from public scoping comments, interdisciplinary interaction between resource professionals, and collaboration with interested agencies, the BLM identified a range of reasonable alternatives. These alternatives include the No Action Alternative (with no amendment to the CDCA Plan), the No Development Alternative (with an amendment to the CDCA Plan), four additional action alternatives, and other alternatives that were considered but eliminated from detailed analysis. The No Action Alternative is required under NEPA and implementing Council on Environmental Quality (CEQ) regulations (40 CFR 1500-1508).

To support the development of alternatives, the BLM prepared reasonably foreseeable development (RFD) scenarios for development of geothermal, solar, and wind energy within the West Chocolate Mountains REEA. The RFD scenarios were developed based on a number of factors:

- The potential for energy development within the West Chocolate Mountains REEA based on the known or estimated resource potential (i.e., presence of a geothermal reservoir, solar insolation, wind speed);
- The presence of known or potential constraints to energy development (e.g., topography [slope], critical habitat for threatened and endangered [T&E] species, setbacks to hydrologic features); availability of water; and
- Prohibited areas (i.e., land not available for surface occupancy).

The BLM prepared RFD scenarios to assist in consideration of potential impacts associated with the alternatives. These RFD scenarios have been prepared as a basis for analyzing environmental impacts resulting from future leasing and development of federal geothermal resources, and grant of rights-of-way for development of solar, and wind resources within the West Chocolate Mountains REEA. The complete RFD scenarios are included as Appendices A through C.

2.1 Available Data and Assumptions

Analytical assumptions, based on the available natural resources data, and general constraints to development discussed below were used to assess the potential for development of geothermal, solar, and wind energy within the West Chocolate Mountains REEA. The assumptions and constraints are described below.

2.1.1 Assumptions (Common to All Alternatives)

Adequate Water Supply. In existing California binary geothermal power plants, fluid loss (usage) for operations ranges from 623 to 2,556 acre-feet/year. Fluid loss for existing California multi-stage flash geothermal power plants for operations ranges from 10,807 to 13,540 acre-feet/year. More precise estimates of water usage will be developed in site-specific NEPA analysis upon receipt of an application for a power plant site license. A more complete characterization of water use for geothermal power plants can be found in Appendix A.

Access to Transmission. Electrical service in this area, for the purpose of a project's operational, maintenance, and/or storage facilities, is limited and requests for service will be reviewed by the Imperial Irrigation District (IID) on a case-by-case basis. Any necessary improvements or relocations of IID facilities would be at the expense of the developers.

2.1.2 Constraints (Common to All Alternatives)

Development would be avoided or excluded due to the following (the assumptions and constraints described below are not applicable to the pending leasing decision):

- NRHP-eligible cultural resources;
- T&E species and/or critical habitat for T&E species, including unique plant assemblages;
- Avian nesting habitat;
- Wildlife corridors;
- 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);
- Areas falling within environmentally sensitive federal lands such as national parks or wilderness areas;
- Isolated BLM parcels less than 1 square kilometer in size;
- Unsuitable topography (only applicable to solar energy);
- Proximity to an airport runway or heliport (only applicable to certain types of CSP technology and wind energy);
- Proximity to DOD/military low fly zones (only applicable to certain types of CSP technology and wind energy).

Additionally, solar would be avoided or excluded in the following areas:

- Areas with an annual average resource less than 6.00 kilowatt hours per square meter per day (kWh/m^2/day); and
- For CSP technology, areas where slope is greater than one percent; for PV solar energy technology, areas where slope is greater than five percent.

In addition, standard stipulations as well as a stipulation related to groundwater usage to require preparation of a water supply assessment under SB-610 would apply. These stipulations are discussed in greater detail in Section 2.2.3.1.

To understand the constraints on water use on solar energy development, Table 2-1 was developed to show the amount of solar water use. Solar development is constrained by its high water use and the limited water supply in the area.

Table 2-1 Technology-Specific Water Assumptions for Solar Energy

	Operational Water Use (AF/yr/MW)			
Parameter	**Parabolic Trough**	**Power Tower**	**Dish Engine**	**Photovoltaic**
Wet (recirculating) cooling[1]	4.5-14.5	4.5-14.5	NA	NA
Dry cooling[1]	0.2-1.0	0.2-1.0	NA	NA
Hybrid system[2]	0.9-2.9	0.9-2.9	NA	NA
Mirror/panel washing/other[3]	0.5	0.5	0.5	0.05

Source: BLM 2010.
Notes:
[1] Wet-cooling and dry-cooling requirements are based on estimates given as gal/h/MW in DOE (2009). An assumed range of operational hours of 30 to 60% of annual hours (1 gal = ~3.1 x 10-6 AF) was used to generate AF/yr/MW values.
[2] Hybrid systems are assumed to use 20% of the water requirements of wet-cooling systems.
[3] The mirror washing estimates from the assumed 2% of total water needs of wet-cooled parabolic trough facilities from DOE (2009). This estimate equals 20 gal/hr/MW, which corresponds to 0.5 AF/yr/MW, with no assumptions on operational time (conservative estimate). The panel washing estimate for PV facilities was assumed to be a factor of 10 less than that for CSP technologies.

These potential constraints will be fully analyzed at the time applications for development or testing are received and the application area is surveyed for these conditions. Ground-disturbing activities would not be authorized prior to these surveys and analyses.

Water would be needed for construction and operation and maintenance of renewable energy projects, which might be purchased from the IID; however, the IID has a limited service area, and the majority of the West Chocolate Mountains REEA is not within it. Water sources could include groundwater or Colorado River water. Either source could represent a constraint due to limited water in the desert. If that occurs, portions of the REEA may be determined to be closed to and unsuitable for energy development, thus reducing the number of acres available for development. Any projects outside the service area would be ineligible to receive water from the IID. The Metropolitan Water District of Southern California, the Coachella Valley Water District, the U.S. Bureau of Reclamation, or some other water provider with rights could be a source for Colorado River water.

The Authorized Officer has the discretion to require additional studies and analysis based on requests for lands for leasing and ROW applications. Based on the results of any future cultural or biological studies, as well as a water supply assessment, the BLM may determine, at a later date, and propose through the planning process, that geothermal leasing and solar and wind ROWs may not be allowed in portions of federal surface estate covered in this REEA programmatic analysis.

As stated previously, RFD scenarios for geothermal, solar, and wind were created to assist in developing a reasonable range of alternatives by estimating the scale of potential development that could occur given certain assumptions and constraints. For example, the RFD scenarios assume that all authorization to use all potentially productive areas for geothermal, solar, or wind energy production, except exclusion areas, would be given subject to: (1) the standard lease (geothermal) or right-of-way (solar/wind) terms and conditions; or (2) the lease (geothermal) or right-of-way (solar/wind) terms and conditions applicable to each alternative.

The RFD scenarios contain estimates for the number of acres potentially disturbed by the facilities necessary for energy development and operation, including substation and generation interties to existing transmission lines. This in no way is intended to imply that the BLM would be making decisions about development on lands not administered by the BLM or development of non-federal mineral estate that may underlie public lands. Those decisions are not exclusively within the purview of the BLM, but the RFD scenarios include consideration of those resources for the purposes of cumulative impact analysis. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR § 1508.7).

2.1.3 Geothermal

Geothermal exploration is carried out to assist in defining the geothermal resource in terms of its geometry, boundaries, controls on permeability, temperature distribution, and fluid flow paths. Exploration can include geologic mapping, geophysical surveys, and geochemical surveys to define an area considered to be most prospective for development. The developer may choose to use temperature-gradient (TG) wells first and then use full-diameter (FD) wells once a resource is identified. Full-diameter wells that are drilled into the resource to provide direct evidence of the resource are not considered exploration by the BLM, but are approved as part of the next stage of geothermal development, drilling, and testing of the geothermal resource.

Given the reservoir temperature in the West Chocolate Mountains REEA, construction of a power plant would likely entail use of binary conversion technology. Regardless of the size of the resource, it is anticipated that power plants would be developed in increments of 20 to 50 MW. A geothermal power plant is typically supported by pipeline systems in the vicinity of the plant. Pipelines are usually constructed above ground and are less than 24 inches in diameter. In a binary-cycle plant, the heat from the produced fluid is transferred to a working fluid that boils at a lower temperature than water. It is the working fluid that expands through a turbine to generate electricity, rather than the geothermal fluid itself. Additional information on this process is available in Appendix A.

Approximately two dozen TG wells have been drilled within the West Chocolate Mountains REEA to establish the geothermal resource development potential that may exist within the region. Most of these TG wells have been plugged and abandoned, but information about the wells is available from geothermal databases maintained by various organizations, including the California Division of Oil, Gas, and Geothermal Resources; the United States Geological Survey (USGS); Southern Methodist University; and the Geo-Heat Center. The TG wells include one deep geothermal exploration well (MCR No. 1-15, drilled in 1979 to 9,800 feet in Section 15, Township 9S, Range 12E), which showed a gradient of 1.9 degrees Fahrenheit (°F) per 100 feet (essentially a background gradient indicating no commercial potential at that site). However, some TG wells drilled for geothermal exploration to depths ranging from several hundred to over 1,500 feet indicate gradients exceeding 5°F per 100 feet. That gradient, if maintained to greater depths, implies reservoir temperatures around 350°F at depths from 5,000 to 6,000 feet, and potentially exceeding 500°F at 9,000 feet. Since actual geothermal gradients may locally decrease or even reverse with depth, it is reasonable to estimate resource temperatures somewhere near 350°F at commercially drillable depths within the West Chocolate Mountains REEA.

In addition to the TG well data, the West Chocolate Mountains REEA's proximity to the Salton Sea geothermal field indicates the potential for geothermal development. The Salton Sea geothermal area is one of the most prolific geothermal areas in the world. The field is located in a geologic rift valley, a complex fault zone where the Pacific Plate and the North American Plate are being pulled away from each other. This pulling action results in abnormally thin crustal rocks, shallow magma, and high temperatures at relatively shallow depths. Temperatures in excess of 600°F have been encountered at depths as shallow as 3,500 feet below the surface, and single production wells can generate over 25 MW. The Salton Sea geothermal field has 10 operating geothermal power plants with a current capacity of approximately 326 MW net.

At its closest point, the West Chocolate Mountains REEA is about 8 miles northeast of the developed portion of the Salton Sea field. Although decreasing resource temperatures on the northeast margin of the Salton Sea field are indicated by published temperature contours (CalEnergy 2003), there are spas with hot water wells adjacent to the northwest portion of the REEA (the Bashford, Lark, and Fountain of Youth spas), which suggests that geothermal resources suitable for electrical generation may be present within the REEA. It is assumed that the productive areas would be less prolific than in the Salton Sea geothermal field and would require more production wells per MW than are required in the Salton Sea geothermal field.

Based on the available data and assumptions discussed in the Geothermal PEIS, Section 2.1, and the Geothermal RFD (Appendix A), geothermal energy development could occur on lands within the West Chocolate Mountains REEA as listed in Table 2-2 and illustrated on Figure 2-1. The existing noncompetitive lease application covers all of one section (about 640 acres), which is split estate (private surface/federal subsurface). Approved geothermal leases in the REEA cover 3,322 acres. To estimate the amount of anticipated development for the 34,998 acres that would potentially occur on BLM land, a simple ratio was developed to estimate the percentage of development that could occur on BLM-managed land. This ratio is based on the percentage of land within the REEA that is managed by the BLM for geothermal leasing (33 percent [11,859 acres BLM/34,998 acres total]). Thus, 33 percent of any given geothermal project in the REEA would occur on BLM land, 67 percent would occur on non-BLM land.

Table 2-2 Lands Available for Geothermal Development

Landowner	Acreage
BLM	11,859[1]
State	1,090
Private	22,050
Total	**34,998**

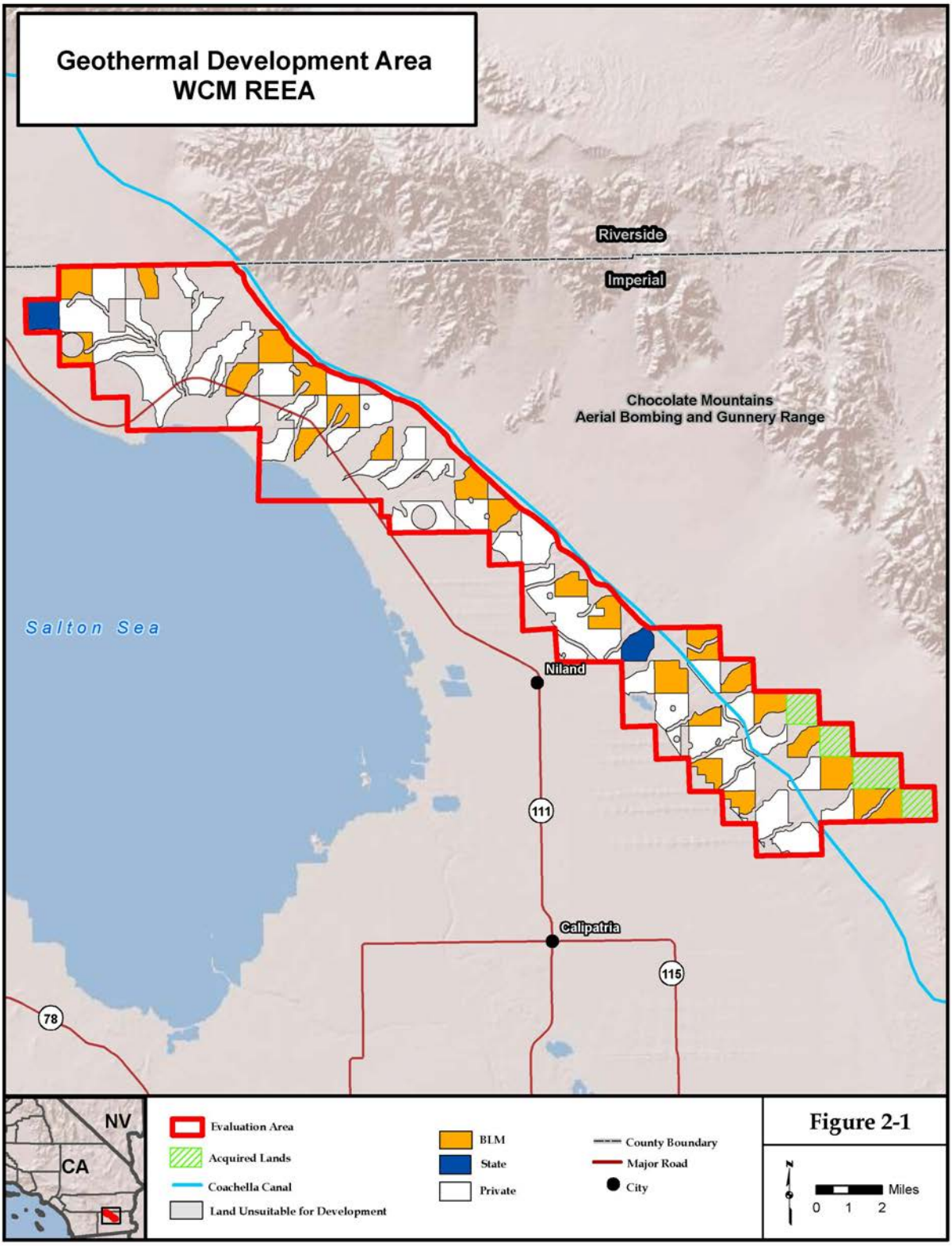
Notes:
[1] Includes BLM surface and split estate available for geothermal leasing.

Surface disturbance from geothermal energy development would occur from geothermal exploration and the development of the well field. 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 West Chocolate Mountains REEA, rather than risk underestimating the potential surface disturbance, it is assumed that only one well would be drilled from each pad. The total foreseeable surface disturbance for new wells and power plants is summarized in Table 2-3.

Table 2-3 Well Site and Power Plant Surface Disturbance for 50-Megawatt Projects

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 per mile	40 miles	144	120 miles	432
Pipelines	1.2 acres per mile	40 miles	48	120 miles	144
Total			**272**		**816**
Power plant location	30 acres/50 MW	50-MW	30	Power plant location	30 acres/50 MW
Access Roads	3.6 acres/mile	1 mile	3.6	Access Roads	3.6 acres/mile
Transmission lines initial	12.1 acres/mile	3 miles	36.3	Transmission lines initial	12.1 acres/mile
Transmission lines final	2.4 acres/mile	3 miles	7.2	Transmission lines final	2.4 acres/mile
Total			**69.9 (initial) 40.8 (final)**	**Total**	

Source: BLM 2008 (RFD Updated 2009. The BLM refined the original RFD in the 2008 Geothermal PEIS based on the specific characteristics of the Salton Sea area. These numbers are consistent with the range provided by the BLM in the Geothermal PEIS, which looked at an 11-state area).


Geothermal Development Area
WCM REEA
Riverside
Imperial
Chocolate Mountains
Aerial Bombing and Gunnery Range
Salton Sea
Niland
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Calipatria
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NV
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Evaluation Area
Acquired Lands
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Land Unsuitable for Development
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It is anticipated that up to three power plants would be built to use the resource from the West Chocolate Mountains REEA. 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 West Chocolate Mountains REEA. It is assumed that the access road would require 30 feet of surface disturbance including cut and fill. Transmission intertie lines require 100 feet of initial 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 three power plants is summarized in Table 2-4.

Table 2-4 Site Disturbance for Three 50-Megawatt Power Plants

Description	Unit Surface Disturbance	Number	Total Surface Disturbance (acres)
Power plant location	30 acres per 50 MW	150-MW	90
Access Roads	3.6 acres per mile	3 mile	10.8
Transmission lines initial	12.1 acres per mile	9 miles	108.9
Transmission lines final	2.4 acres per mile	9 miles	21.6
Total			**209.7 (initial)** **122.4 (final)**

Source: BLM 2008 (RFD Updated 2009. The BLM refined the original RFD in the 2008 Geothermal PEIS based on the specific characteristics of the Salton Sea area. These numbers are consistent with the range provided by the BLM in the Geothermal PEIS, which looked at an 11-state area).

These numbers are based on the best available information at the time of this EIS; project-specific natural resource surveys would have to be conducted to ultimately determine whether these areas are available for development.

2.1.4 Solar

It is assumed that some level of exploration would occur prior to full-field development. This exploration is typically limited to the placement of solar meters in the vicinity of the proposed solar project area.

Construction of a 500-MW solar trough project generally follows the sequence of site preparation, grading, and roadwork; installation of piers and solar field preparation; assembly of

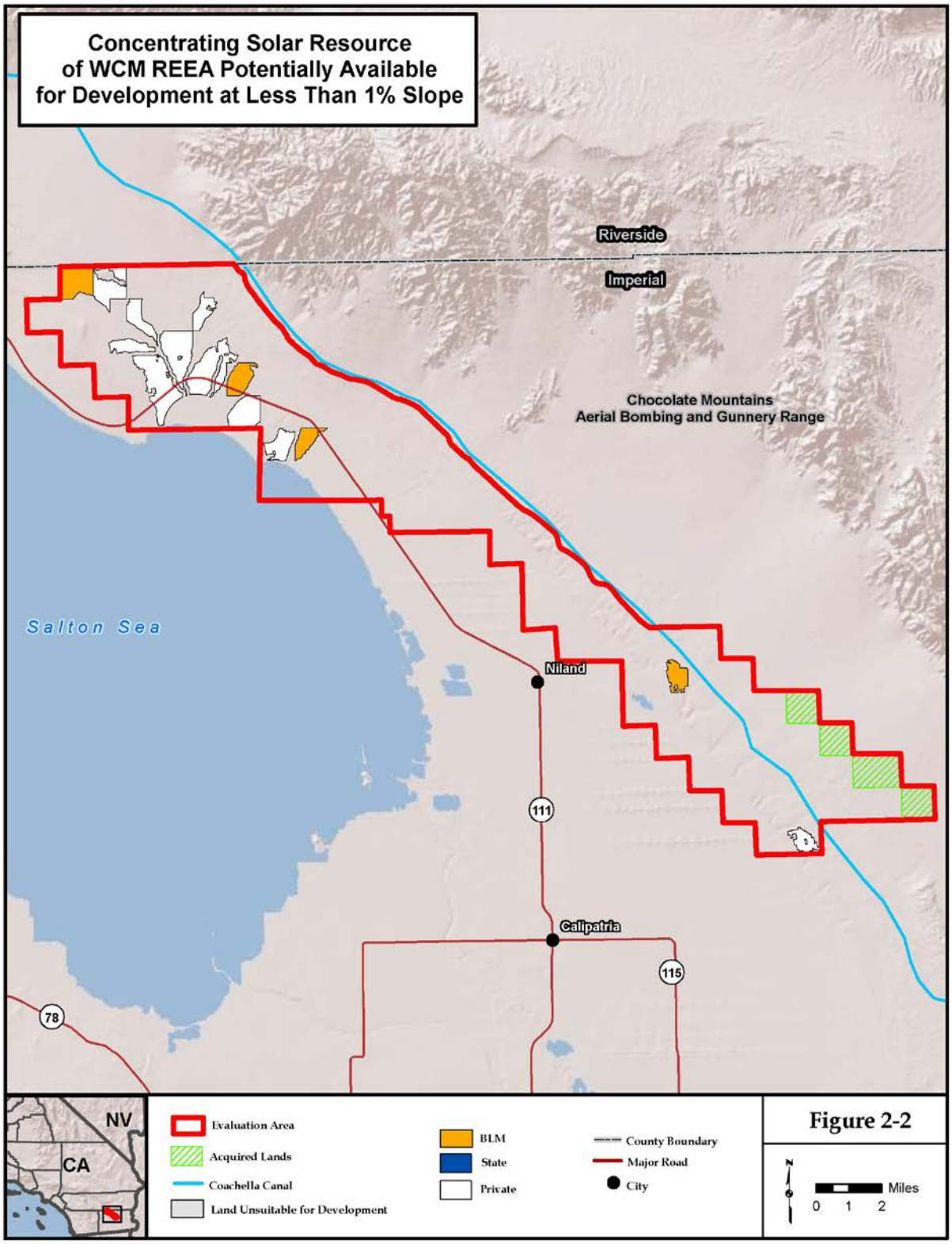
solar collector elements; installation of the power block; and installation of buildings and evaporation ponds. Construction of a 50-MW PV solar project generally follows the sequence of planning; surveying, staking, and flagging the perimeter of the project area; constructing security fencing and access roads; clearing, grading, and excavating; installing temporary fencing, parking, and stormwater systems; assembling and installing project facilities; and cleanup and reclamation of temporary work areas.

Management and supervision of the plant would be centered within the solar field maintenance organization. Skilled personnel would be assigned to conduct expedient maintenance and mirror washing. The operation and maintenance of a PV solar power plant is primarily automated. Additional information on solar energy development is available in Appendix B.

The NREL provides solar resource estimates in kilowatt hours per meter squared per day ($kWh/m^2/day$) for CSP, PV, and concentrating solar thermal technologies across the United States. Portions of the West Chocolate Mountains REEA are considered suitable for CSP development and contain solar thermal resources estimated at 6.7 to 7.4 $kWh/m^2/day$ on a scale ranging from 6 to 8.2. Portions of the REEA are also considered suitable for PV solar development and contain solar thermal resources estimated at 6.4 to 6.6 $kWh/m^2/day$ on a scale ranging from 6 to 8.2, with 8 representing the highest solar thermal resource potential available in the state of California (Haase 2010).

The model inputs are hourly visible irradiance from satellites and monthly average aerosol optical depth, precipitable water vapor, and ozone sampled at a 10-kilometer resolution. These factors are used to estimate the amount of solar radiation that would penetrate the atmosphere at a particular location. This 2010 NREL analysis used modeled direct normal solar radiation estimates at a 10-kilometer ground resolution. These results were further screened by the BLM to eliminate: (1) areas with an annual average resource less than 6.00 $kWh/m^2/day$; (2) for CSP technology, areas where slope is greater than one percent; for PV solar energy technology, areas where slope is greater than 5 percent.

Based on the available natural resources data and assumptions, solar energy development could occur, regardless of surface or mineral ownership, on lands within the West Chocolate Mountains REEA listed in Table 2-5 and illustrated on Figures 2-2 to 2-5. The REEA (BLM and non-BLM land) consists of approximately 64,058 acres; however, modeling using the above constraints revealed that only a maximum of 6,638 acres was available for CSP solar energy development and 29,758 acres was developable for PV solar energy. Of the 6,638 acres for CSP, there are roughly 1,575 acres of BLM surface and of the 29,758 acres for PV there are roughly 9,066 acres of BLM surface, with the rest being state or private land. The remainder was eliminated for reasons discussed previously in this section. To estimate the amount of anticipated development for the entire 6,638 and 29,758 acres which would potentially occur on BLM land, a simple ratio was developed based on the percentage of land within the REEA that is managed by the BLM and is available for solar ROW (For CSP 24 percent [1,574 acres BLM/6,638 acres total] (For PV 30 percent [9,066 acres BLM/29,758 acres total]). Thus, 24 percent of any given CSP project and 30 percent of an given PV project in the REEA would occur on BLM land with the rest occurring on non-BLM land.


Concentrating Solar Resource
of WCM REEA Potentially Available
for Development at Less Than 1% Slope
Riverside
Imperial
Chocolate Mountains
Aerial Bombing and Gunnery Range
Salton Sea
Niland
111
Calipatria
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Evaluation Area
Acquired Lands
Coachella Canal
Land Unsuitable for Development
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Figure 2-2

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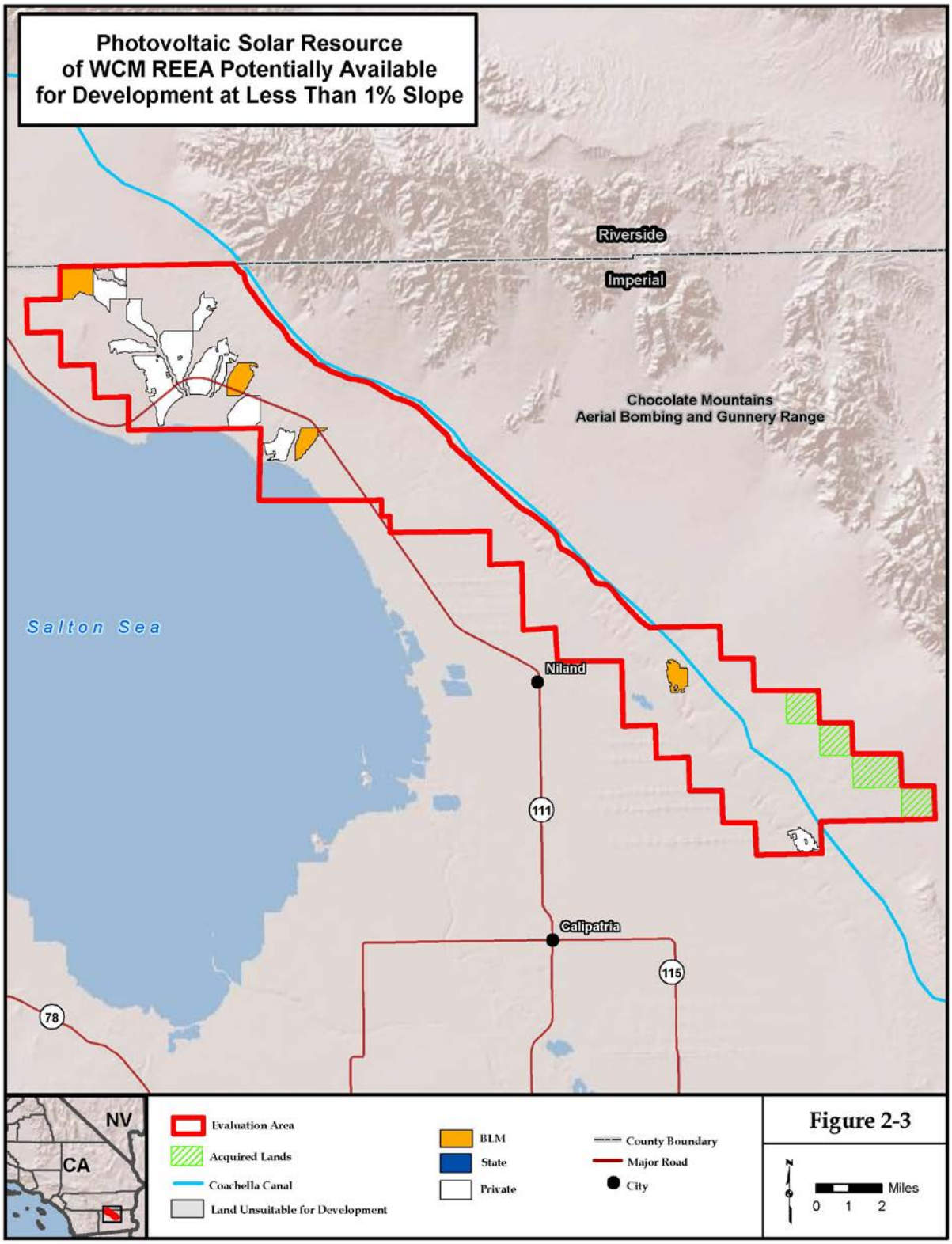
Photovoltaic Solar Resource
of WCM REEA Potentially Available
for Development at Less Than 1% Slope
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Chocolate Mountains
Aerial Bombing and Gunnery Range
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Figure 2-3

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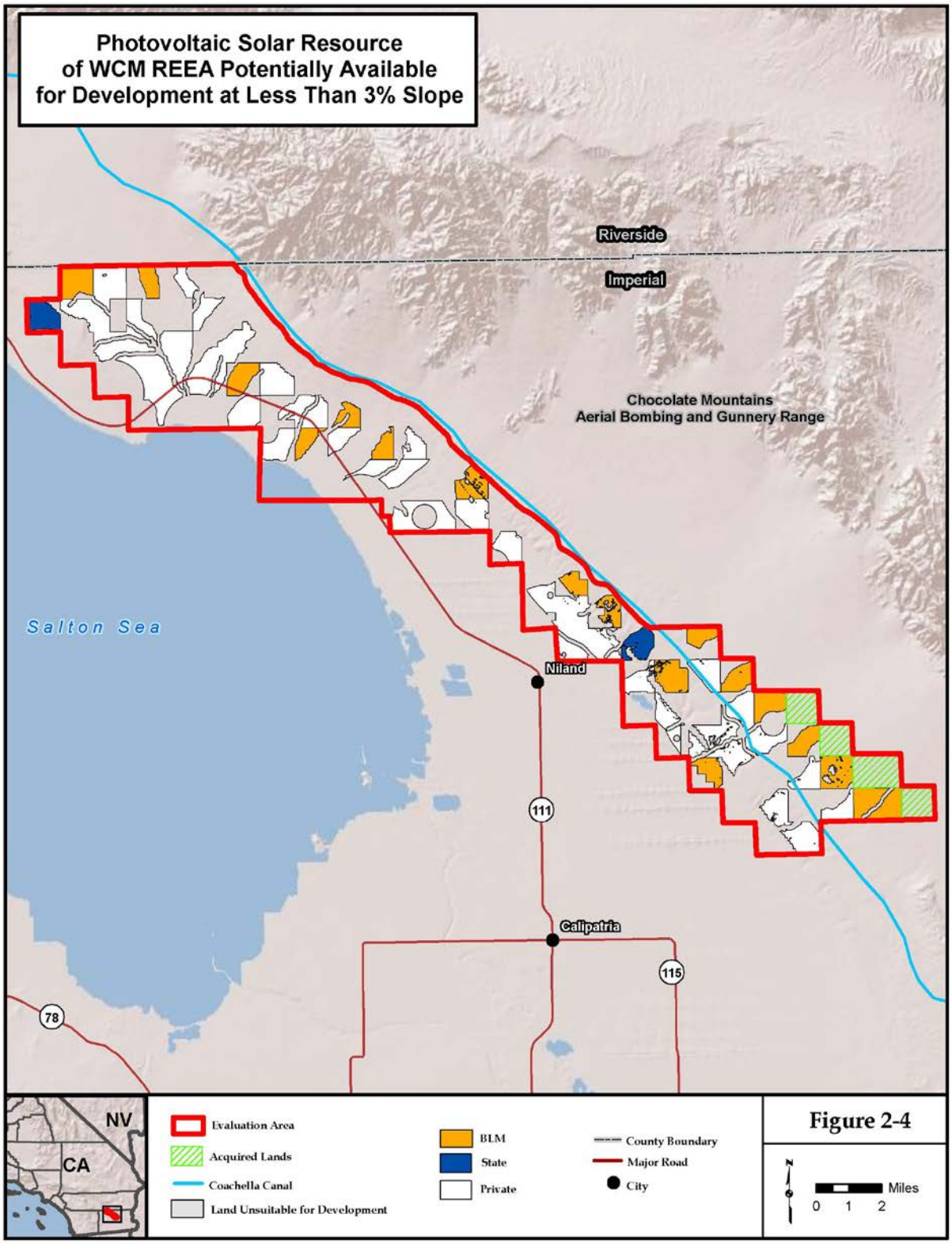
Photovoltaic Solar Resource
of WCM REEA Potentially Available
for Development at Less Than 3% Slope
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Chocolate Mountains
Aerial Bombing and Gunnery Range
Salton Sea
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Figure 2-4

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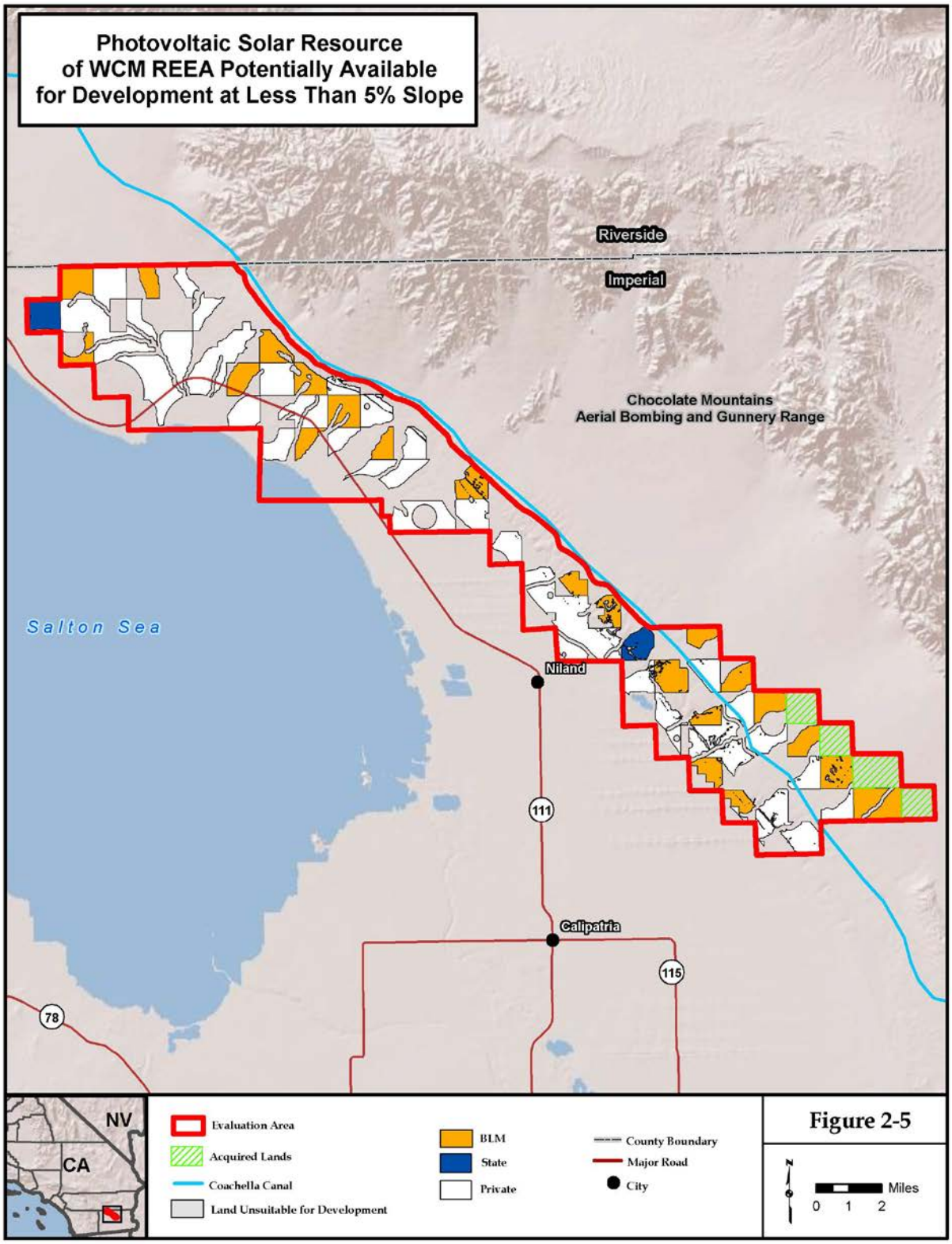
Photovoltaic Solar Resource
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for Development at Less Than 5% Slope
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Figure 2-5

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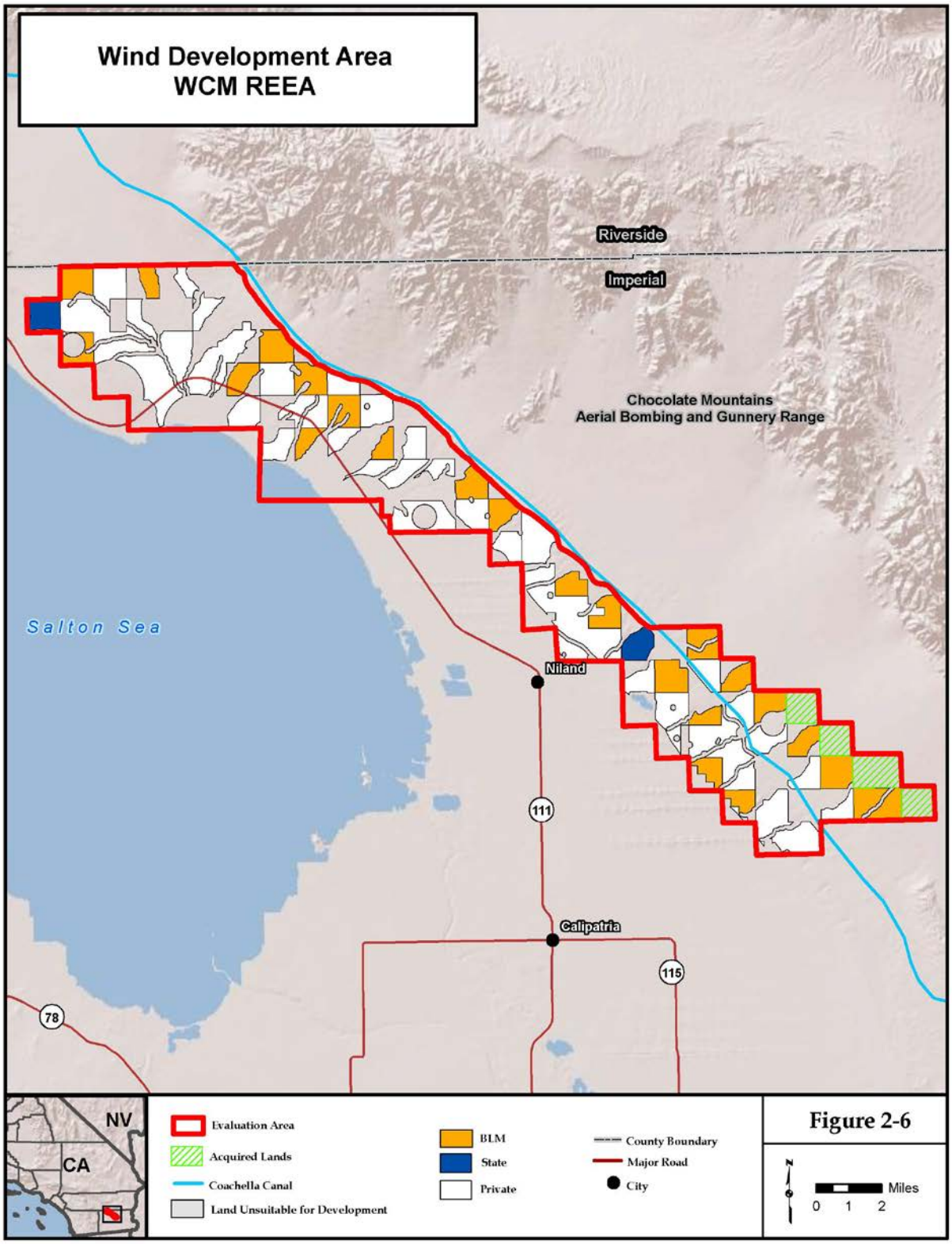
Wind Development Area
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Figure 2-6

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Table 2-5 Lands Available for Solar Development [1]

Landowner	Acreage [2] (CSP and PV Greater than 1% Slope)	Acreage[2] (PV Greater than 3% Slope)	Acreage[2] (PV Greater than 5% Slope)
BLM	1,574	7,049	9,066
State	0	953	1,060
Private	5,063	17,682	19,632
Total	6,638	25,683	29,758

Notes:
[1] The BLM does not make decisions for state and private lands but due to the checkerboard nature of BLM ownership, it may be necessary to approach state and private landowners to negotiate access to these lands.
[2] This is the amount of land available for CSP and PV development based on the slope in the REEA, e.g., the more restrictive the slope (the lower) the less land available.

For CSP, it was assumed that 5 acres per MW would be needed for development of a solar trough project and 9 acres per MW would be needed for PV and the dish engine and power tower. Based on these numbers, the following solar energy could be developed:

Concentrated Solar Power Technology

Trough – 1,327 MW; or
Dish – 737 MW; or
Power Tower – 737 MW

Photovoltaic Technology

1% Slope or less – 737 MW
3% Slope or less – 2,857 MW
5% Slope or less – 3,306 MW

The anticipated surface disturbance for this amount of development is summarized in Table 2-6.

Table 2-6 Surface Disturbance for Solar Power Plants in the West Chocolate Mountains REEA

Technology Type	BLM Disturbance (acres)	Total Disturbance (acres)	Size (megawatts)
Solar Trough	1,593	6,637	500
Dish – Engine	1,593	6,637	500
Power Tower	1,593	6,637	500
PV			
1% Slope or less	1,593	6,637	50
3% Slope or less	7,048	25,683	50
5% Slope or less	9,066	29,758	50

2.1.5 Wind

As is common practice, it is anticipated that meteorological (MET) towers would be constructed by wind energy developers on BLM-managed lands to gather meteorological and climatological data. Wind farm construction generally follows the sequence of planning; surveying and staking; construction of roads and temporary use areas; foundation development and trenching for underground electrical lines; tower and turbine delivery and placement; electrical line installation; and cleanup and reclamation. Routine operations and maintenance for a 45-MW project are typically conducted by four staff. Additional information regarding wind power development can be found in Appendix C.

There are no direct data on which to base the RFD scenario. The amount of energy produced from wind energy development in the West Chocolate Mountains REEA would depend on the acreage devoted to such development and the MW output per wind turbine based on the model implemented. The wind power estimates produced as part of the BLM's Wind PEIS and based on NREL's wind power resource data (see Figure 2-6) show the REEA to have a wind potential of "Poor." These data were produced using the Mesomap system (a wind resource model) and historical weather data and were validated with available surface data by NREL and wind energy meteorological consultants (Haase 2010).

The 2009 Black & Veatch document "The Renewable Energy Transmission Initiative Phase 1B Final Report" (RETI report) identifies competitive renewable energy zones throughout western North America to help meet renewable energy production goals set by regions or states. The RETI report identifies the West Chocolate Mountains REEA of Imperial County as having no wind potential. The area in Imperial County closest to having viable wind energy potential is Imperial South, which has 45 MW of potential wind energy. However, for the purposes of analysis and management objectives, a small wind development potential has been considered for the REEA.

Based on available natural resources data and assumptions discussed above, wind energy development could occur on lands within the West Chocolate Mountains REEA as listed in Table 2-7 and illustrated on Figure 2-6. A simple ratio was developed to estimate the percentage of development that could occur on BLM-managed land. This ratio is based on the percentage of land within the REEA that is managed by the BLM for geothermal leasing (31 percent [10,597 acres BLM/33,738 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
State	1,090
Private	22,050
Total	**33,738**

The Wind RFD scenario assumes that one 45-MW wind energy power plant would be developed. To support 45 MW of net wind generation, fifteen 3-MW wind turbine generators would need to be erected within an approximately 1,300-acre footprint. The development would occur on approximately 390 acres on BLM-administered land (approximately 30 percent of the site's 1,300 acres). The project's permanent footprint on BLM land would be 40 acres (0.03 percent of the total site area). Large areas of open, vacant desert exist between the individual turbines, rows of turbines, and the boundaries of the BLM parcels that could be developed for wind energy generation. Unobstructed open space is necessary for the free flow of wind, which results in efficient, safe, long-term operation of the wind turbine generators.

Total foreseeable surface disturbance for wind energy development is summarized in Table 2-8. The anticipated surface disturbance for the area is summarized in Table 2-9.

Table 2-8 Surface Disturbance for Wind Energy Development

	BLM Property	Total Area[2]
Project Site Area	390 acres	1,300
Temporary Total Disturbance Area	10.8 acres	36
Permanent Total Project Footprint	12 acres	40
Total Disturbance Area (temporary plus permanent)	22.8 acres	76
Acreage of Access Roads	3.33 acres	9
Length of Project Roads & Access Roads	1.53 miles	4.5 miles

Source: Daggett Ridge Wind Energy POD 2009.
Notes:
[1] All numbers adjusted from the Daggett Ridge Wind Energy POD for a 50-MW project.
[2] BLM and non-BLM land.

Table 2-9 Surface Disturbance for One 45-Megawatt Wind Energy Project in the West Chocolate Mountains REEA

Disturbance Area	BLM Disturbance (acres)	Total Disturbance[1] (acres)
Initial	27	76
Final	14	40

Note:
[1] BLM and non-BLM land.

2.2 Discussion of Alternatives

This proposed CDCA Plan Amendment will identify areas within the West Chocolate Mountains REEA that are suitable for geothermal leasing and solar and wind ROW applications, as well as identify certain resource protection stipulations that may be required as a condition of development. This analysis will also be used to decide on a pending geothermal lease application within the REEA. Development of the geothermal lease would be assessed under a separate NEPA document. It should be noted that, while the alternatives consider various amounts of

potential development, it is likely that development levels will be far lower than the maximum identified in the RFD scenarios.

While the alternatives described and analyzed in this Final EIS/Proposed CDCA Plan Amendment establish the framework for considering environmental consequences associated with this planning initiative, the reader should be aware that it is possible that decision makers may eventually select approval elements from among the alternatives. For all the alternatives, pending geothermal leasing applications can be approved or denied, consistent with the terms and conditions of the current CDCA Plan. Development would be assessed under separate NEPA documentation. Restrictions, stipulations, terms, and conditions are designed to protect certain resources. Stipulations are designed not merely to restrict a type or category of activities on a lease or ROW; in most cases, they are designed to protect a specific resource or aspect, or to prevent undue degradation or harm. The BLM Land Use Planning Handbook H-1601-1 provides for waivers, exceptions, and modifications (WEMs) of stipulations when the lessee or project proponent can demonstrate, to the satisfaction of the Authorized Officer, that the stipulation is no longer necessary to protect the specific resource or that an alternative is available that will provide an equal or greater level of protection.

During the public comment period on the Draft EIS/Draft Proposed CDCA Plan Amendment, several commenters suggested that, in addition to evaluating land suitability for solar energy development in the West Chocolate Mountains REEA, a development focus area via SEZ designation be evaluated as an element in the range of alternatives. SEZs are specific identified locations well-suited for utility-scale production of solar energy. BLM will prioritize development in these areas subsequent to the October 2012 publication of the Solar PEIS Record of Decision (ROD).

Four of the action alternatives (i.e., those action alternatives other than the No Development and the required No Action Alternative) meet the purpose and need statement for the West Chocolate Mountains REEA (see Chapter 1) to facilitate the appropriate development of renewable energy resources on public lands, by assessing and allocating lands for possible future geothermal, solar, and wind energy development, and meeting national energy policy, Congressional direction, and the FLPMA. This proposed plan amendment will not make decisions regarding lands or mineral resources that are not under BLM jurisdiction. Table 2-10 compares Alternatives 1 through 6.

Table 2-10 Surface Disturbance for Three 50-MW Geothermal Projects in the West Chocolate Mountains REEA

Disturbance Area	BLM Disturbance (acres)	Total Disturbance[1] (acres)[2]
Temporary	380	1,026
Permanent (for the life of the project)	347	938

Notes:
[1] BLM and non-BLM land.
[2] Combination of disturbance for power plant and well field.

2.2.1 Alternative 1 – No Action/No CDCA Plan Amendment/No Geothermal Lease

Under the No Action Alternative, the CDCA Plan would not be amended. The West Chocolate Mountains REEA would remain under current management of the CDCA Plan, which categorizes the area as "unclassified," which makes the land provisionally available for geothermal leasing and for 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.

No renewable energy development cap or other protective stipulations/measures pertaining to the east side of the Coachella Canal would be adopted under this alternative. Additionally, under this alternative, an SEZ would not be designated.

Under this alternative, the proposed CDCA Plan Amendment would not be approved. The existing noncompetitive geothermal lease application would be denied, consistent with the terms and conditions of the CDCA Plan.

2.2.2 Alternative 2 – No Development/CDCA Plan Amendment/No Geothermal Lease

Under the No Development Alternative, the CDCA Plan would be amended to identify the West Chocolate Mountains REEA as closed to and unsuitable for geothermal leasing and development, as well as wind and solar energy development.

Under Alternative 2, the following would be the same as Alternative 1:

- Renewable energy development cap;
- Designation of an SEZ; and
- Existing noncompetitive lease application.

2.2.3 Alternative 3 – Renewable Energy Development Emphasis

Under this alternative, geothermal, solar, and wind could be developed to the maximum extent as defined in the geothermal, solar, and wind RFD scenarios. The CDCA Plan would be amended to identify sites within the West Chocolate Mountains REEA as suitable for geothermal, solar, and wind energy development subject to constraints related to the protection of resources.

Lands acquired by the BLM under donation agreements for mitigation/compensation purposes and with LWCF funds (including Catellus lands) would be managed per CA IM-2009-020 (see http://www.blm.gov/ca/dir/pdfs/2009/im/CAIM2009-020.pdf) as avoidance areas for land use authorizations that could result in surface-disturbing activities.

Under this alternative, the REEA would be designated as an SEZ. An SEZ would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments to occur within the SEZ, including geothermal and wind energy development.

Under this alternative, the BLM would approve the existing noncompetitive geothermal lease application, subject to standard geothermal lease stipulations and any constraints resulting from the required Water Supply Assessment. The geothermal lease would also be subject to the ESA and stipulations found in Appendix G and Section 2.2.6.2.

2.2.3.1 Geothermal

For this alternative, it is assumed that the maximum development defined in the geothermal RFD scenario of up to 1,026 acres of land disturbance could occur on up to 34,998 acres of both BLM and non-BLM land from all renewable energy development within the West Chocolate Mountains REEA. Within this 1,026 acres of disturbance, up to three 50-MW geothermal power plants could be constructed. The anticipated total surface disturbance for the area is summarized in Table 2-10.

Under this alternative, the BLM would approve the existing noncompetitive geothermal lease application. The geothermal lease would be subject to standard stipulations and mitigation measures discussed in Appendix G and Section 2.2.6.2. Additional mitigation measures would be developed as a part of future site-specific analyses and permitting considerations covering subsequent proposed exploration, development, or utilization activities.

2.2.3.2 Solar

For this alternative, it is assumed that the maximum development scenario (the maximum amount of land that would be developed for solar energy) of up to 6,637 acres of land for CSP development and up to 29,758 acres of land for PV development could occur on BLM and non-BLM land. The anticipated surface disturbance for the area is summarized in Table 2-11.

Table 2-11 Surface Disturbance for Solar Power Plants in the West Chocolate Mountains REEA

Technology Type	Output (MW)	BLM Disturbance (acres)	Total Disturbance (acres)
Solar Trough	1,327 MW	1,593	6,637
Dish Engine	737 MW	1,593	6,637
Power Tower	737 MW	1,593	6,637
PV 5% Slope or Less	3,306 MW	9,066	29,758

2.2.3.3 Wind

For this alternative, it is assumed that the maximum development defined in the wind RFD scenarios of up to 76 acres of land disturbance could occur on 29,929 acres of both private and BLM land from all renewable energy development within the West Chocolate Mountains REEA. Within these 76 acres of disturbance, one 45-MW wind farm would be developed. The anticipated surface disturbance for the area is summarized in Table 2-12.

Table 2-12 Estimated Surface Disturbance for One 45-MW Wind Energy Project in the West Chocolate Mountains REEA

Disturbance Area	BLM Disturbance (acres)	Total Disturbance (acres)
Temporary	23	76
Permanent (for the life of the project)	12	40

2.2.4 Alternative 4 – Geothermal Development Only

Under this alternative, geothermal energy could be developed to the maximum extent as defined in the geothermal RFD scenario. The CDCA Plan would be amended to identify sites within the West Chocolate Mountains REEA as suitable for geothermal energy development, subject to the constraints related to the presence of protected resources. The CDCA Plan also would be amended to identify sites within the REEA as closed to and unsuitable for wind and solar energy development.

Under Alternative 4, the following would be the same as Alternative 3:

- Acquired lands;
- Existing noncompetitive lease application; and
- Amount of geothermal development.

Under this alternative, all lands within the West Chocolate Mountains REEA would not be designated as an SEZ.

2.2.5 Alternative 5 – Solar Energy Development Emphasis with Moderate Geothermal Development and No Wind Development

Under this alternative, solar energy could be developed to the maximum extent as defined in the solar RFD scenario. Geothermal energy could be developed to a moderate level (342 acres) as defined in geothermal RFD scenario. The CDCA Plan would be amended to identify sites within the West Chocolate Mountains REEA as suitable for geothermal and solar energy development. The CDCA Plan Amendment would identify sites within the REEA as closed to and unsuitable for wind energy development.

Under Alternative 5, the following would be the same as Alternative 3:

- Acquired lands;
- Existing noncompetitive lease application; and
- Amount of solar development.

Under this alternative, all lands within the West Chocolate Mountains REEA would be designated as an SEZ.

2.2.6 Alternative 6 – Geothermal Development Emphasis with Moderate Solar Development and No Wind Development (Preferred Alternative)

Under this alternative, it is assumed that the maximum development defined in the geothermal RFD scenario would take place and a moderate amount of solar development would occur. The CDCA Plan would be amended to identify sites within the West Chocolate Mountains REEA as suitable for geothermal leasing and development and solar energy development. Any solar development would have the same restrictions as those defined under Alternative 3. In addition, no projects would be allowed that cannot demonstrate sufficient water supply for completion of the project and the term of the lease/ROW. The CDCA Plan Amendment also would identify sites as closed to and unsuitable for wind energy development.

Under Alternative 6, the following would be the same as Alternative 3:

- Acquired lands;
- Existing noncompetitive lease application;
- Amount of geothermal development; and
- Amount of PV solar development.

Under this alternative, the west side of the Coachella Canal would be identified as an SEZ. The SEZ will allow project-specific consideration, processing, and potential approval of geothermal and solar energy development. The SEZ designation is compatible with the use of the area for geothermal development. It does not change the area's availability for geothermal projects and may be appropriate for projects that blend geothermal and solar technologies. The east side of the Coachella Canal would not be considered for an SEZ.

2.2.6.1 Solar

During the Draft EIS public comment period, the public and the DOD raised concerns regarding high water use by some technologies, technologies with large heat signatures, and structures taller than 200 feet in the vicinity of the CMAGR, such as some power tower technologies that can exceed 350 feet in height. Thus, solar energy technologies that require high water use (solar trough and power tower) would not be approved, nor would technologies with large heat signatures or with structures exceeding 200 feet in height.

Of the 64,058 acres within the West Chocolate Mountains REEA, modeling performed by the NREL revealed that a maximum of 29,758 acres (9,066 acres on BLM) could be developed for solar energy. The anticipated surface disturbance for the area is summarized in Table 2-13.

Table 2-13 Surface Disturbance for CSP and PV Power Plants in the West Chocolate Mountains REEA

Technology Type	Output (MW)	BLM Disturbance (acres)	Total Disturbance (acres)
Dish Engine	737 MW	1,574	6,637
PV 5% Slope or Less	3,306 MW	9,066	29,758

Alternative 6 is the BLM's preferred alternative.

2.2.6.2 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).

2.3 Best Management Practices

As discussed in Section 1.6.1.3, the REAT agencies (CEC, CDFG, BLM, and 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 EO S-14-08, Secretary of the Interior S.O. No. 3285, and related memoranda between California and the DOI, and between the REAT agencies (signed in 2008 and 2009). The BMPs proposed in the manual have been adopted for all of the development alternatives in this proposed plan amendment, and are analyzed in this EIS. All the BMPs presented in the Solar PEIS, as well as those presented in the Geothermal PEIS and Wind PEIS, have been adopted for this planning initiative as described below and listed in Appendix I.

BMPs will be considered when the BLM reviews site-specific project development proposals. All appropriate BMPs will be incorporated in the analyses for future proposed actions 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.

2.4 Alternatives Considered but Eliminated from Detailed Analysis

In accordance with 40 CFR 1502.14, the BLM considered a number of additional alternatives and issues, beyond those described in Sections 2.2 or being fully analyzed in this EIS. This process included a review of public comments received during the initial scoping period held in 2010.

Many of the suggestions provided through external scoping are incorporated into the EIS, including, but not limited to, the exclusion of alternate BLM locations with significant environmental concerns such as critical habitat, Areas of Critical Environmental Concern (ACECs), Desert Wildlife Management Areas (DWMAs), designated OHV areas, WSAs, and designated Wilderness Areas or other sensitive resources and, conversely, the development of some sensitive areas with appropriate mitigation.

Other alternative sites, technologies, and methods (detailed below) were considered but eliminated from detailed analysis under NEPA. These alternatives were eliminated from detailed analysis because one or more of the following criteria from the BLM NEPA Handbook H-1790-1 apply:

1. It is ineffective (it would not respond to the BLM project purpose and need);
2. It is technologically or economically infeasible;
3. It is inconsistent with the basic policy objectives for the management of the area (e.g., does not conform to the CDCA Plan);
4. Its implementation is remote or speculative;
5. It is substantially similar in design to an alternative that is analyzed; and/or
6. It would have substantially similar effects to an alternative that is analyzed.

Not all of these criteria from the BLM Handbook were used in eliminating alternatives from consideration as described below. This process for eliminating these alternatives from detailed analysis complies with 40 CFR 1502.14(a) and is described briefly in the following sections.

2.4.1 Alternative Sites

During scoping, a comment indicated that all the public lands north and east of the Coachella Canal are relatively undisturbed, and suggested that the Coachella Canal be used as the boundary of the evaluation area. This was eliminated from further consideration since all lands east of the Coachella Canal are withdrawn for exclusive military use by the DOD. The Department of the Navy is currently reviewing an alternative in the Legislative EIS for the Proposed Extension of the CMAGR Land Withdrawal that would extend and enlarge the scope of the withdrawal.

2.4.2 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 CMAGR and the Catellus Corporation property acquired from the Wildlands Conservatory. These are intact blocks of public lands that appear to be largely free of impacting multiple uses at this time. It was recommended that lands be protected from surface-disturbing activities. The BLM 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. The BLM considered this information and has added several stipulations designed to protect the area east of the canal from future surface development activities (see Section 2.1.2).

Another comment suggested the evaluation area boundary exclude all of the high value habitats associated with the Salton Sea, Salton Sea shoreline, and any wetland or riparian habitats associated with natural drainages between Bombay Beach and the Imperial State Wildlife Area due to its importance for a number of listed and declining bird species as well as the endangered desert pupfish. Based on this, the BLM eliminated alternate BLM locations with significant environmental concerns, such as critical habitat, ACECs, DWMAs, designated OHV areas, WSAs, and designated Wilderness Areas or other sensitive resources. The BLM also added stipulations that would provide setbacks from hydrologic features and wetland/riparian areas.

2.5 Comparison of Alternatives

Table 2-14 provides a comparison of the alternatives.

Table 2-14 Comparison of All Alternatives

Alternative 1 **No Action** **No CDCA Plan Amendment**	**Alternative 2** **No Development CDCA Plan Amendment**	**Alternative 3** **Renewable Energy Development Emphasis**	**Alternative 4** **Geothermal Development Only**	**Alternative 5** **Solar Energy Development Emphasis with Moderate Geothermal Development and No Wind Development**	**Alternative 6** **Geothermal Development Emphasis with Moderate Solar Development and No Wind Development**
Summary of Alternatives					
No CDCA Plan Amendment.	CDCA Plan amended to identify REEA as closed to and unsuitable for geothermal, solar, and wind development.	CDCA Plan amended to identify REEA as suitable for geothermal, solar, and wind development subject to certain constraints (Constraints listed in Chapter 2).	CDCA Plan amended to identify REEA as suitable for geothermal subject to certain constraints (Constraints listed in Chapter 2).	CDCA Plan amended to identify REEA as suitable for geothermal and solar subject to certain constraints (Constraints listed in Chapter 2).	CDCA amended to identify REEA as suitable for geothermal and solar subject to certain constraints (Constraints listed in Chapter 2).
REEA remains under current management.		Full RFD development possible for geothermal, solar, and wind with applicable stipulations and BMPs.	REEA identified as closed to and not suitable for solar and wind development.	REEA identified as closed to and not suitable for wind development.	REEA identified as closed to and not suitable for wind development.
Lands provisionally available for geothermal. solar and wind projects would require a plan amendment.			Full geothermal RFD development possible with applicable stipulations and BMPs.	Full solar RFD development possible with applicable stipulations and BMPs. Constraints make only partial development of geothermal RFD likely.	Full geothermal RFD development possible with applicable stipulations and BMPs. Constraints make only partial development of solar RFD likely.
Future projects would be processed on a case by case basis under separate NEPA.					
Geothermal Development					
Development could be allowed under current CDCA.	None.	Acres Available for Development (BLM and Non-BLM Land): 34,998 acres Maximum Amount of Surface Disturbance: 1,026 acres Energy Potential: 150 MW	Same as Alternative 3.	Acres Available for Development (BLM and Non-BLM Land): 34,998 acres Maximum Amount of Surface Disturbance: 342 acres Energy Potential: 50 MW	Same as Alternative 3.
Solar Development					
CDCA Plan amendment would be required for development.	None.	Acres Available for Development (BLM and Non-BLM Land): 6,637 acres (CSP) 29,758 acres (PV) Maximum Amount of Surface Disturbance: 6,637 acres (CSP) 29,758 acres: PV Energy Potential: 737 -1,327 MW (CSP) depending on technology 3,306 MW (PV)	None.	Same as Alternative 3.	Acres Available for Development (BLM and Non-BLM Land): 6,637 acres (CSP) 29,758 acres (PV) Maximum Amount of Surface Disturbance: 6,637 acres (CSP) 29,758 acres: PV Energy Potential: 737 (CSP) Dish Engine Only. 3,306 MW (PV)

Table 2-14 Comparison of All Alternatives

Alternative 1 **No Action** **No CDCA Plan Amendment**	**Alternative 2** **No Development CDCA Plan Amendment**	**Alternative 3** **Renewable Energy Development Emphasis**	**Alternative 4** **Geothermal Development Only**	**Alternative 5** **Solar Energy Development Emphasis with Moderate Geothermal Development and No Wind Development**	**Alternative 6** **Geothermal Development Emphasis with Moderate Solar Development and No Wind Development**
Wind Development					
CDCA Plan Amendment would be required for development.	None.	Acres Available for Development (BLM and Non-BLM Land): 29,929 acres Maximum Amount of Surface Disturbance: 76 acres Energy Potential: 45 MW	None.	None.	None.
Existing Noncompetitive Lease Authorization					
The existing noncompetitive lease application would not be approved.	The existing noncompetitive lease application would not be approved and the CDCA would be amended to make the REEA closed to and not suitable for geothermal, solar, and wind energy development.	The existing noncompetitive lease application would be approved with applicable stipulations and BMPs.	Same as Alternative 3.	Same as Alternative 3.	Same as Alternative 3.
SEZ Designation					
No SEZ.	No SEZ.	Designated as an SEZ.	No SEZ.	Designated as an SEZ.	West side of Canal would be designated. East side would not be designated.
Leasing Catellus (Acquired) Lands					
None.	None.	Under Alternatives 3 through 6, all acquired lands (including Catellus lands) in the planning area would be managed as avoidance areas for land use authorizations that could result in surface-disturbing activities.			
Standard and Special Stipulations					
None.	None.	Standard and Special Stipulations would apply.			

3 Affected Environment

Introduction

This chapter provides a description of those portions of the environment that could be affected by the alternatives selected for analysis. Particular emphasis is placed on how the alternatives could affect the unique resource values of the West Chocolate Mountains REEA). This chapter describes the affected environment for the general impact assessment found in Chapter 4, Environmental Consequences, which focuses on the potential leasing of geothermal resources and granting wind and solar ROWs in the REEA.

Some resource values not found in the West Chocolate Mountains REEA are not discussed in this chapter unless they would provide context for the analysis in Chapter 4. The following resource disciplines are omitted entirely because they are not found in the REEA and are not relevant to the discussion: wildfire ecology and management and caves.

For the purpose of preparing the analysis in Chapter 4 of this EIS, the affected environment is defined as those baseline conditions that exist currently under existing management direction, without effects from any of the action alternatives.

Geographic Setting

The West Chocolate Mountains REEA's name is derived from its proximity to the West Chocolate Mountains. Imperial County extends over 4,482 square miles, bordering Mexico on the south, Riverside County on the north, San Diego County on the west, and the state of Arizona on the east. The terrain varies from 235 feet below sea level at the Salton Sea to 4,548 feet above sea level at Blue Angel Peak. Approximately 93 percent (4,175 square miles) of Imperial County is land and 7 percent (307 square miles – predominantly the Salton Sea) is water. The Colorado River forms the county's eastern boundary with the state of Arizona. Two notable geographic features are found in the county: the Salton Sea, at 235 feet below sea level, and the Algadones Dune, one of the largest dunes fields in the United States.

Geographically, the West Chocolate Mountains REEA is in Western Imperial County within the Colorado Desert, approximately 90 miles east of San Diego, adjacent to the eastern shore of the Salton Sea. The REEA is north of the community of Niland, a town of approximately 1,100 people. The REEA is dominantly federal land managed by the BLM with some privately owned and state owned lands intermingled. The northern boundary of the REEA is adjacent to Riverside County and approximately half of the REEA is within the southern portion of the Coachella Valley. The Coachella Valley and Imperial Valley together form the Salton Trough.

State Route (SR) 111 runs through and to the west of the West Chocolate Mountains REEA from north to south. Imperial Valley, one of California's and the nation's most productive

agricultural regions, is southwest of the REEA along the southern border of the Salton Sea. Part of the REEA is within the East Mesa area which is made up of alluvial material from the Chocolate Mountains. The terrain is gently sloping from the Chocolate Mountains east (northeast) of the REEA to the Salton Sea, west (southwest) of the REEA. The Peninsular Range separates San Diego and Imperial counties and is located to the west.

3.1 Air Quality and Climate

This section identifies existing air quality and climatic conditions within and adjacent to the West Chocolate Mountains REEA and discusses applicable regulations.

During the scoping period, meetings were conducted with the public and government agencies to identify their concerns. Several comments were received pertaining to emissions of criteria air pollutants and hazardous air pollutants (or toxic air contaminants [TACs]) resulting from the proposed plan and their potential effects on the existing air quality conditions. Additional comments were also received concerning applicable regulations, identification of emission sources and methods for quantifying emissions, analysis of cumulative impacts to air quality, and mitigation strategies for combustion and fugitive dust emissions. In addition, comments received included related regulatory information, such as the general conformity analysis and the new source review (NSR) construction permit program. Comments also included concerns about energy development's effect on greenhouse gas (GHG) emissions and geothermal energy projects' impacts to air quality.

Comments were also received regarding climate change related effects on desert ecosystems. Commentors recommended that the EIS discuss: (1) whether the trenching, grading, and filling associated with the construction of renewable energy projects would affect the desert's ability to store carbon, and, if so, to what degree; (2) how climate change could influence the proposed plan, specifically within sensitive areas; and (3) how the projected impacts could be exacerbated by climate change.

The FEIS is a programmatic-level environmental document that considers various types of renewable energy development that could be developed over a large area of BLM-managed land. Although no specific projects are currently proposed, the environmental analysis looks at a variety of representative projects. The GHG analysis calculates estimated emissions for these representative projects utilizing known data taken from previously constructed projects. Data that would be required to conduct GHG emissions estimates associated with water use, electricity use, waste disposal, transportation, land conversion, carbon sequestration, and the life cycle of building materials is not yet available for the specific projects that may be developed in the future. Any estimate as to the GHG emissions from these activities would be speculative at best. This chapter of the FEIS also considers the impact of global climate change on resources in the study area for this planning initiative.

All comments related to potential air quality and climate change impacts and mitigation measures are addressed in Chapter 4, Environmental Consequences, Section 4.1.

3.1.1 Definition of the Resource

3.1.1.1 Air Quality

The air quality in a region is a result of not only the types and quantities of atmospheric pollutants and pollutant sources in an area, but also surface topography and the prevailing meteorological conditions. In accordance with federal Clean Air Act (CAA) requirements, the air quality in a given region or area is defined by the concentration of pollutants in the atmosphere. Concentrations of these pollutants in ambient air are expressed in units of parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$).

California is divided into 15 air basins that were established by grouping counties or portions of counties with similar geographic and/or meteorological features. The West Chocolate Mountains REEA is located in Imperial County, within the Salton Sea Air Basin (SSAB). The SSAB encompasses all of Imperial County and a portion of central Riverside County. Existing conditions within the SSAB are described in Section 3.1.3. The Imperial County Air Pollution Control District (ICAPCD) is responsible for monitoring air quality and preparing attainment plans to achieve and maintain national and ambient air quality standards within Imperial County.

On a cumulative perspective, the proposed plan would contribute to effects over an extended area, including adjacent areas in Riverside County under the jurisdiction of the SCAQMD, and a portion of San Diego County under the jurisdiction of the County of San Diego Air Pollution Control District (SDAPCD).

3.1.1.2 Greenhouse Gases

Climate change refers to any significant change in measures of climate (e.g., temperature, precipitation, or wind) that lasts for an extended period (e.g., decades or longer). Climate change may result for a variety of reasons. Natural factors, such as changes in the sun's intensity or Earth's orbit around the sun, can affect climate change. In addition, natural processes within the climate system (e.g., changes in ocean circulation) and human activities that change the atmosphere's composition (e.g., burning fossil fuels) and the land surface (e.g., deforestation, reforestation, urbanization, and desertification) can affect change.

Global warming is an average increase in the temperature of the atmosphere near the Earth's surface and in the troposphere which can contribute to changes in global climate patterns. Global warming can occur from a variety of causes, both natural and human. In common usage, "global warming" often refers to warming that may occur as a result of increased GHG emissions due to human activities.

GHGs include: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6), and other fluorinated gases. Emissions of GHGs are typically expressed in terms of CO_2 equivalents (CO_2e), where the potential of each gas to increase heating in the atmosphere is expressed as a multiple of the heating potential of CO_2. Converting all GHG source emissions into equivalent units allows for a comparison between all emission sources based on their global warming potential (GWP). The GWPs of CO_2, CH_4, and SF_6 are 1, 23, and 23,000, respectively. Therefore, a pound of CH_4 emitted to the atmosphere has 23 times the relative impact as a pound

of CO_2; SF_6 is one of the most potent GHGs yet discovered, and one pound emitted has the same relative impact as 23,000 pounds of CO_2 (or over ten metric tonnes).

3.1.2 Applicable Plans, Policies, and Regulations

3.1.2.1 Federal

Clean Air Act

The CAA directs the EPA to develop, implement, and enforce strong environmental regulations to ensure clean and healthy ambient air quality. To protect public health and welfare, the EPA developed numerical concentration-based standards (NAAQS) for pollutants determined to affect human health and the environment, known as criteria pollutants. NAAQS are currently established for six criteria pollutants: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), respirable particulate matter (PM) including particulates less than 10 microns in diameter (PM_{10}) and particulates equal to or less than 2.5 microns in diameter ($PM_{2.5}$), and lead. The State of California, through the California Air Resource Board (CARB), has established additional standards that are generally more restrictive than the NAAQS. Table 3.1-1 presents federal and state ambient air quality standards.

Table 3.1-1 California and National Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards[1]	National Standards[2]	
			Primary[3,4]	Secondary[3,5]
O_3	8 Hours	0.07 ppm[5]	0.075 ppm	0.075 ppm
	1 Hour	0.09 ppm	—[5]	—[5]
CO	8 Hours	9.0 ppm	9 ppm	—
	1 Hour	20 ppm	35 ppm	—
NO_2	Annual Average	0.03 ppm	0.053 ppm	0.053 ppm
	1 Hour	0.18 ppm	0.100 ppm[6]	—
SO_2	Annual Average	—	0.030 ppm	—
	24 Hours	0.04 ppm	0.14 ppm	—
	3 Hours	—	—	0.5 ppm
	1 Hour	0.25 ppm	—	—
$PM_{2.5}$	Annual Geometric Mean	12 µg/m^3	15 µg/m^3	15 µg/m^3
	24 Hours	—	35 µg/m^3	35 µg/m^3
PM_{10}	Annual Arithmetic Mean	20 µg/m^3	—	—
	24 Hours	50 µg/m^3	150 µg/m^3	150 µg/m^3
Lead	30-Day Average	—	1.5 µg/m^3	1.5 µg/m^3
	Rolling 3-Month Average[6]	—	0.15 µg/m^3 [6]	0.15 µg/m^3 [5]
Sulfates	24 Hours	25 µg/m^3	—	—
Hydrogen sulfide	1 Hour	0.03 ppm	—	—

Table 3.1-1 California and National Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards[1]	National Standards[2]	
			Primary[3,4]	Secondary[3,5]
Vinyl chloride[7]	24 Hours	0.010 ppm	—	—

Sources: CARB 2010; EPA 2010.
Notes:
1 California standards for ozone, carbon monoxide (except for Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, suspended particulate matter- PM_{10}, $PM_{2.5}$, and visibility reducing particles are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in §70200 Title 17 California Code of Regulations (CCR).
2 National standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest eight-hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 $\mu g/m^3$ or less than one. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact EPA for further clarification and current federal policies.
3 Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25 degrees Celsius (ºC) and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25ºC and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.
4 National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.
5 National Secondary Standards: The levels of air quality necessary to protect the public welfare form any known or anticipated adverse effects of a pollutant.
6 To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 0.1 ppm (effective January 22, 2010).
7 The CARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.
Key:
ppm = parts per million by volume
$\mu g/m^3$ = micrograms per cubic meter

Specific geographic areas are classified as either "attainment" or "nonattainment" areas for each pollutant, based on the comparison of measured data with federal and state standards. Responsibility for attaining and maintaining ambient air quality standards in California is divided between the CARB and regional air pollution control districts.

General Conformity Rule

Section 176 of the 1990 CAA Amendments requires the EPA to promulgate rules to ensure federal actions conform to the appropriate State Implementation Plan (SIP). These rules, known together as the General Conformity Rule (40 Code of Federal Regulations [CFR] 51.850-.860 and 40 CFR 93.150-.160), require any federal agency responsible for an action in a nonattainment area to determine that the action conforms to the applicable SIP or is exempt from the General Conformity Rule requirements. This means federally supported or funded activities will not: (1) cause or contribute to any new air quality standard violation; (2) increase the frequency or severity of any existing standard violation; or (3) delay the timely attainment of any standard, interim emission reduction, or other milestone.

Actions would conform to a SIP and be exempt from a conformity determination if an applicability analysis shows the total direct and indirect emissions from construction and

operation activities would be less than specified emission rate thresholds, known as *de minimis* limits, and emissions would be less than 10 percent of the area's emission budget.

New Source Review

New major stationary sources of air pollution and major modifications to existing sources are required by the CAA to obtain an air pollution permit before commencing construction. This process is called new source review, or NSR, and is required whether the major source or modification is planned for an area where the NAAQS are exceeded (non-attainment areas) or an area where air quality is acceptable (attainment and unclassifiable areas). Permits for sources in attainment areas are referred to as Prevention of Significant Deterioration (PSD) permits, while permits for sources located in non-attainment areas are referred to as non-attainment area (NAA) NSR permits. The entire program, including both PSD and NAA permitting, is referred to as the NSR program and is established in Parts C and D of Title I of the CAA. Based upon an area's attainment/non-attainment designations and a proposed plan's anticipated criteria pollutant emission rates, a project may require both a PSD and a NAA permit.

The NSR requirements establish air pollutant emissions thresholds and other criteria to determine if a new stationary source would be subject to NSR/PSD[1]. Considering the major components and design features, solar and wind facilities are not expected to be considered as major stationary sources of air pollutants. In contrast, stationary emissions from geothermal facilities could include the release of geothermal fluid vapors, such as hydrogen sulfide, carbon dioxide, mercury, arsenic, and boron (if present in the reservoir). Impacts from these facilities would depend upon the amount, duration, location, and characteristics of the emissions and the meteorological conditions (e.g., wind speed and direction, precipitation, and relative humidity). Each proposed geothermal generation plant would have to be evaluated individually to determine the applicability of NSR/PSD requirements. Additionally, even though a facility could be exempt from these requirements, it would still be required to get an air permit from the state or local agency.

California Desert Conservation Area Plan: Air Quality Element

The California Desert Conservation Area (CDCA) Plan contains provisions and guidance for public land use management in the California Desert District under BLM jurisdiction. The CDCA Multiple Land Use Class Guidelines requires that all land uses within the CDCA be managed to protect air quality and visibility in accordance with the Class II objectives of Part C of the CAA Amendments unless designated as another class by the State of California as a result of recommendations developed by any BLM air quality management plan. Additionally, the CDCA Plan considers air quality monitoring as a key parameter in programs established in the CDCA Plan elements related to wildlife and energy production and utility corridors, as well as a one of the support requirements for implementation.

[1] The NSR/PSD emissions thresholds are used to determine regulatory applicability only. Even if NSR/PSD regulations apply to the proposed plan, these thresholds are not considered as impact significance criteria.

The Federal Land Policy and Management Act of 1976 (FLPMA), the CAA, and the Executive Order (EO) 12088 of 1978, "Federal Compliance with Pollution Control Standards," require the BLM and other federal land management agencies preserve and protect air quality-related values on federal lands.

Proposed Endangerment and Cause or Contribute Findings for Greenhouse Gases under the Clean Air Act

This action is being taken under Section 202(a) of the CAA, and the proposal has been signed with two distinct findings regarding GHGs under this section:

- **Endangerment Finding:** The EPA is proposing to find that the current and projected concentrations of the following six key GHGs in the atmosphere threaten the public health and welfare of current and future generations: CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6.
- **Cause or Contribute Finding:** The EPA is further proposing to find that the combined emissions of CO_2, CH_4, N_2O, and HFCs from new motor vehicles and motor vehicle engines contribute to the atmospheric concentrations of these key GHGs and, thereby, contribute to the threat of climate change.

Mandatory Reporting of Greenhouse Gases Rule

In response to the Fiscal Year (FY) 2008 Consolidated Appropriations Act (H.R. 2764; Public Law 110–161), EPA has issued the Final Mandatory Reporting of Greenhouse Gases Rule. The rule requires reporting of GHG emissions from large sources and suppliers in the United States, and is intended to collect accurate and timely emissions data to inform future policy decisions.

Under the rule, suppliers of fossil fuels or industrial GHGs, manufacturers of vehicles and engines, and facilities that emit 25,000 metric tons or more per year of GHG emissions are required to submit annual reports to EPA. The gases covered by the proposed rule include: CO_2, CH_4, N_2O, HFC, PFC, SF_6, and other fluorinated gases.

The final rule was signed by the Administrator on September 22, 2009. On October 30, 2009, the final rule was published in the Federal Register (FR) under Docket ID No. EPA-HQ-OAR-2008-0508-2278. The rule became effective December 29, 2009.

Bureau of Land Management Guidance on Greenhouse Gases

Currently, there is no finalized BLM guidance or policy on addressing GHG emissions and impact analysis in National Environmental Policy Act (NEPA) documents. Instruction Memorandum (IM) 2008-171 published by the BLM on August 29, 2008 (BLM 2008) provides draft guidance on incorporating climate change analysis into management plans and NEPA documents at the BLM and is to be used in the interim while the final guidance is prepared. As a result, several BLM Manual/Handbook Sections would be required to be modified, including the Land Use Planning Handbook (H-1601-1): Chapter 1 (C)(1)(a) Issues Used to Develop all Alternatives, (H) Overall Vision; Chapter 2 (B) Management Common to all Alternatives, (G) Comparison of Impacts; Chapter 3 (A) Resources, (B) Resource Uses, (C) Special Designations, and (D) Social and Economic; and Chapter 4 (A)(1) Analytical Assumptions, (A)(2) Types of

Effects to be Addressed, (A)(4) Incomplete or Unavailable Information, (B) Resources by Alternative, (C) Resource Uses, (D) Special Designations, and (E) Social and Economic.

For EIS preparation, IM 2008-171 requires an evaluation to determine whether or not climate change analysis for an EIS in preparation can be tiered to an existing EIS; however, if it cannot, an attachment to the IM details procedures to follow in order to adequately incorporate climate change considerations into the EIS process. The guidance is intended to adhere to and supplement the procedures established in the Land Use Planning Handbook (H-1601-1), identifying additional considerations specific to climate change.

3.1.2.2 State

California Health and Safety Code §41700

The Health and Safety Code is implemented by the local air quality management districts and prohibits the discharge of air pollutants that cause injury, detriment, nuisance, or annoyance to the public.

California Clean Air Act, California Health and Safety Code §42300 et seq.

The California Clean Air Act (CCAA) of 1988 provides for air quality planning and regulation independent of federal regulations. CARB is the state's lead air quality agency and adopts standards for the California Ambient Air Quality Standards (CAAQS), some of which are more stringent than NAAQS. CARB is responsible for overseeing the attainment and maintenance of NAAQS and CAAQS, overseeing the operation of local air quality districts, and monitoring motor vehicle air pollution control. CARB also assists the individual air districts with air quality monitoring as well as planning activities, such as performing air pollutant emission inventories and air quality modeling. Under delegation from the EPA, CARB and the individual air districts have the primary authority for managing air quality in California.

California Air Resource Board Off-Road Mobile Sources Emissions Reduction Program

The CCAA mandates that CARB achieve the maximum degree of emission reductions from all off-road mobile sources (including construction equipment) in order to attain the CAAQS. Tier 1 standards for large compression-ignition engines used in off-road mobile sources went into effect in California in 1996, requiring unregulated construction equipment of model year 2000 and later to achieve exhaust standards for oxides of nitrogen (NO_X), volatile organic compounds (VOCs), CO, and PM_{10}. For later model years—Tier 2 (2003 and later) and Tier 3 (2007 and later)—the standards are increasingly stringent. CARB implements a control measure to reduce diesel particulate matter emissions as well as NO_X from in-use (existing) off-road diesel equipment throughout California. Owners and operators of such equipment must report and meet fleet emissions targets in 2010. The intention of this rule is to help ensure that relatively low emitting equipment will be used for construction equipment. The rules for in-use off-road diesel vehicles also include idling limits (California Code of Regulations [CCR] Title 12, Chapter 9, Article 4.8, §2449, et seq.).

California Global Solutions Act: Assembly Bill 32

The State of California has emerged as a national leader in statewide GHG policies. On June 1, 2005, California Governor Arnold Schwarzenegger issued EO S-3-05, establishing

statewide GHG emission reduction targets of 2000 levels by 2010, 1990 levels by 2020, and 80 percent below 1990 levels by 2050. On September 27, 2006, Governor Schwarzenegger signed the Global Warming Solutions Act, Assembly Bill (AB) 32, which capped the state's GHG emissions at 1990 levels by 2020. This was the first statewide program in the country to mandate an economy-wide emissions cap that included enforceable penalties.

Greenhouse Gas Emissions Data Report

Pursuant to Subchapter 10, Article 2 (Mandatory Greenhouse Gas Emissions Reporting), operators of electricity generating facilities that are located in California or operated by a retail provider as defined in Section 95102(a), individually have a generating capacity greater than or equal to one megawatt (MW), and emit greater than or equal to 2,500 metric tonnes of carbon dioxide in any calendar year after 2007 from electricity generating activities, must perform a GHG emissions data report. The operator shall include the fugitive CO_2 emissions from geothermal facilities (in metric tonnes) within the GHG data report (CARB 2007).

Senate Bill 97

In 2007, the California Senate passed Senate Bill (SB) 97, requiring the Governor's Office of Planning and Research (OPR) to prepare, develop, and transmit guidelines for the feasible mitigation of GHG emissions or their effects, including, but not limited to, effects associated with transportation or energy consumption.

Proposed California Environmental Quality Act Guideline Amendments for Greenhouse Gases

On April 13, 2009, OPR submitted to the Secretary for the California Natural Resources Agency its proposed amendments to the California Environmental Quality Act (CEQA) Guidelines for GHG emissions, as required by SB 97. The Natural Resources Agency conducted formal rulemaking in 2009 and adopted amendments to the CEQA Guidelines for GHG emissions on December 30, 2009. On February 16, 2010, the Office of Administrative Law approved the Amendments, and filed them with the Secretary of State for inclusion in the CCR. The Amendments became effective on March 18, 2010.

The amendments proposed a number of revisions related to GHG impacts, including determining significance of impacts from GHG emissions (Section 15064.4), thresholds of significance (Section 15064.7(c)), discussion of cumulative impacts (Section 15130), tiering and streamlining the GHG analysis (Section 15183.5), and changes to questions in the CEQA Guidelines Appendix G Checklist. Additional changes also addressed forest loss, energy conservation, and transportation effects.

3.1.2.3 Local

Imperial County Air Pollution Control District

In Imperial County, the ICAPCD is the agency responsible for protecting the public health and welfare through the administration of federal and state air quality laws and policies. The ICAPCD shares responsibility with CARB for ensuring that all state and federal ambient air quality standards are achieved and maintained within the county. This includes regulation of stationary source emissions and development of local nonattainment plans, when applicable. The

ICAPCD is also responsible for the inspection of stationary sources, monitoring ambient air quality, and planning activities such as modeling and maintenance of the emission inventory.

1991 Air Quality Attainment Plan

The Imperial County's 1991 Air Quality Attainment Plan (AQAP) was adopted on April 14, 1992 and is designed to meet ambient air quality standards and corresponding attainment requirements.

Modified Attainment Plan for Ozone

On December 3, 2009, the EPA issued a final ruling determining that the Imperial County "moderate" 8-hour ozone non-attainment area attained the 1997 8-hour standard. This determination effectively suspends the requirement for the state to submit an attainment demonstration, a reasonable further progress plan, contingency measures and other planning requirements for so long as Imperial County continues to attain the 1997 8-hour ozone standard. Because this determination does not constitute a re-designation to attainment under the CAA section 107(d)(3), the designation status will remain "moderate" non-attainment for the 1997 8-hour ozone standard. However, Imperial County was required to submit for EPA approval a "Modified" 2009 8-hour Ozone Air Quality Management Plan. This Plan was published and adopted by the ICAPCD on July 13, 2010. CARB adopted this Plan on November 19, 2010 (Resolution 10-35).

Particulate Matter Attainment Plan

On April 26, 2010, CARB issued a staff report named "Status Report on Imperial County Air Quality and Approval of the State Implementation Plan Revision for PM_{10}." CARB staff found that the SIP met all applicable CAA requirements and recommended the Board adopt it, including upgraded transportation conformity budgets and emissions inventory, as a revision to the California SIP for submittal to EPA. However, due to an EPA comment letter received in May 2010, the CARB staff changed their recommendation to the Board to hold the PM_{10} SIP. Since EPA did not concur on the high wind events analysis, it was not feasible to revise the existing SIP and develop an attainment demonstration due to an uncontrollable event. The 2009 PM_{10} SIP meets the elements required under the CAA, as amended for areas classified as "serious" non-attainment of the NAAQS. The elements of the plan are as follows:

- Air quality data analysis for the years 2006 through 2008 including exceptional events;
- An updated emissions inventory;
- A determination of significant sources of PM_{10} and classification; and
- Best available control strategies along with an impact analysis.

The Imperial Valley Final SIP for PM_{10} provides a general description of particulate matter as an air pollutant, a brief description of the Imperial County area, and a discussion of the purpose and regulatory agency requirements concerned with this SIP. This report provides the necessary data and discussion in presenting the SIP for PM_{10} on behalf of the ICAPCD (ENVIRON 2009).

South Coast Air Quality Management District Air Quality Management Plan

The South Coast Air Quality Management District (SCAQMD) and the Southern California Association of Governments (SCAG) have been designated to develop regional air quality plans for the SCAG to ensure attainment of national and state ambient air quality standards. The SCAQMD is required to update plans for improving air quality in the basin as needed or every three years. The 2007 Air Quality Management Plan (AQMP) is the latest iteration designed to satisfy requirements of both federal and state clean air laws. The plan outlines policies and practices intended to achieve attainment levels for criteria pollutants and avoid future levels that exceed applicable standards. The plan outlines the SCAQMD long-term strategies designed to keep regional air quality in compliance with NAAQS and CAAQS. The emission inventory included as part of this plan includes fugitive dust and emissions from off-road and construction equipment. The parameters of the AQMP are established according to forecasted air pollution emissions within the SCAG based on existing land uses and growth projections.

In order to achieve the goals and objectives of the South Coast AQMP at the local level, all cities and counties must adopt Air Quality Elements, ordinances, or plans that fully address air quality and help implement AQMP measures for achieving compliance with state and federal standards. In 2005, the SCAQMD published the Guidance Document for Addressing Air Quality Issues in General Plans and Local Planning, as a reference for local governments for addressing air quality issues within the SCAQMD jurisdiction. In addition to the South Coast AQMP, other plans or programs with air quality elements in the vicinity of the West Chocolate Mountains REEA include the Air Quality Element of the Riverside County General Plan (2003) and the City of Lake Elsinore General Plan (adopted 1990, currently under review). These plans contain policies and goals in compliance with SCAQMD rules as discussed above and set requirements for grading, erosion, and sediment control, including fugitive dust prevention and control procedures.

South Coast Air Quality Management District Rule 403: Fugitive Dust Regulations

The purpose of Rule 403 is to reduce the amount of particulate matter in the ambient air as a result of man-made sources by requiring actions to prevent, reduce, or mitigate fugitive dust emissions. The rule prohibits construction activities from generating visible dust in the atmosphere beyond the property line of the emission source. The rule also requires construction activities to use the best available control measures (BACM) to minimize fugitive dust emissions from each source type within the active operation. Fugitive dust emissions would come from a variety of construction activities including backfilling, clearing, demolition, earth-moving, stockpiling, landscaping, and vehicle traffic. The range of applicable BACM include the use of water, chemical stabilizers, or covers for disturbed areas and materials transported off-site; limits to traffic speeds on unpaved roads to, among others. These measures are required for all projects within the SCAG capable of generating fugitive dust.

South Coast Air Quality Management District 2003 Coachella Valley PM_{10} State Implementation Plan

The Coachella Valley (located within the cumulative effects area of the West Chocolate Mountains REEA) is currently designated as a serious nonattainment area for PM_{10}. In 2003, the SCAQMD adopted the Coachella Valley PM_{10} State Implementation Plan (CVSIP). The 2003 CVSIP contains updated emissions inventories, emission budgets, and attainment modeling. It requests that EPA replace the approved transportation conformity budgets in the 2002 CVSIP with those in the 2003 CVSIP. EPA approved these budgets on March 25, 2004, with an effective date of April 9, 2004.

County of San Diego Air Pollution Control District Rule 52: Particulate Matter

The provisions of this rule only apply to equipment that is required to obtain an Authority to Construct, Permit to Operate or Registration in accordance with these Rules and Regulations, with the exception of internal combustion engines. Particulate matter discharges into the atmosphere from any source are limited to 0.10 grain per dry standard cubic foot (0.23 grams per dry standard cubic meter) of gas.

3.1.3 Existing Conditions

3.1.3.1 Climate

Imperial County climatic conditions are characterized by large warming air masses. The coastal mountains prevent the intrusion of any cool, damp, marine air, and the Imperial Valley experiences clear skies, very low humidity, extremely hot summers, mild winters, and little rainfall. The prevailing wind directions at Niland, approximately one mile southwest of the West Chocolate Mountains REEA, are from the southeast (38 percent frequency) and the west (14 percent frequency). The average wind speed is approximately 7.5 miles per hour (Western Regional Climate Center [WRCC] 2007). Temperature and precipitation measured at the Brawley, California monitoring station (located 15 miles southwest of the REEA) are shown in Table 3.1-2.

Table 3.1-2 Temperature and Precipitation in Brawley, California

Month	Average Max Temp (°F)	Average Min Temp (°F)	Average Precipitation (Inches)
January	69.4	38.9	0.40
February	73.7	43.1	0.39
March	79.0	47.6	0.26
April	86.0	53.2	0.11
May	94.1	59.8	0.03
June	102.9	66.8	0.01
July	107.6	75.2	0.05
August	106.5	75.8	0.30
September	102.3	69.5	0.25

Table 3.1-2 Temperature and Precipitation in Brawley, California

Month	Average Max Temp (°F)	Average Min Temp (°F)	Average Precipitation (Inches)
October	91.3	57.8	0.22
November	78.8	46.0	0.17
December	69.9	39.2	0.46
Annual	**88.5**	**56.1**	**2.65**

Source: WRCC 2007

3.1.3.2 Existing Air Quality

The proposed plan would be located in Imperial County, within the SSAB. Ambient air quality for the SSAB is measured at several monitoring locations within Imperial County. The monitoring sites include:

- Brawley-220 Main Street ($PM_{2.5}$ and PM_{10});
- Calexico-East ($PM_{2.5}$, CO, NO_2, and O_3);
- Calexico-Ethel Street ($PM_{2.5}$, PM_{10}, CO, SO_2, NO_2 and O_3);
- El Centro-9th Street ($PM_{2.5}$, PM_{10}, CO, NO_2 and O_3);
- Niland-English Road (PM_{10} and O_3); and
- Westmorland-West 1st Street (PM_{10} and O_3).

Although some decreasing trends have been noted at these sites, data indicate air quality issues are still a concern in Imperial County. Particulate levels frequently exceed the state 24-hour PM_{10} standard of 50 µg/m³. These monitoring locations also consistently exceed the state annual standard of 20 µg/m³ and exceed the 24-hour national PM_{10} standards of 150 µg/m³. For 2008, all monitoring stations did not exceed the NAAQS but did exceed the CAAQS (Soucier 2010).

Wind-generated dust can produce very high episodic PM_{10} concentrations. Frequent high concentrations on windy days can also result in high annual average concentrations. In 2004, $PM_{2.5}$ levels exceeded the federal 24-hour $PM_{2.5}$ standard. It has been estimated that approximately 72 percent of $PM_{2.5}$ in Calexico is from combustion sources (San Diego Gas and Electric [SDG&E] 2006).

Except for the Calexico-Ethel Street and Westmorland-West 1st Street sites, days exceeding the ozone standards have had a declining trend since 1992 (SDG&E 2006).

3.1.4 Compliance with Air Quality Standards/Regional and Local Air Quality

Table 3.1-3 shows Imperial County's attainment status with regard to the CAAQS and NAAQS. As shown, Imperial County is in attainment with regard to CO, NO_2, SO_2, and sulfates, and is currently classified as nonattainment with regard to O_3 and PM_{10}. With respect to

particulate matter, the SSAB regularly exceeds the CAAQS PM_{10} 24-hour standard (187 days with exceedances in 2008). The SSAB only experienced exceedances of the NAAQS PM_{10} 24-hour standard two days in 2007 (ENVIRON 2009).

Table 3.1-3 Imperial County Attainment Status

Standard Pollutant	CAAQS Attainment Status	NAAQS Attainment Status
O_3 – 1-hour	"Moderate" Nonattainment	No Federal Standard
O_3 – 8-hour	Nonattainment	Nonattainment/Moderate[1]
$PM_{2.5}$ – 24-hour	Unclassified	Attainment
$PM_{2.5}$ – annual	Unclassified	Attainment
PM_{10} – 24-hour	Nonattainment	Serious Nonattainment
PM_{10} – annual	Nonattainment	Serious Nonattainment
CO	Attainment	Attainment
NO_2	Attainment	Attainment
SO_2	Attainment	Attainment

Sources: CARB 2010; EPA 2011.

Note:
[1] The EPA is in the process of determining that the Imperial County, California moderate 8-hour ozone nonattainment area has attained the 1997 8-hour NAAQS for ozone.

The Coachella Valley, located in the Riverside County portion of the SSSAB (part of the cumulative effects area, in the vicinity to the northern limit of the West Chocolate Mountains REEA) is designated as non-attainment area for PM_{10} currently under the jurisdiction of the SCAQMD.

3.1.5 Greenhouse Gases

Climate change refers to any significant change in measures of climate (temperature, precipitation, or wind) that lasts for an extended period (i.e., decades or longer). Climate change may be affected by a number of factors including natural cycles (e.g., changes in the sun's intensity or Earth's orbit around the sun); natural processes within the climate system (e.g., changes in ocean circulation); and human activities that change the atmosphere's composition (e.g., burning fossil fuels) or land surface (e.g., deforestation, reforestation, urbanization, and desertification).

California is a substantial contributor to global GHG emissions, as it is the second largest contributor in the U.S. and the sixteenth largest in the world (California Energy Commission [CEC] 2006). The main GHGs of concern include:

- Carbon dioxide (CO_2);
- Methane (CH_4);
- Nitrous oxide (NO_X);

- Hydrofluorocarbons (HFCs);
- Perfluorocarbons (PFCs); and
- Sulfur hexafluoride (SF_6).

The primary GHGs that would be emitted from project activities are CO_2, CH_4 from combustion equipment and vehicles, and fugitive SF_6 from power transformers and circuit breakers at power plants. SF_6 emissions are a common concern in power plant operations given its high GWP, which is a measure of how much a given mass of GHG is estimated to contribute to global warming and is devised to enable comparison of the warming effects of different gases.

According to the Intergovernmental Panel on Climate Change (IPCC) Third Assessment Report, increased atmospheric levels of CO_2 are correlated with rising temperatures; concentrations of CO_2 have increased by 31 percent above pre-industrial levels since 1750. Climate models show that temperatures will probably increase by 1.4 degrees Celsius (°C) to 5.8°C between the years 1990 and 2100. Much of the uncertainty in this increase results from not knowing future CO_2 emissions, but there is also some uncertainty about the accuracy of climate models. The IPCC concluded, in a statement released February 2, 2007, that "the widespread warming of the atmosphere and ocean, together with ice-mass loss, support the conclusion that it is extremely unlikely that global climate change of the past 50 years can be explained without external forcing, and very likely that it is not due to known natural causes alone" (IPCC 2007).

3.1.5.1 California Statewide Emissions

The CEC reports that California's GHG emissions are the second highest in the United States. In 2004, California produced 492 million gross metric tons of CO_{2e} GHG emissions. This figure includes imported electricity, but excludes the combustion of international fuels and carbon sinks and storage (CEC 2006).

The California GHG inventory compiles statewide anthropogenic GHG emissions and sinks. It includes estimates for CO_2, CH_4, N_2O, SF_6, HFCs, and PFCs. The current inventory covers years 2000 to 2006. Data sources include California and federal agencies, international organizations, and industry associations. The calculation methodologies are consistent with IPCC guidance. The current inventory uses GWP from the IPCC Second Assessment Report to be compatible with the national inventory (Table 3.1-4).

3.1.5.2 Regional Global Warming Effects

If global warming emissions continue unabated, California is expected to face poorer air quality, a sharp rise in extreme heat, a less reliable water supply, more dangerous wildfires, and expanding risks to agriculture. Statewide annual temperatures are expected to increase by as much as 10°F by the end of the century. As temperatures rise, electricity demand will also increase. Additionally, diminished snow melt flowing through dams, potentially exacerbated by decreasing precipitation, would decrease the potential for hydropower production, which now comprises about 15 percent of California's in-state electricity production (Union of Concerned Scientists 2006).

Table 3.1-4 California Greenhouse Gas Inventory for 2000-2006 (by Category as Defined in the Scoping Plan)

Category	2000	2001	2002	2003	2004	2005	2006
Transportation	171.94	174.62	181.32	178.90	183.03	185.82	185.77
Electric Power	102.59	115.93	101.13	105.04	115.65	106.35	105.92
Commercial and Residential	45.18	43.03	44.68	42.95	44.68	43.90	44.37
Industrial	101.02	98.84	101.01	99.88	94.50	93.71	96.05
Recycling and Waste	5.86	5.94	5.89	5.97	5.91	6.21	6.31
High GWP	10.94	11.42	12.06	12.90	13.79	14.51	15.15
Agriculture	25.46	25.47	28.54	28.66	28.95	29.20	30.13
Forestry	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Total Gross Emission	463.19	475.43	474.82	474.50	486.71	479.89	483.87
Forestry Net Emissions	-4.74	-4.54	-4.40	-4.38	-4.36	-4.19	-4.07
Total Net Emissions	**458.45**	**470.89**	**470.42**	**470.12**	**482.35**	**475.70**	**479.80**

Source: CARB 2009
Note:
million tons of CO_2 equivalent - (unit of measurement for net GHG emissions in CO_2e).

3.2 Noise

This section discusses applicable plans, policies, and regulations for noise and identifies the existing levels and sources of noise, as well as sensitive receptors. During the scoping period, meetings were conducted with the public and government agencies to identify their concerns. Written comments were also received. One comment suggested studies for noise in the immediate area and noise carried through mountainous areas and canyons. This comment has been noted and potential noise impacts and mitigation measures will be addressed in Chapter 4, Environmental Consequences, Section 4.2.

3.2.1 Definition of the Resource

Noise is defined as unwanted sound. Noise can be described in terms of three variables: amplitude (loud or soft), frequency (pitch), and time pattern (variability), and its potential effects can be described in terms of a noise generating source, a propagation path, and a receiver (Federal Transit Administration [FTA] 2006). The ambient sound level of a region is defined by the total noise generated within the specific environment and is usually composed of sound emanating from natural sources and from human activities. Ambient sound levels vary with time of day, wind speed and direction, and level of human activity. In this context, the ambient noise level constitutes the normal or existing level of environmental noise at a given location.

Although exposure to high noise levels has been demonstrated to cause hearing loss, the principal human response to environmental noise is annoyance. The response of individuals to similar noise events is diverse and influenced by the type of noise, the perceived importance of

the noise and its appropriateness in the setting, the time of day and the type of activity during which the noise occurs, and the sensitivity of the individual. Excessive noise exposure has been shown to cause interference with human activities at home, work, or recreation, community annoyance, and hearing loss, affecting people's health and well-being. Even though hearing loss is the most clearly measurable health hazard, noise is also linked to other psychological, sociological, physiological, and economical effects, either temporary or permanent (EPA 1974). Potential human annoyance and health effects associated with noise may vary depending on factors such as: (1) the difference between the new noise and the existing ambient noise levels; (2) the presence of tonal noise (noticeable or discrete continuous sound, such as hums, hisses, screeches, or drones); (3) low frequency noise; (4) fluctuating, intermittent, or periodic sounds, such as backup alarms; and (5) impulsive sounds (Earthworks 2010). In some cases, noise can also disrupt the normal behavior of wildlife. Although the severity of the effects varies depending on the species being studied and other conditions, research has found that wildlife can suffer adverse physiological and behavioral changes from intrusive sounds and other human disturbances (National Park Service [NPS] 2009).

The amplitude of sound is usually described by the decibel (dB), which is a logarithmic measure of the sound pressure level. Pressure variations in the air cause the eardrum to vibrate, which is interpreted as sound by the brain. The stronger the pressure variation, the louder the sound is heard. The level of noise is measured objectively using a sound level meter normally set on the A-weighted scale, which was developed to mimic the way the human ear responds to pressure variations in the air. Since humans are less sensitive to low frequencies (less than 250 hertz [Hz]) than mid-frequencies (500 to 1,000 Hz), and they are most sensitive to frequencies in the 1,000- to 5,000-Hz range, sound measurements are adjusted, or weighted, as a function of frequency to account for human perception and sensitivities.

In terms of human response, it is widely accepted that people are able to begin to detect sound level increases of 3 dB, while an increase in noise level of 10 dB is generally perceived as being twice as loud; however, a 5-dB change is generally considered to be a substantially noticeable change above the existing noise environment. Everyday sounds normally range from 30 dB (very quiet) to 100 dB (very loud), as described in Table 3.2-1. Sound level is typically measured in A-weighted decibels (dBA). The most widely used sound level filter is the A scale. Using this filter, the sound level meter is less sensitive to very high and very low frequencies, similar as it is perceived by the human ear. Measurements made on this scale are expressed as dBA.

The decrease in sound level due to distance from any single sound source normally follows the inverse square law (i.e., the sound pressure level changes in inverse proportion to the square of the distance from the sound source). In a large open area with no obstructive or reflective surfaces, it is a general rule that, at distances greater than 50 feet, the sound pressure level from a point source of sound drops off at a rate of 6 dB, with each doubling of distance away from the source. Sound energy is absorbed in the air as a function of temperature, humidity, and the frequency of the sound. This attenuation can be up to 2 dB over 1,000 feet. The drop-off rate also varies with both terrain conditions and the presence of obstructions in the sound propagation path.

Table 3.2-1 Typical Sound Levels Measured in the Environment and Industry

Noise Source at a Given Distance	A-Weighted Sound Level (dBA)	Noise Environments	Qualitative Description
Carrier deck jet operation	140	Carrier flight deck	Painfully Loud
Civil defense siren (100 feet)	130		
Jet takeoff (200 feet)	120		Threshold of Pain
Loud rock music	110	Rock music concert	
Pile driver (50 feet)	100		Very Loud / Very Annoying
Ambulance siren (100 feet)	90	Boiler room	
Pneumatic drill (50 feet)	80	Noisy restaurant	Annoying
Freeway traffic (50 feet)	70		Intrusive / Moderately Loud
Air conditioning unit (20 feet)	60	Data processing center	
Light auto traffic (100 feet); rainfall	50	Private business office	
Bird calls	40	Average living room library	Quiet
Soft whisper (5 feet); rustling leaves	30	Quiet bedroom	Very Quiet
Broadcasting/Recording studio	20		
Normal breathing	10		Threshold of hearing

To characterize the average ambient noise environment in a given area, noise level descriptors are commonly used. The Sound Equivalent Level (Leq) is generally used to characterize the average sound energy that occurs during a relatively short period of time, such as an hour. Two other descriptors, the Day-Night Level (Ldn) and Community Noise Equivalent Level (CNEL), would be used for an entire 24-hour period. The value of the Ldn and CNEL are generally within one dB of each other and, therefore, will be used interchangeably in this analysis. Both the Ldn and CNEL noise metric descriptors place a stronger emphasis on noise that occurs during night-time hours (10 p.m. to 7 a.m.) by applying a 10-dB “penalty” to those hours, with the difference being that the CNEL also applies a 5-dB “penalty” to the evening hours of 7 p.m. to 10 p.m.

Vibration is a phenomenon related to noise. It is an oscillatory motion that can be described in terms of displacement, velocity, or acceleration (FTA 2006). The ground-borne energy of vibration has the potential to cause structural damage and annoyance; it can be felt outdoors, but the perceived intensity of vibration impacts are much greater indoors, due to the shaking of structures (Baker 2008). Several land uses are sensitive to vibration (e.g., hospitals, libraries, residential areas, school, offices, and cultural resources).

Vibration particle velocity (measured in inches or millimeters per second) and/or vibration velocity level in decibels (VdB) are typically used to describe vibration. For residential uses, the background vibration level is usually 50 VdB or lower, while 75 VdB is generally considered intrusive (Table 3.2-2). Typical outdoor sources of perceptible ground-borne vibration are trains, buses on rough roads, construction-related activities such as blasting, pile-driving, and operating heavy earth-moving equipment, and traffic on rough roads (FTA 2006).

Table 3.2-2 Typical Levels of Groundborne Vibration

Vibration Velocity Levels (VdB)[1]	Human/Structural Response	Typical Sources (50 feet from the source)
100	Threshold of minor damage to fragile buildings	Blasting from construction projects
90 -100	Difficulty with tasks such as reading display screens	Bulldozers and other heavy tracked construction equipment
80 -90	Residential annoyance, infrequent events	Rapid transit[2] (upper range)
70 -80	Residential annoyance, frequent events	Rapid transit[2] (typical), bus or truck over bump
60 - 70	Limit for vibration sensitive equipment. Approximate threshold for human perception	Bus or truck (typical)
50	Typical background vibration level	Typical background vibration

Source: FTA 2006
Note:
1 Vibration velocity level in dB or VdB relative to 10-6 inches/second.
2 Rapid Transit is defined as an urban public transit system using underground or elevated trains.

3.2.2 Applicable Plans, Policies, and Regulations

Federal, state, and local bodies of government establish regulations and guidance to control excessive noise and reduce disturbance due to noise to a level that is acceptable within their jurisdiction. While federal and state laws regulate transportation noise, establish “normally” and “conditionally” acceptable exterior noise limits based on land-use type, and establish maximum acceptable interior noise limits for residences, no federal or state provisions regulate noise levels due to temporary construction activity. This type of noise is generally regulated at the local or county-wide level.

3.2.2.1 Federal

Noise and land use guidelines have been produced by a number of federal agencies including the Federal Highway Administration (FHWA), the EPA, the Department of Housing and Urban Development (HUD), and the American National Standards Institute (ANSI). These guidelines are all based upon statistical noise criteria such as Leq, Ldn, or CNEL. The EPA identified outdoor and indoor noise levels to protect public health and assets. A $Leq_{(24)}$ of 70 dB was identified as the level of environmental noise that would prevent any measurable hearing

loss over a lifetime. Ldns of 55 dBA outdoors and 45 dBA indoors were identified as noise thresholds that would prevent activity interference or annoyance (EPA 1974).

California Desert Conservation Area Plan

The CDCA Plan (BLM 1980) contains provisions for public land use management in the California Desert District under BLM jurisdiction. Since its first date of publication in 1980, the CDCA Plan has been amended in order to incorporate public concerns and Congressional mandates in regards to the use of desert resources, such as the provisions of the California Desert Protection Act of 1994.

In particular, noise-related guidelines established in the CDCA Plan include the long-term monitoring of impacts from vehicle noise on wildlife (Chapter 3, Wildlife Element) and implementation of land use compatibility standards within Limited (Vehicle Use) Areas in order to minimize conflicts between off-road vehicle use and other existing or proposed recreational uses of the same or neighboring public lands (Chapter 3, Motorized Vehicle Access). The CDCA Plan also identifies energy and utility corridors within the California Desert District, which is part of the impact analysis framework, particularly in terms of alternatives analysis and cumulative impacts.

Western Colorado Desert Routes of Travel Designations Plan Amendment

The West Chocolate Mountains REEA is located within the Western Colorado (WECO) planning area. The WECO planning area includes approximately 475,000 acres in parts of Imperial and San Diego counties (BLM 2002). In 2002, the WECO Desert Routes of Travel Designations Amendment to the CDCA Plan, hereinafter referred to as the WECO Plan Amendment, designated off-road vehicle routes of travel as open, limited, or closed in the WECO planning area to allow users access to adjacent state, county, and private lands.

The WECO Plan Amendment included an Environmental Assessment (EA) that was written to study and designate preferred routes of travel. Preference was given to routes of travel that provided the most vital access to the most users while also preserving the environment to the greatest extent possible. The WECO Plan Amendment identified mitigation measures to protect sensitive desert wildlife and cultural resource values throughout the planning area, while encouraging OHV use, camping, and other recreational uses to be compatible "with existing conditions in populated areas, taking into account noise and other factors" (BLM 2002). Routes of travel designations resulted in approximately 1,432 miles of approved open routes, 345 miles of closed routes, 27 miles of limited use routes (use by permit and/or seasonal route closures), and 513 miles of undesignated routes in limited areas (BLM 2002).

3.2.2.2 State

The California Department of Health Services has established the Office of Noise Control, which has prepared studies associated with noise levels and their effects on various land uses. Based upon these studies, the State of California has established interior and exterior noise standards by land use category and standards for the compatibility of various land uses and noise levels (Table 3.2-3). For low-density residential areas, such as the rural environment where the West Chocolate Mountains REEA is located, the maximum normally acceptable noise level established by this guidance is 60 dBA. New construction or development would conditionally

reach a maximum noise level of 70 dBA only after a detailed analysis of the noise requirements is made and needed noise insulation features are included in the design. In addition, noise limits for highway vehicles are regulated under the California Vehicle Code, §§23130 and 23130.5. The limits are enforceable on the highways by the California Highway Patrol and the County Sheriff's Office.

Table 3.2-3 Noise/Land Use Compatibility Matrix for Community Noise Environments

Land Use Category	Community Noise Exposure Level (CNEL, dBA)						
	50	55	60	65	70	75	80
Residential – Low density single-family, duplex, and mobile homes							
Residential – Multi-family							
Transient Lodging – Hotels, motels							
Schools, Libraries, Churches, Hospitals, Nursing homes							
Auditoriums, Concert halls, Amphitheaters							
Sport arenas, Outdoor spectator sports, amusement parks							
Playgrounds, neighborhood parks							
Golf courses, riding stables, Cemeteries							
Office and Professional Buildings, Retail Commercial, Banks, Restaurants							

Table 3.2-3 Noise/Land Use Compatibility Matrix for Community Noise Environments

Land Use Category	Community Noise Exposure Level (CNEL, dBA)						
	50	55	60	65	70	75	80
Industrial, Manufacturing, Utilities, Service Stations, Warehousing, Agriculture							

Source: California Department of Health Services, Office of Noise Control 1976.

Key:

Normally acceptable: Specified land use is satisfactory based upon the assumption that any buildings involved are of normal conventional construction without any special noise insulation requirements.

Conditionally acceptable: New construction or development should be undertaken only after a detailed analysis of the noise requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air systems or air conditioning, normally suffices.

Normally unacceptable: New construction or development should generally be discouraged. If it does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

Clearly unacceptable: New construction or development should generally not be undertaken.

3.2.2.3 Local

The Noise Element of the Imperial County General Plan provides a program for incorporating noise issues into the land use and planning process, with a goal of minimizing adverse noise impacts to sensitive noise receptors. The Noise Element establishes goals, objectives, and procedures to protect the public from noise intrusion. The Noise Element for Imperial County is applicable to lands owned or zoned by the county; however, lands regulated by the state or federal government are preempted from local land use policy (County of Imperial 1993). Approximately 53 percent of the West Chocolate Mountains REEA is privately owned land and is subject to the goals and objectives of the Noise Element of the County of Imperial General Plan, which include:

- **Goal 1:** Provide an acceptable noise environment for existing and future residents in Imperial County;
- **Objective 1.1:** Adopt noise standards which protect sensitive noise receptors from adverse impact;
- **Objective 1.2:** Ensure that noise standards and policies are compatible with the standards and policies of other General Plan Elements and other County agencies;
- **Objective 1.3:** Control noise levels at the source where feasible;
- **Objective 1.4:** Coordinate with airport operators to ensure operations are in conformance with approved Airport Land Use Plans;
- **Objective 1.5:** Identify sensitive receptors with noise environments which are less than acceptable, and evaluate measures to improve the noise environment; and
- **Objective 1.6:** Collect data for existing noise sources in the County to improve the data base and enhance the ability to evaluate proposed plans and land uses.

The County of Imperial Noise Element establishes Property Line Noise Limits listed in Table 3.2-4 that apply to noise generation from one property to an adjacent property. The standards imply the existence of a sensitive receptor on the adjacent or receiving property. In the absence of a sensitive receptor, an exception or variance to the standards may be appropriate. These standards do not apply to construction noise.

Table 3.2-4 Property Line Noise Limits

Zone	Time	Applicable Limit One-hour Average Sound Level (Decibels)
Residential Zones	7 a.m. to 10 p.m.	50
	10 p.m. to 7 a.m.	45
Multi-Residential Zones	7 a.m. to 10 p.m.	55
	10 p.m. to 7 a.m.	50
Commercial Zones	7 a.m. to 10 p.m.	60
	10 p.m. to 7 a.m.	55
Light Industrial / Industrial Park Zones	Anytime	70
General Industrial Zones	Anytime	75

Note: When the noise-generating property and the receiving property have different uses, the more restrictive standard shall apply. When the ambient noise level is equal to or exceeds the Property Line noise standard, the increase of the existing or proposed noise shall not exceed 3 dB Leq.

3.2.3 Existing Conditions

3.2.3.1 Existing Noise Sources

The primary noise sources attributable to human activities within and surrounding the West Chocolate Mountains REEA include vehicular traffic along SR 111 and all transportation routes in the vicinity (including the Burlington Northern Santa Fe Railway [BNSF] that parallels SR 111 on the east side), the aerial bombing and live fire aerial gunnery practice from the CMAGR used by the United States Navy and Marines, and from OHV use from the Imperial Sand Dunes Recreation Area (ISDRA). High explosive ordnance deliveries are restricted to the hours of 7:00 a.m. to 9:00 p.m. Pacific Standard Time and 8:00 a.m. to 10:00 p.m. Pacific Daylight Time due to noise complaints related to activities at the CMAGR (Global Security 2009).

OHV uses are limited in the West Chocolate Mountains REEA due to the lack of legal routes. No racing has been permitted in the REEA (Meeks 2009).

3.2.3.2 Existing Noise Levels

Ambient noise level measurements for the West Chocolate Mountains REEA are not available; however, ambient noise levels in the REEA and the vicinity are generally assumed to be low and typical of remote desert areas (i.e., 35 to 50 dBA). Natural deserts do not exceed 66

dBA, and no desert animal creates sounds above 56 dBA. Ambient noise levels may be modified by noise-generating activities in the vicinity, including:

- Noise associated with occasional recreational and support activities, especially OHV uses of the ISDRA located to the southwest and adjacent to the West Chocolate Mountains REEA. A motorcycle ranges from 40 to 100 dBA. Within 300 feet, the peak noise levels created by a motorcycle exceed those of naturally occurring sounds (BLM 2003);
- Ambient vehicular traffic noise on SR 111 and transportation routes within and surrounding the West Chocolate Mountains REEA;
- Occasional military aircraft overflights associated with flight corridors from the CMAGR located east and northeast of the West Chocolate Mountains REEA;
- U.S. Border Patrol helicopter use of the West Chocolate Mountains REEA as a part of providing medical aid and apprehending undocumented immigrants and smugglers; and
- Natural sources such as wind, rain, thunder, and wildlife.

3.2.3.3 Off-Highway Vehicle Noise Levels

OHV noise levels are variable, with older vehicles producing higher noise levels than newer ones. California Vehicle Code §38370 requires that dBA levels (measured at 50 feet) for Green Sticker vehicles (vehicles registered as OHVs in California) be below (1) 92 dbA for any such vehicle manufactured before January 1, 1973; (2) 88 dbA for any such vehicle manufactured on or after January 1, 1973 and before January 1, 1975; (3) 86 dbA for any such vehicle manufactured on or after January 1, 1975 and before January 1, 1986; and (4) 82 dbA for any such vehicle manufactured on or after January 1, 1986.

Tests conducted at the Oregon Dunes National Recreation Area concluded that, even with mufflers, noise levels from all-terrain vehicles are found to be in the range of 81 to 111 dBA per unit at a distance of 20 inches (Scharf and Scharf 1999). A noise level of 111 dBA at 20 inches is estimated to attenuate to a level of approximately 85 dBA at a distance of 50 feet. For purposes of this section, 92 dBA will be the average assumed noise level at 50 feet for OHV use within the ISDRA.

The level of recreational activities in or near the West Chocolate Mountains REEA (associated with the ISDRA) varies throughout the year with little, if any, OHV use and noise during the summer months. Virtually all OHV usage in ISDRA occurs from approximately mid-October to May. During high-use, holiday weekends, OHV-related noise levels can be relatively high within certain areas of the ISDRA. The background OHV noise levels in and around the REEA range from low, during weekdays to moderate during moderate-use weekends, to high, during the high-use weekends. The ISDRA (approximately 159,000 acres) contains the largest mass of sand dunes in California and is the most heavily and intensively used OHV recreation area in the California Desert District, with an estimated 8,536,000 OHV Visitor Use Days per year (Meeks 2009).

3.2.3.4 Sensitive Receptors

Sensitive noise receptors are, in general, those areas of human habitation or substantial use where the intrusion of noise has the potential to adversely impact the occupancy, use, or enjoyment of the environment. These can include residences, schools, hospitals, parks, and places of business requiring low levels of noise. The closest areas of likely sensitive receptors would be within the small town of Bombay Beach, which abuts the Salton Sea and the West Chocolate Mountains REEA, the town of Niland, located approximately 0.6 mile southwest of the REEA, and the users of the Bashford's Hot Mineral Spa, Pacific Aquafarms (fish farm), and Fountain Youth Spa which are located less than one mile from the northeastern boundary of the REEA. The Fish Partners fish farm is located within the southwest portion of the REEA and approximately 2.2 miles southeast of Niland, California.

3.3 Topography, Geology, and Geologic Hazards

This section discusses applicable plans, policies, and regulations for geology, topography, and geologic hazards and identifies the existing geologic and topographic conditions. During the scoping period, meetings were conducted with the public and government agencies to identify their concerns. One comment was received regarding geologic hazards. There was a recommendation that the EIS evaluate the potential for seismic risk and explain how this risk would be evaluated and monitored. This comment is addressed in Section 3.3.3, Existing Conditions, and in Chapter 4, Environmental Consequences, Section 4.3.

3.3.1 Definition of the Resource

Geologic resources include the naturally occurring mineral resources (e.g., rocks and soil) which comprise the landforms within a given region. The formational history of the landscape (geomorphology) by way of tectonic activity (e.g., earthquakes and volcanoes) along with erosional and transportational effects of hydrologic systems and climate (including physical and chemical changes) combine to create the entirety of the geologic environment.

3.3.2 Applicable Plans, Policies, and Regulations

3.3.2.1 Federal

California Desert Conservation Area Plan

The CDCA Plan directs the BLM to responsibly manage resources on 12 million acres of public lands within California's interior deserts. This responsibility includes management of geologic resources, which are discussed in the Geology, Energy, and Mineral (GEM) Resources Element of the Plan. The goals of the GEM Resources Element are primarily focused on allowing mineral resource development, including geothermal exploration and solid mineral extraction, to occur in an economically and environmentally sustainable manner.

Western Colorado Desert Routes of Travel Designations Amendment

As discussed in Section 3.2.2.1, the WECO Plan Amendment designated preferred routes of travel across public lands managed by the BLM in the WECO Planning Area. An EA was written for the WECO Plan Amendment; however, this document did not introduce goals for

protecting or managing geologic resources; it only briefly mentions that actions by the U.S. Border Patrol near the West Chocolate Mountains REEA contribute to erosion and compaction of soils (discussed further in Section 3.4, Soils).

3.3.2.2 State

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act of 1972 (formerly the Special Studies Zoning Act) regulates development and construction of buildings intended for human occupancy to avoid the hazard of surface fault rupture. The law resulted from structural damage associated with the 1971 San Fernando Earthquake. This Act groups faults into categories of active, potentially active, and inactive. Historic and Holocene age faults (formed within the last 10,000 years) are considered active, late Quaternary and Quaternary age faults (formed within the last 2.6 million years) are considered potentially active, and pre-Quaternary age faults (formed previous to the last 2.6 million years) are considered inactive. These classifications are qualified by the conditions that a fault must be shown to be "sufficiently active" and "well defined" by detailed site-specific geologic explorations in order to determine whether building setbacks should be established.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act of 1990 (Public Resources Code, Chapter 7.8, Division 2) directed the California Department of Conservation (CDC), Division of Mines and Geology (now called California Geological Survey [CGS]) to delineate Seismic Hazard Zones. The purpose of this Act is to reduce the threat to public health and safety and to minimize the loss of life and property by identifying and mitigating seismic hazards. City, county, and state agencies are directed to use seismic hazard zone maps developed by CGS in their land use planning and permitting processes. The Act requires that site-specific geotechnical investigations be performed prior to permitting most urban development projects within seismic hazard zones.

California Building Code

The California Building Code (CBC) of 2007 is based on the 2006 International Building Code, with the addition of more extensive structural seismic provisions. Chapter 16 of the CBC contains definitions of seismic sources and the procedure used to calculate seismic forces on structures.

3.3.2.3 Local

Imperial County General Plan

The Seismic and Public Safety Element of the Imperial County General Plan provides for mitigation of geologic hazards through a combination of engineering, construction, land use, and development standards. The Plan addresses the geologic hazards present within Imperial County, including fault rupture, ground shaking, liquefaction, seismically-generated subsidence, seiches (seismically-induced waves on lakes, reservoirs or ponds) and dam inundation, landslides/mudslides, non-seismic subsidence, erosion, and volcanic activity (County of Imperial 1996).

3.3.3 Existing Conditions

3.3.3.1 Topography

The West Chocolate Mountains REEA is approximately 59,095 acres, which consist of a desert basin, bordered by the Salton Sea to the west and the foothills of the northwest-to-southeast trending Chocolate Mountains to the east. Desert washes cross nearly the entire area, with Iris Wash being the largest and most pronounced. The slopes trend downward to the west, toward the Salton Sea, and average between 0 to 3 percent. The elevation ranges from approximately 400 feet above mean sea level (msl) in the southeast corner of the REEA, near the Chocolate Mountains, to approximately -235 feet below msl at the surface of the Salton Sea. In fact, several sections of BLM land in the western portion of the REEA are below sea level and the former shoreline of ancient Lake Cahuilla can be observed at approximately 25 and 50 feet above sea level (San Diego State University [SDSU] n.d.). Seven distinct areas within the REEA are discussed below.

Salton Trough

The Salton Trough is a deep sediment-filled structural as well as topographic depression that is bounded by the Santa Rosa Mountain range to the northwest, the Orocopia Mountain range to the northeast, the Chocolate Mountain range to the east, and the Peninsular Mountain ranges of Southern and Baja California to the southwest. It extends linearly in a southeast to northwest direction from the Gulf of California, through the Mexicali Valley in Mexico, and in the United States through the Imperial Valley south of the Salton Sea and the Coachella Valley north of the Salton Sea (Lawrence Livermore 2008).

Cahuilla Basin

The Cahuilla Basin refers to the area prior to the formation of the Salton Sea. Ancient Lake Cahuilla was a fresh water lake that received inflow from the Colorado River and runoff from the local mountains. Lake Cahuilla drained south to the Gulf of California unless blocked by its own delta. There are evidences of multiple strand lines (shorelines) showing past Lake Cahuilla elevations and an abundance of fresh water gastropod and pelecypod shells below these strand line elevations that start at about 50 feet msl. The last filling of Lake Cahuilla is reported to be between A.D. 900 to 1400 (Norris and Webb 1990).

Salton Sea Basin

The Salton Sea Basin, including the Salton Sea and its surrounding closed watershed, extends further into San Bernardino and San Diego counties, as well as into the Mexicali Valley of Baja California, Mexico. The Salton Sea is the largest lake in area in California, some 35 miles long, 9 to 15 miles wide, and with about 120 miles of shoreline. At its current elevation, the Salton Sea has a maximum depth of about 50 feet, an average depth of 30 feet, a total surface area of 359 square miles, and a total water volume of 7.2 million AF (Lawrence Livermore 2008). The Salton Sea is a closed basin containing no natural outlet. Water inflows occur primarily from the Alamo, New, and Whitewater rivers, agricultural drains, groundwater inflows, spring discharges, and other ephemeral runoff from rainfall, amounting to approximately 1.35 million AF/year (Lawrence Livermore 2008).

Chocolate Mountains

The Chocolate Mountains of California are located in Imperial County and Riverside County in the Colorado Desert in Southern California. The mountains stretch more than 60 miles in a northwest to southeast direction, and are located east of the Salton Sea and south and west of the Chuckwalla Mountains. To the northwest lie the Orocopia Mountains.

The alluvial fans associated with the western flank of the Chocolate Mountains rise in elevation from slightly above 0 foot msl, near the point where these deposits intercept the valley floor, to above 380 feet msl along the southeastern portion of the West Chocolate Mountains REEA. In the REEA, these fans generally drain to the southwest and exhibit a moderate degree of slope of about 1.5 percent. The Chocolate Mountains alluvial fans have had progressive landscape development over the millennia. Stream down cutting and infilling resulted in the development of channels and terraces (incised flood plains). Runoff from major storm events flow over the alluvial fans, terraces, and washes, eventually finding a way to the Salton Sea.

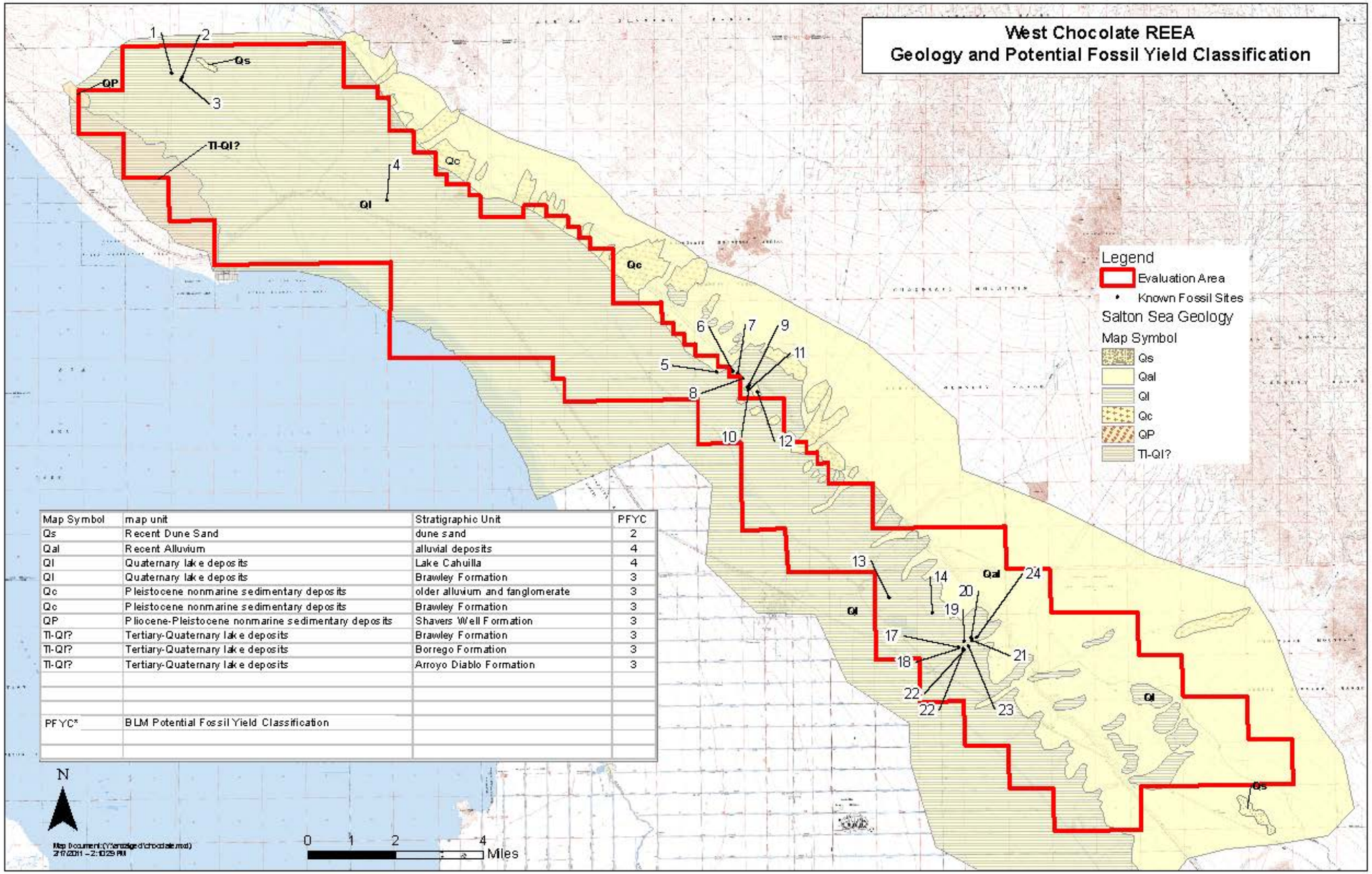
Durmid Hills

The Durmid Hills area is located along the eastern margin of the Salton Sea in the northwest part of the West Chocolate Mountains REEA, and west of the Chocolate Mountains, and exhibits elevations that range from approximately -150 feet msl up to less than approximately -20 feet msl. In the Durmid Hills area, the actual San Andreas Fault begins, emerging from the locally developed sand deposits, and passing through Salt Creek and into the dramatically folded Mecca Hills to the north. In the REEA, the topographic expression of the hills is that of a gentle or subdued rise in elevation from the surrounding valley floor and adjacent Salton Sea, draining to the southwest, south, and generally east to northeast within the REEA.

3.3.3.2 Geologic Setting

The West Chocolate Mountains REEA is part of the Colorado Desert geomorphic province of California and the Salton Trough physiographic sub-province which is the at southwesternmost extent of the Basin and Range physiographic province. Figure 3.3-1 provides a map of the REEA showing geologic units across the REEA and paleontologic localities.

Created through very active tectonic process, the Salton Trough is a complex transition zone between the right-lateral motion of the San Andreas transform fault system and the northwestward progressing spreading ridge complex of the Gulf of California segment of the Eastern Pacific Rise (Alles 2007).



Map Symbol	map unit	Stratigraphic Unit	PFYC
Qs	Recent Dune Sand	dune sand	2
Qal	Recent Alluvium	alluvial deposits	4
Ql	Quaternary lake deposits	Lake Cahuilla	4
Ql	Quaternary lake deposits	Brawley Formation	3
Qc	Pleistocene nonmarine sedimentary deposits	older alluvium and fanglomerate	3
Qc	Pleistocene nonmarine sedimentary deposits	Brawley Formation	3
QP	Pliocene-Pleistocene nonmarine sedimentary deposits	Shavers Well Formation	3
Tl-Ql?	Tertiary-Quaternary lake deposits	Brawley Formation	3
Tl-Ql?	Tertiary-Quaternary lake deposits	Borrego Formation	3
Tl-Ql?	Tertiary-Quaternary lake deposits	Arroyo Diablo Formation	3
PFYC*	BLM Potential Fossil Yield Classification		

Figure 3.3-1 Known Paleontological Sites, Geologic Rock Units, and Potential Fossil Yield Classifications of the West Chocolate Mountains REEA

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The Salton Trough, an extension of the Gulf of California Gulf, is separated from the Gulf of California by the Colorado River Delta. The Colorado River delta covers about 3,325 square miles (Sykes 1937) and is up to 3.5 miles deep (Jenning and Thompson 1986), containing over 10,000 cubic miles of the Colorado River's sediments from the last 2 to 3 million years. The sediments that were deposited by the river more than 2 to 3 million years ago have been shifted northwestward by movement along the San Andreas and related faults (Winker and Kidwell 1986).

The Salton Trough is a Neogene age (23 million years ago to present) basin. This basin has been partially filled with marine and freshwater sediment, which is estimated at nearly 4 miles thick, and includes surface sediments varying from Holocene clay and silt alluvium near the Salton Sea, to sandy gravel near the Chocolate Mountains. The Salton Trough spans approximately 4,500 square miles between the igneous and metamorphic rocks of the Transverse Range at San Gorgonio Pass at the northern extent and the U.S.-Mexico international border towards the southern extent (Barker 1995; EPA 2007).

The Salton Trough has experienced continual in-filling with both marine and non-marine sediments since its approximate formation in the Miocene Epoch. The opening of this trough and the adjacent Gulf of California to the south started in the middle Miocene time (some 15 million years ago) and included marine deposition. Since the latest Miocene (5 million years ago), the Colorado River has deposited marine and non-marine sediment in the Gulf (Gastil et al. 1996), forming a broad delta that, south of the U.S.-Mexico border, rises to a height of 40 to 50 feet. This natural dam (Colorado River delta fan deposits) prevents the Salton Trough from being flooded by marine waters of the Gulf of California.

In modern times, the Salton Trough, a desert basin whose center is 278 feet below msl in the area of the Salton Sea, became a lake in 1891, but dried up within a year. The lake began to form again in 1893. In 1901, a company began diverting some Colorado River water down into the valley for irrigation. In 1905, the company lost control of the diversion during a flood when the Colorado River broke through the half-finished headgate of an irrigation ditch. The river kept widening the ditch, until almost the entire river was flowing into the Salton Sea area rather than toward the Gulf of California. It took engineers and work crews until 1907 to return the river to its proper course, by which time a considerable lake had formed, creating the Salton Sea (Worster 1985). Due to evaporation, the lake became saline.

Within the Salton Trough lies the Imperial Valley. The Imperial Valley is located in the southeastern half of this broad northwest-trending basin of the Salton Trough and is bounded by the Salton Sea to the west, alluvial fans of the Chocolate Mountains to the east, uplifted lacustrine sediments along the San Andreas Fault Zone to the north, and dunes of the Sand Hills to the south. To the south of the U.S.-Mexico border, this valley is known as Mexicali Valley in Mexico. Below the alluvial cover of the Imperial Valley lies an unexposed succession of late Tertiary and Quaternary sedimentary rocks that are over 4.3 miles thick in some places (Eiders 1979a,b). Little is known of the nature, fossils, and age of these sedimentary rocks.

General surface deposits within the West Chocolate Mountains REEA consist of Holocene to Pliocene (5.3 million years ago to present) alluvial sediments bordered to the east by

the Holocene to Tertiary (65 million years ago to present) sedimentary, metamorphic, and igneous rocks of the Chocolate Mountains and bordered to the south by the Holocene to Pleistocene (1.8 million years ago to present) eolian sand dunes (Figure 3.3-1) (USGS 2004). Eolian sand dunes are formed by strong desert winds that transport sand downwind until they form into sheets and dunes.

The geology exposed within the West Chocolate Mountains REEA includes deposits derived from terrestrial, lacustrine (lake), and marine depositional environments. These environments are characteristic of sediments lain down in shallow marine and freshwater lacustrine bodies of water within the Salton Trough. Other sediments include deposits associated with alluvial fan deposition from along the eastern margin of the Salton Trough associated with the Chocolate Mountains (Table 3.3-1). The exposed geologic units within the REEA have been divided into three physiographic regions; Chocolate Mountains alluvial fans, the Imperial Valley, and Durmid Hills as follows:

- **Chocolate Mountains Alluvial Fans:** Quaternary non-marine deposits, Quaternary lake deposits, and Quaternary younger alluvial fans (cone-shaped accumulations of alluvial material along the western edge of the Chocolate Mountains);
- **Imperial Valley:** Quaternary lake deposits; and
- **Durmid Hills:** Tertiary to Quaternary lake deposits, Plio-Pleistocene non-marine deposits, and Quaternary lake deposits that have been deformed (folded and faulted) along the San Andreas Fault Zone.

3.3.3.3 Geologic Units and Formations

Geologic formations of the West Chocolate Mountains REEA and their locations can be viewed on Figure 3-3.1.

Quaternary Paleospring Deposits

Paleospring deposits are sediments that accumulate around springs that are formed by groundwater disruption caused by faulting (California Department of Water Resources [DWR] and California Department of Fish and Game [CDFG] 2006).

Quaternary Sand (Qs)

Quaternary sand deposits are present in several areas. These deposits represent aeolian (dune sand) and are in active phases of the dune cycle. These dunes move slowly with the rate depending on the direction and wind speed of the prevailing winds.

Quaternary Lake/Playa Deposits (Ql) – Lake Cahuilla Beds

The eastern side of Imperial Valley is directly underlain by Lake Cahuilla beds, which consist of interbedded lenticular and tabular silt, sand, and clay that are probably less than 100 feet thick. Although modern in age at the surface, these lake/playa sediments increase in age with depth and may be late Pleistocene in age (40,000 years or less) (Maloney 1986). According to Van de Kamp (2006), the Lake Cahuilla sediments came from two sources. The first source was the Colorado River which intermittently flowed into the southern portion of the Salton Trough

and deposited sand and mud in deltaic, fluvial, and lacustrine environments. The second source was the sediments derived from the basin. A recent study by Li et al. (2007) dating various layers of calcareous tufa (a carbonate coral-like rock that encrusts boulders in freshwater lakes) at Travertine Rock, near Salton City, found evidence of at least 30 basin filling lakes in the Salton Trough in the last 20,000 years. Evidence of these inundations and subsequent desiccations are chronicled in the sediments of the Lake Cahuilla beds. Only the last five to ten lake phases of the Lake Cahuilla sediments (from 400 to 5,900 years before present [B.P.]) have been studied in any detail (Waters 1980, 1983; Reynolds 1989; Whistler et al 1995; Quinn 2000; Wagner 2007; Crull et al. 2008).

Brawley Formation (Ql)

Underlying the Lake Cahuilla beds, the Pleistocene Brawley Formation (mapped as Ql-Quaternary Lake Deposits) was mapped by Jennings (1967) at the surface and at depth over a large portion of the West Chocolate Mountains REEA. This sedimentary rock unit consists of at least 2,000 feet of gray clay, sand, and pebbles (Proctor 1968). Recent work on the west side of the Salton Trough has shown that the coarser Ocotillo Formation is a lateral facies of the Brawley Formation (Kirby et al. 2007). The term “facies” refers to all of the characteristics of a particular rock unit which are a result of the depositional environment. Sediments of the Brawley Formation range in age from 1 to 1.2 million (Dorsey 2006) to about 40,000 years (Maloney 1986) and tend to be fossiliferous.

Like the Lake Cahuilla beds, the Brawley Formation stratigraphic record represents a series of inundations of the Salton Trough by waters of the Colorado River which formed large freshwater to brackish lakes that persisted for some time and subsequent desiccations, when the Colorado River was diverted back into the delta, and these lakes dried up. The lithologic record of the Brawley Formation consists of altering lacustrine, fluvial, and deltaic deposits, with subaerial (terrestrial) aeolian, playa (dry lake), and alluvial sediments. In the Chocolate Mountain alluvial fans, the Brawley Formation may be present below Lake Cahuilla beds deposits or may inter-finger at depth with alluvial fan deposits. In the Imperial Valley, the Brawley Formation may be covered by at least 100 feet of Lake Cahuilla beds and alluvium fan deposits. In some areas, rocks of the Brawley Formation may be very close to the surface because of faulting along the San Andreas Fault Zone.

In the Durmid Hills area, Dibblee (1954) originally recognized the Brawley Formation at the surface, but this rock unit has been faulted and folded by the San Andreas Fault (Babcock 1974). Babcock (1974) identified the Bishop Tuff ash horizon which has been dated at 758,000 years in the Brawley Formation in the Durmid Hills.

Quaternary Alluvium (Qal)

Quaternary alluvium (late Pleistocene and Holocene age) has been mapped (Jennings 1967) at the surface of alluvial fans coming off the western side of the Chocolate Mountains. These alluvial and fluvial deposits consist of sand, silt, clay, and gravel. Throughout Southern California (Jefferson 1991a, b) and the Mojave Desert (Jefferson 1989, 1991a, b).

Shavers Well Formation (QP) – Palm Spring Formation of Dibblee 2008

In the Durmid Hills, the Shavers Wells Formation, which is late Pliocene or early Pleistocene in age, crops out northeast of the San Andreas Fault in the Bat Caves Buttes area (Babcock 1974). The formation has been divided into two members: the lower Sea View Member and the upper Skeleton Canyon Member. The Sea View Member has been further divided into lower and upper sub-members. The lower sub-member of the Sea View Member consists 220 feet of conglomerate and coarse-grained sandstone with minor interbeds of grayish-tan fine grained sandstone and siltstone. The upper sub-member consists 330 feet of tan medium to coarse grain sandstone with pebble conglomerate in lenses. The upper Skeleton Canyon Member, which is finer grained than the underlying Sea View Member, consists of tan medium to fine grained sandstone with lenses of conglomerate and consists of gray and olive colored laminated siltstone. Recently, Dibblee (2008) mapped the outcrop area of Shavers Well Formation as Palm Spring Formation.

Borrego Formation of the Palm Spring Group

The Borrego Formation (Dibblee 2008) of the Palm Spring Group, primarily in the Durmid Hills area, is the lateral facies of the Arroyo Diablo Formation (Cassiliano 2002) of the Palm Spring Group. Both units are well exposed in Superstition Hills, San Felipe Hills, and the Borrego Badlands (Dibblee 1984) on the western side of the Salton Trough. The Borrego Formation, which is primarily laminated claystone and siltstone with rare sandstones, was probably deposited in a series of fairly large fresh water to brackish perennial lakes (Kirby et al. 2007). Based on fossils and paleo-magnetic data, this rock unit is 1.1 to 3 (?) million years old (Dorsey 2006; Kirby et al. 2007). This large lake basin was separated from Gulf of California as it moved tectonically along the San Andreas Fault to the northeast past the Colorado River delta to its present location.

Arroyo Diablo Formation of the Palm Spring Group

On the western side of the Salton Trough, the Arroyo Diablo Formation is the lateral facies of the Borrego Formation (Cassiliano 2002) of the Palm Spring Group. Primarily a sandstone rock unit with interbeds of mudstone, the Arroyo Diablo Formation was deposited in the ancestral Colorado River Delta in shifting channels, and interchannel swamps and marshes (Dorsey 2006) some 2 to 4 million years ago. This rock unit has been moved approximately 40 miles by faulting to its present locations.

3.3.3.4 Seismicity

Earthquakes

Active surface fault rupture has not been mapped in the West Chocolate Mountains REEA as part of the Alquist-Priolo Earthquake Fault Zoning Act; however, fault ruptures from 1968, 1979, and 1987 have been mapped within the vicinity of the Salton Sea (Southern California Earthquake Data Center [SCEDC] 2010). These and other historical significant earthquakes are listed in Table 3.3-1 and their fault trace is shown on Figure 3.3-2. The 1987 rupture, known as the Superstition Hills earthquake, measured a Richter Magnitude of 6.6 and caused a displacement of 35 inches.

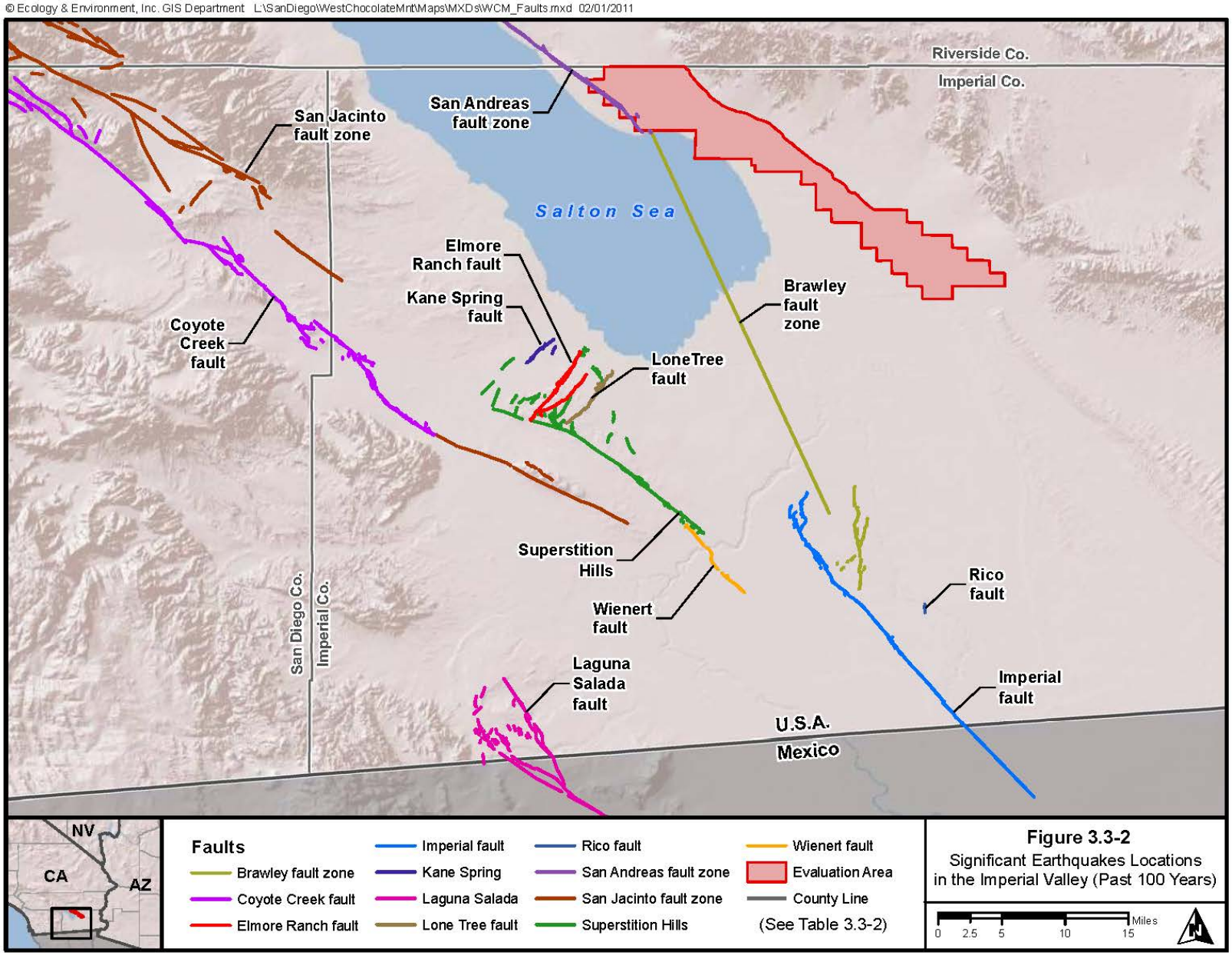

Figure 3.3-2
Significant Earthquakes Locations in the Imperial Valley (Past 100 Years)

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Table 3.3-1 Significant Earthquakes in the Imperial Valley (Past 100 Years)

Date	Earthquake	Approximate Magnitude	Faults Ruptured
June 22, 1915	Imperial Valley	6.1 and 6.3	Imperial
March 25, 1937	San Jacinto (Terwilliger Valley)	6.0	San Jacinto
May 18, 1940	Imperial Valley	6.9	Imperial
April 8, 1968	Borrego Mountain	6.5	Coyote Creek
October 15, 1979	Imperial Valley	6.4	Imperial, Brawley, and Rico
November 23, 1987	Elmore Ranch	6.2	Elmore Ranch, Lone Tree and Kane Spring
November 24, 1987	Superstition Hills	6.6	Superstition Hills, Wienert (Slip triggered on the Imperial, San Andreas and Coyote Creek)
April 4, 2010	Sierra El Mayor	7.2	Laguna Salada

Source: SCEDC 2010.

Faults

The Gulf of California and its onshore extension, the Salton Trough (which includes Mexicali, Imperial, and Coachella Valleys), are located over a series of rifts in the Earth's crust which are filling with sediment from above, chiefly from the Colorado River, and magmatic material from below. The Cerro Prieto geothermal field in Mexico and the Brawley Seismic zone in the U.S. are located above two of these rifts, and young volcanoes in these locations are evidence of intrusion of magma from below. These two regions are linked by a plate-boundary segment known as the Imperial fault. The Cerro Prieto rift is linked by the Cerro Prieto fault to the next rift south in the Gulf of California, and the Brawley Seismic Zone is linked by the San Andreas fault to a junction of three plates at Cape Mendocino, California (USGS Salton Seismic-Imaging Project [SSIP] 2010).

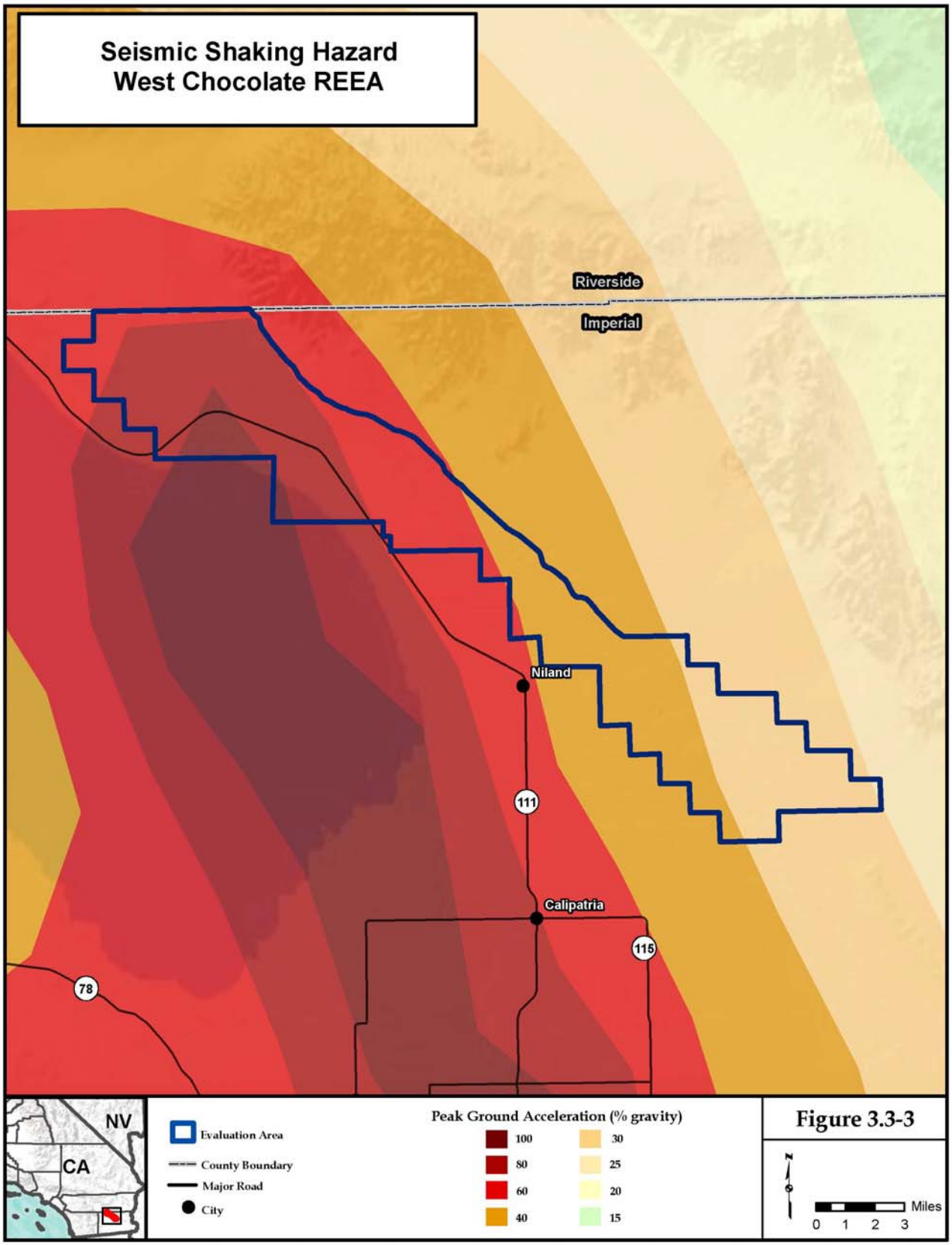
In the area of the Salton Trough (and Salton Sea), a high level of seismicity (earthquake activity) from active northwest-trending faults and oceanic-type spreading centers is characteristic. Seismicity is concentrated between the offsets of three major transform faults—San Andreas, Imperial, and Cerro Prieto. A transform fault is a fault that runs along the boundary of a tectonic plate whose movement is predominantly side-to-side. Various measurements, including historic and geomorphic evidence of recent fault movement, indicate a high rate of tectonic activity in the area. The Salton Trough is bounded on the northeast by the San Andreas Fault and inactive Sand Hills Fault, and to the southwest by the San Jacinto Fault Zone.

The West Chocolate Mountains REEA is part of a larger seismically active region, as evidenced recently by the Richter Magnitude 7.2 Sierra El Mayor earthquake centered approximately 50 miles south-southeast of Brawley on April 4, 2010 (Table 3.3-2). The REEA contains the Hot Springs Fault and the Coachella Segment of the San Andreas Fault just inside of its northeastern boundary and has several faults within close proximity. These faults are all associated with the Brawley seismic spreading zone (Figure 3.3-2), which cuts through the southeast portion of the Salton Sea and is an active geothermal area (SCEDC 2010).

Table 3.3-2 Summary of Surficial and Bedrock Geologic Units of the West Chocolate Mountains REEA

Map Symbol	Age	Formation Description / Comment
Chocolate Mountains Alluvial Fans		
Qs	Quaternary (Late Pleistocene to Holocene) [< 12,000 years ago]	Sand Dunes: very young wind-blown sand.
Ql	Quaternary (Late Pleistocene and Holocene) [< 40,000 years ago]	Lake Cahuilla Beds: lake and river (stream) deposits.
Qal	Quaternary (Middle to Late Pleistocene) [1 million to 10,000 years ago]	Alluvial Fans: alluvium along western flank of the mountains.
Qc	Quaternary (Middle to Late Pleistocene) [1.1 million to 40,000(?) years ago]	Older Alluvium: remnants of older alluvium and alluvial fan deposits.
Imperial Valley		
Qs	Quaternary (Late Pleistocene to Holocene) [< 12,000 years ago]	Sand Dunes: very young wind-blown sand.
Ql	Quaternary (Late Pleistocene and Holocene) [< 40,000 years ago]	Lake Cahuilla Beds: lake and river (stream) deposits.
	Quaternary (Middle to Late Pleistocene) [1.1 million to 40,000(?) years ago]	Brawley Formation: lake and river (stream) deposits; where underlies the Lake Cahuilla Beds.
Durmid Hills		
Ql	Quaternary (Late Pleistocene and Holocene) [< 40,000 years ago]	Lake Cahuilla Beds: lake and river (stream) deposits.
QP	Quaternary (Late Pliocene to Early Pleistocene) [2 million to 3 million years ago]	Shavers Well Formation = Palm Spring Formation: alluvial and stream deposits.
Tl-Ql	Tertiary to Quaternary	Lake Deposits
Ql	Quaternary (Middle to Late Pleistocene) [1.1 million to 40,000(?) years ago]	Brawley Formation: lake and river (stream) deposits; where underlies the Lake Cahuilla Beds.
Tb,Qb	Quaternary (Late Pliocene to Middle Pleistocene) [3(?) million to 1.1 million years ago]	Borrego Formation (Palm Springs Group): lake and river (stream) deposits.
Tad	Quaternary (Late Pliocene to Middle Pleistocene) [3.9 million to 1.1 million years ago]	Arroyo Diablo Formation (Palm Springs Group): lake and river (stream) deposits.

Sources: Dibblee 1954; Jennings 1967; Babcock 1974; Baldwin et al. 1997; Cassiliano 2002; Kirby et al. 2007; Dorsey 2006; Dibblee 2008; and Jefferson 2010.


Seismic Shaking Hazard
West Chocolate REEA
Riverside
Imperial
Niland
111
Calipatria
115
78
NV
CA
Evaluation Area
County Boundary
Major Road
City
Peak Ground Acceleration (% gravity)
100
80
60
40
30
25
20
15
Figure 3.3-3
N
Miles
0 1 2 3

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Seismic Shaking Hazards

Figure 3.3-3 presents peak ground acceleration (PGA) along the evaluation area for a 10 percent probability of exceedance in 50 years in percentage of gravity (i.e., the acceleration of gravity). The map is derived from seismic hazard curves calculated on a grid of sites across the southwestern United States that describe the frequency of exceeding a set of ground motions. The ground motions relate the source characteristics of the earthquake and propagation path of the seismic waves to the ground motion at a site. The predicted ground motion is typically quantified in terms of a median value (a function of magnitude, distance, style of faulting, and other factors) and a probability density function of peak horizontal ground acceleration (USGS 2008).

Peak ground acceleration in the middle of the West Chocolate Mountains REEA is about 0.46 times that of gravity in alluvial fill (CDC 2006). The peak ground acceleration increases to 1.0 times gravity in the northern extent of the REEA. The seismic shaking potential for the REEA is greatest in the vicinity of the northern section of the REEA and the Salton Sea along the Brawley Seismic Zone and the San Andreas Fault. Shaking intensities decrease both east and west of the San Andreas Fault.

Seiche

Seiche is defined as oscillations of enclosed and semi-enclosed bodies of water, such as bays, lakes, or reservoirs, due to strong ground motion from seismic events, wind stress, volcanic eruptions, and local basin reflections of tsunami. Seiches can result in the creation of long-period waves which can cause water to overtop containment features or cause seiche run-up on adjacent land masses, similar to tsunami run-up. The most likely location for a significant seiche to occur is the Salton Sea. While there have been a number of seismic events since the formation of the Salton Sea, no significant seiches have occurred to date. A seiche could occur, however, in the Salton Sea under the appropriate seismic conditions. The Salton Sea is proximal to the San Andreas and San Jacinto faults and would be subject to significant seismic ground shaking that could generate a seiche (County of Imperial 2003).

3.4 Soils

This section discusses applicable plans, policies, and regulations for soils and identifies the soil associations/individual types from soil surveys with locations within the site; characteristics/ formation of those soils (e.g., well-drained, sandy/silty/clayey; form on alluvial fans); and agricultural productivity potential. During the scoping period, meetings were conducted with the public and government agencies to identify their concerns. One comment was received regarding soils and the commenter suggested a complete analysis of impacts to the soil from each possible proposed energy development project. This comment will be addressed in Section 3.4.3, Existing Conditions, and in Chapter 4, Environmental Consequences, Section 4.4.

3.4.1 Definition of the Resource

Soil is the unconsolidated mineral or organic matter on the surface of the Earth that has been subjected to and shows effects of genetic and environmental factors of climate (including water and temperature effects) and macro- and microorganisms, conditioned by relief (elevation

and slope), acting on parent material over a period of time (Soil Science Society of America 2010).

3.4.2 Applicable Plans, Policies, and Regulations

3.4.2.1 Federal

Soil and Water Resources Conservation Act

The Soil and Water Resources Conservation Act of 1977, as amended, provides the United States Department of Agriculture (USDA) broad strategic assessment and planning authority for the conservation, protection, and enhancement of soil, water, and related natural resources. The Resources Conservation Act allows the USDA to appraise the status and trends of soil, water, and related resources on non-federal land and assess their capability to meet present and future demands; evaluate current and needed programs, policies, and authorities; and develop a national soil and water conservation program to give direction to soil and water conservation activities (USDA 2009).

California Desert Conservation Area Plan

The CDCA Plan directs the BLM to responsibly manage resources on 12 million acres of public lands within California's interior deserts. This responsibility includes management of soil resources, which are discussed in the GEM Resources Element of the Plan. The goals of the GEM Resources Element are primarily focused on allowing mineral resource development, including geothermal exploration and solid mineral extraction, to occur in an economically and environmentally sustainable manner. Specific measures regarding soil resources are not mentioned.

Western Colorado Desert Routes of Travel Designations Amendment

As discussed in Section 3.2.2.1**,** the WECO Plan Amendment designated preferred routes of travel across public lands managed by the BLM in the WECO Planning Area. An EA was written for the WECO Plan Amendment; however this document did not introduce goals for protecting or managing soil resources; it only briefly mentions that actions by the U.S. Border Patrol near the West Chocolate Mountains REEA contribute to erosion and compaction of soils.

3.4.2.2 State

California Public Resources Code

Sections 600 through 615 of the California Public Resources Code delegate the responsibilities of monitoring and ensuring the protection of the state's soil resources to the CDC. This includes combining efforts with the Natural Resources Conservation Service (NRCS) to perform soil surveys to assist with agricultural management, soil conservation measures, engineering, land use planning, and state and local policy decisions (State of California 2008).

California Land Conservation Act (Williamson Act)

The Williamson Act enables local governments to enter into contracts with private landowners for the purpose of restricting specific parcels of land to agricultural or related open

space use. In return, landowners receive property tax assessments which are much lower than normal because they are based upon farming and open space uses as opposed to full market value (State of California 2007a).

Farmland Mapping and Monitoring Program

The Farmland Mapping and Monitoring Program (FMMP) was established in 1982 in response to a critical need for assessing the location, quality, and quantity of agricultural lands and conversion of these lands over time. The FMMP is a nonregulatory program and provides a consistent and impartial analysis of agricultural land use and land use changes throughout California (State of California 2007b).

3.4.2.3 Local

Imperial County General Plan, Conservation and Open Space Element

The Conservation and Open Space Element provides goals and objectives for the preservation and management of natural resources, including soils and minerals. Goal 1, Objective 1.1, calls for the recognition "that the degradation of one natural resource will have a concomitant negative effect upon the total resource base, including water, vegetation, air, wildlife, soil, and minerals"; and Goal 4, Objective 4.2, emphasizes control and prevention of soil erosion (County of Imperial 1996).

3.4.3 Existing Conditions

3.4.3.1 Soil Associations

Soil associations provide general information about soil including composition and characteristics. Information in this section is largely based on existing data from NRCS. It is summarized in Table 3.4-1 and shown on Figure 3.4-1.

The West Chocolate Mountains REEA contains the Myoma-Carsitas-Carrizo (s991) soil association in the southern half and along the eastern boundary and Vint-Imperial-Glenbar-Gilman (s993) soil association in the northern half and along most of the western boundary (Figure 3.4-1) (STATSGO 1994).

The Myoma-Carsitas-Carrizo association consists of Myoma soils which are somewhat excessively drained, very fine sands that form on nearly level topography in sand blown from recent alluvium; Carsitas soils, which are excessively drained, gravelly sands that form on level, strongly sloped and dissected remnants of alluvial fans and moderately steep valley fills; and Carrizo soils which are very deep, excessively drained, extremely gravelly sands that form on floodplains, alluvial fans, fan piedmonts and bolson floors.

The Vint-Imperial-Glenbar-Gilman association consists of Vint soils which are very deep, somewhat excessively drained, loamy fine sands that form on floodplains with 0 to 3 percent slopes; Imperial soils which are well to moderately well drained, silty clays that form on floodplains and old lake beds; Glenbar soils which are very deep, well drained clay loams that form on floodplains and alluvial fans with slopes of 0 to 3 percent; and Gilman soils which are

very deep, well drained loams that form on floodplains and alluvial fans with 0 to 3 percent slopes.

3.4.3.2 Soil Complexes and Units

The soil associations mentioned above include multiple underlying soil complexes and units which are delineated by the NRCS during field-level soil surveys and provide much more site-specific data. These complexes and units demonstrate various properties, such as the potential to corrode concrete or uncoated steel or potential to shrink and swell, that may influence site selection for the projected renewable energy projects within the West Chocolate Mountains REEA (Table 3.4-1). In Table 3.4-1, shrink/swell potential is based on linear extensibility. Linear extensibility is calculated by measuring the change in length of a moistened, unconfined clod of soil as it is dried (NRCS 2008).

Table 3.4-1 Soil Units and Unit Characteristics Found within the West Chocolate Mountains REEA[1]

Complex/Unit ID Number	Complex or Unit Name/Association	Parent Material/ Composition/Slope	Shrink/Swell Potential [2]	Corrosion Potential	
				Concrete	Uncoated Steel
102	Badland/MCC	Alluvium from mixed sources/85% badland; 2% Imperial; 2% Holtville; 2% Meloland; 2% Indio/30 – 75%	N/A	Low	High
103	Carsitas Gravelly Sand/MCC and VIGG	Alluvium from granite/85% Carsitas; 5% Rositas; 5% Niland; 3% Superstition; 2% Antho/0 – 5%	Low	Low	High
104	Fluvaquents, Saline/VIGG	Alluvium from mixed sources/85% Fluvaquents, Saline; 5% Rositas/0 – 1%	N/A	High	High
108	Holtville Loam/MCC	Alluvium and/or lacustrine deposits from mixed sources/85% Holtville; 3% Antho, silty clay surface; 3% Antho; 3% Imperial; 3% Laveen; 3% Superstition/0 – 2%	Low - High	Moderate	High
112	Imperial Silty Clay/MCC	Clayey alluvium and/or clayey lacustrine deposits from mixed sources/85% Imperial; 5% Niland; 5% Meloland; 5% Holtville/0 – 2%	High	Moderate	High
113	Imperial Silty Clay, Saline/VIGG	Clayey alluvium and/or clayey lacustrine deposits from mixed sources/85% Imperial, Saline; 5% Niland, wet; 5% Meloland, wet; 5% Imperial, wet/0 – 2%	High	Moderate	High

Table 3.4-1 Soil Units and Unit Characteristics Found within the West Chocolate Mountains REEA[1]

Complex/Unit ID Number	Complex or Unit Name/Association	Parent Material/ Composition/Slope	Shrink/Swell Potential [2]	Corrosion Potential	
				Concrete	Uncoated Steel
114	Imperial Silty Clay, Wet/MCC and VIGG	Clayey alluvium and/or clayey lacustrine deposits from mixed sources/85% Imperial, wet; 4% Glenbar, wet; 4% Meloland, wet; 4% Holtville; 3% Niland/0 – 2%	High	Moderate	High
115	Imperial-Glenbar Silty Clay Loams, Wet/MCC and VIGG	Clayey alluvium and/or clayey lacustrine deposits from mixed sources/40% Glenbar, wet; 40% Imperial, wet; 10% Holtville; 10% Meloland/0 – 2%	Moderate - High	Moderate	High
122	Meloland Very Fine Sandy Loam, Wet/MCC and VIGG	Alluvium and/or eolian deposits from mixed sources/85% Meloland, wet; 3% Imperial; 3% Indio; 3% Holtville; 3% Glenbar; 3% Vint/0 – 2%	Low - High	Moderate	High
124	Niland Gravelly Sand/MCC and VIGG	Alluvium from mixed sources/85% Niland; 3% Imperial; 3% Meloland;2% Carsitas; 2% Indio; 2% Vint; 2% Rositas; 1% Aquents/0 – 2%	Low - High	Moderate	High
125	Niland Gravelly Sand, Wet/MCC and VIGG	Alluvium from mixed sources/85% Niland, wet; 6% Imperial; 3% Unnamed;3% Carsitas; 3% Meloland/0 – 2%	Low - High	Moderate	High
127	Niland Loamy Fine Sand/MCC	Alluvium from mixed sources/85% Niland; 4% Holtville; 4% Imperial;4% Rositas; 4% Superstition/0 – 2%	Low - High	Moderate	High
128	Niland-Imperial Complex, Wet/MCC and VIGG	Alluvium from mixed sources (Niland); lacustrine deposits (Imperial)/40% Niland, wet; 25% Imperial, wet; 10% Carsitas; 10% Rositas; 5% Meloland, wet; 5% Imperial, saline; 5% Imperial, sandy surface/0 – 2%	Low - High	Moderate	High
129	Pits/MCC	No information/90% Pits; 10% Unnamed/no information	N/A	N/A	N/A

Table 3.4-1 Soil Units and Unit Characteristics Found within the West Chocolate Mountains REEA[1]

Complex/Unit ID Number	Complex or Unit Name/Association	Parent Material/ Composition/Slope	Shrink/Swell Potential [2]	Corrosion Potential	
				Concrete	Uncoated Steel
130	Rositas Sand, 0 to 2 Percent Slopes/MCC	Alluvium from mixed sources/85% Rositas; 4% Carsitas; 4% Vint; 4% Rositas; 3% Niland/0 – 2%	Low	Low	High
131	Rositas Sand, 2 to 5 Percent Slopes/MCC	Alluvium from mixed sources/90% Rositas; 5% Carsitas; 5% Niland/2 – 5%	Low	Low	High
132	Rositas Fine Sand, 0 to 2 Percent Slopes/MCC	Alluvium and/or eolian deposits from mixed sources/85% Rositas; 4% Niland; 4% Rositas; 4% Vint; 1% Antho; 1% Holtville; 1% Superstition/0 – 2%	Low	Low	High
133	Rositas Fine Sand, 2 to 9 Percent Slopes/MCC	Eolian deposits from mixed sources/85% Rositas; 3% Antho; 3% Holtville; 3% Indio; 3% Superstition; 3% Vint/2 – 9%	Low	Low	High
135	Rositas Fine Sand, Wet, 0 to 2 Percent Slopes/MCC and VIGG	Alluvium and/or eolian deposits from mixed sources/85% Rositas, wet; 4% Vint; 4% Superstition; 4% Carsitas; 3% Antho/0 – 2%	Low	Low	High
137	Rositas Silt Loam, 0 to 2 Percent Slopes/MCC	Alluvium and/or eolian deposits from mixed sources/90% Rositas; 5% Vint; 3% Meloland; 2% Rositas/0 – 2%	Low	Low	High
138	Rositas-Superstition Loamy Fine Sands/MCC	Alluvium and/or eolian deposits from mixed sources/45% Rositas; 35% Superstition; 9% Antho; 9% Laveen; 1% Superstition; 1% Rositas/0 – 1%	Low	Low	High
139	Superstition Loamy Fine Sand/MCC	Alluvium from mixed sources/85% Superstition; 4% Rositas; 4% Antho; 3% Holtville; 3% Laveen; 1% Superstition/2 – 5%	Low	Low	High
141	Torriorthents and Orthids, 5 to 30 Percent Slopes/MCC	No information/55% Torriorthents; 35% Orthids; 5% Superstition; 4% Laveen; 1% Rositas/5 – 30%	N/A	N/A	N/A

Table 3.4-1 Soil Units and Unit Characteristics Found within the West Chocolate Mountains REEA[1]

Complex/Unit ID Number	Complex or Unit Name/Association	Parent Material/ Composition/Slope	Shrink/Swell Potential [2]	Corrosion Potential	
				Concrete	Uncoated Steel
142	Vint Loamy Very Fine Sand, Wet/MCC	Alluvium and/or eolian deposits from mixed sources/90% Vint, wet; 5% Indio; 5% Meloland/0 – 2%	Low	Moderate	High
144	Vint and Indio Very Fine Sandy Loams, Wet/MCC and VIGG	Alluvium and/or eolian deposits from mixed sources/50% Vint, wet; 40% Indio, wet; 5% Rositas; 5% Meloland/0 – 2%	Low - High	Moderate	High

Source: NRCS 2008

Notes:
1 Much of the West Chocolate Mountains REEA has yet to be surveyed by the NRCS and, therefore, the soil information is not currently available. All soil complex and unit data is based on the "Imperial County, California, Imperial Valley Area" soil survey performed in 1981 which covers approximately 38% of the REEA (NRCS 2008).
2 Based on linear extensibility. Low = <3%; Moderate = 3 – 6%; High = 6 – 9%. Varies by depth and soil unit or complex.

Key:
MCC = Myoma-Carsitas-Carrizo
VIGG = Vint-Imperial-Glenbar-Gilman

3.4.3.3 Erosion

Soils units and complexes within the West Chocolate Mountains REEA have been assessed by the NRCS for susceptibility to erosion by water and wind during past field surveys. To gauge susceptibility to sheet and rill erosion by water, the NRCS utilizes the "K Factor" which is based primarily on the percentage of silt, sand, and organic matter in the soil, as well as soil structure and saturated hydraulic conductivity (ability of water to permeate a soil when the soil is saturated). It allows for the estimation of soil loss in tons per acre per year. K Factors are given in a range from 0.02 to 0.69 for all soils, with a lower number indicating lower susceptibility to erosion and a higher number indicating higher susceptibility to erosion. Soils in the West Chocolate Mountains REEA range from 0.02 for sandy soils, such as Carsitas Gravelly Sand, to 0.49 for fine, silty loams, such as Rositas Silt Loam (NRCS 2008).

Susceptibility to wind erosion is assessed by the assignment of Wind Erodibility Groups (WEGs) to different soil types. Soils are classified into WEGs, ranging from 1 (most susceptible) to 8 (least susceptible). In general, gravelly, fine sands throughout the West Chocolate Mountains REEA carry the lowest WEG numbers, while loams carry the highest numbers, which is essentially a reversal of erosion susceptibility by water. For example, Carsitas Gravelly Sand is among the most susceptible (WEG 1), while Rositas Silt Loam is among the least susceptible (WEG 5) (NRCS 2008).

Flash flood events are relatively common in the desert southwest. During past flash flood storm events, portions of the East Highline Canal and Highline Extension have been filled with sand and mud carried by runoff from the Chocolate Mountain washes, causing flooding of adjacent farmland properties and portions of the town of Niland, as well as Imperial Irrigation

District (IID) and Imperial County facilities (County of Imperial 2007). More information on surface water hydrology is included in Section 3.5.3.1, Surface Water Resources.

3.4.3.4 Farmland

Imperial County is one of the most productive agricultural regions in the United States. In 2008, the county yielded nearly $1.7 billion worth of agricultural products consisting primarily of cattle, alfalfa, wheat, and lettuce (California Farm Bureau Federation 2009). The FMMP monitors the status of farmland within Imperial County and the West Chocolate Mountains REEA and releases a biennial report of its findings. The 2008 report is not currently available for Imperial County; therefore, statistics from the 2006 report are used in this section. Table 3.4-2 provides an overview of the different categories of farmland and their approximate acreages found within the REEA. Figure 3.4-2 provides graphic representation of where each category of farmland occurs.

Table 3.4-2 Farmland Categories and Acreages within the West Chocolate Mountains REEA

Category	Definition	Acreage (Nearest Full Acre)
Prime Farmland	Irrigated land with the best combination of physical and chemical features able to sustain long-term production of agricultural crops. This land has the soil quality, growing season, and moisture supply needed to produce sustained high yields. Land must have been used for production of irrigated crops at some time during the four years prior to the mapping date.	288
Farmland of Statewide Importance	Irrigated land similar to Prime Farmland that has a good combination of physical and chemical characteristics for the production of agricultural crops. This land has minor shortcomings, such as greater slopes or less ability to store soil moisture than Prime Farmland. Land must have been used for production of irrigated crops at some time during the four years prior to the mapping date.	3,739
Unique Farmland	Lesser quality soils used for the production of the state's leading agricultural crops. This land is usually irrigated, but may include non-irrigated orchards or vineyards as found in some climatic zones in California. Land must have been cropped at some time during the four years prior to the mapping date.	76
Farmland of Local Importance	Unirrigated and uncultivated lands with Prime and Statewide soils.	3,596
	Total:	**7,699**

Source: FMMP 2009

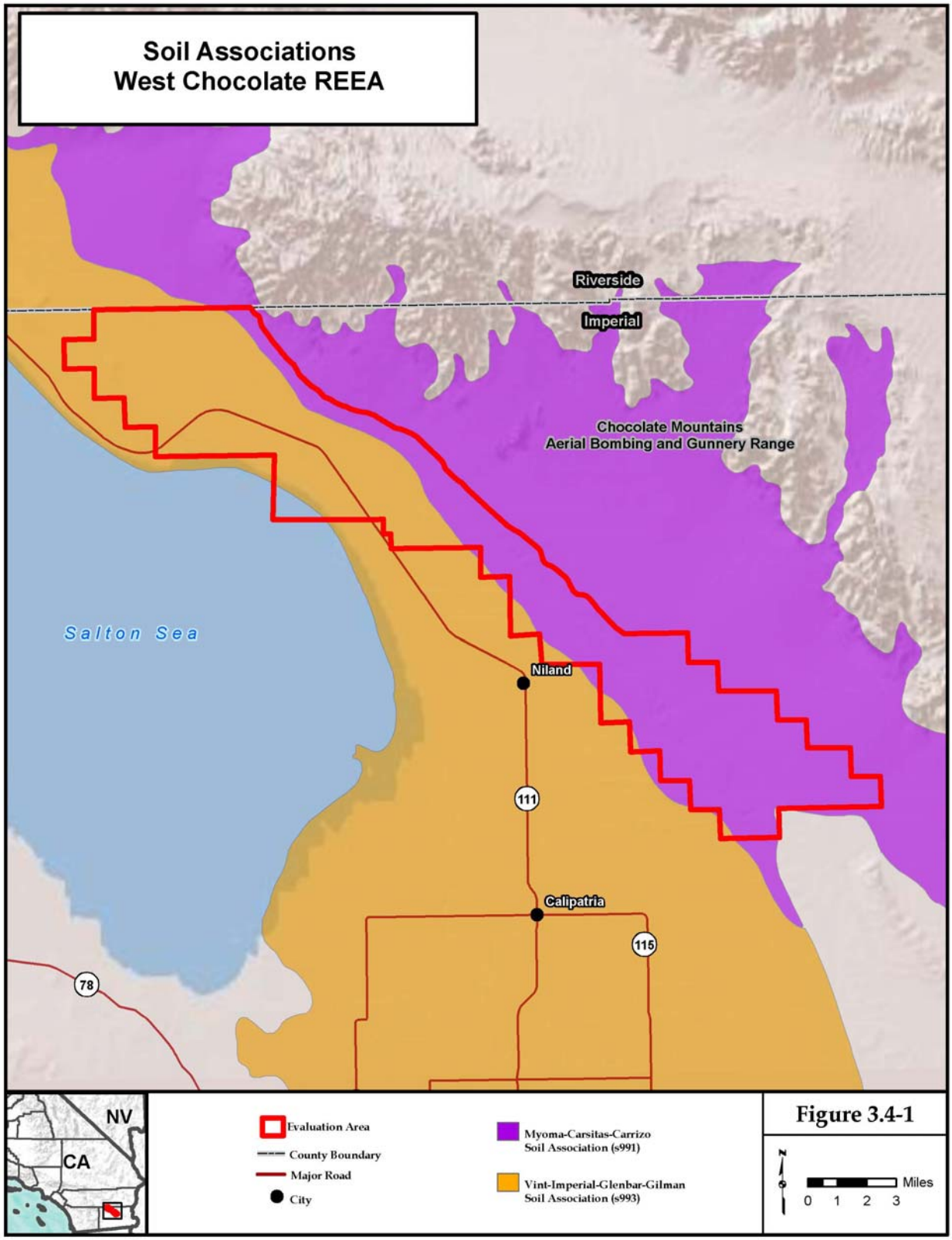
Soil Associations
West Chocolate REEA
Riverside
Imperial
Chocolate Mountains
Aerial Bombing and Gunnery Range
Salton Sea
Niland
111
Calipatria
115
78
NV
CA
Evaluation Area
County Boundary
Major Road
City
Myoma-Carsitas-Carrizo
Soil Association (s991)
Vint-Imperial-Glenbar-Gilman
Soil Association (s993)
N
Miles
0 1 2 3

Figure 3.4-1

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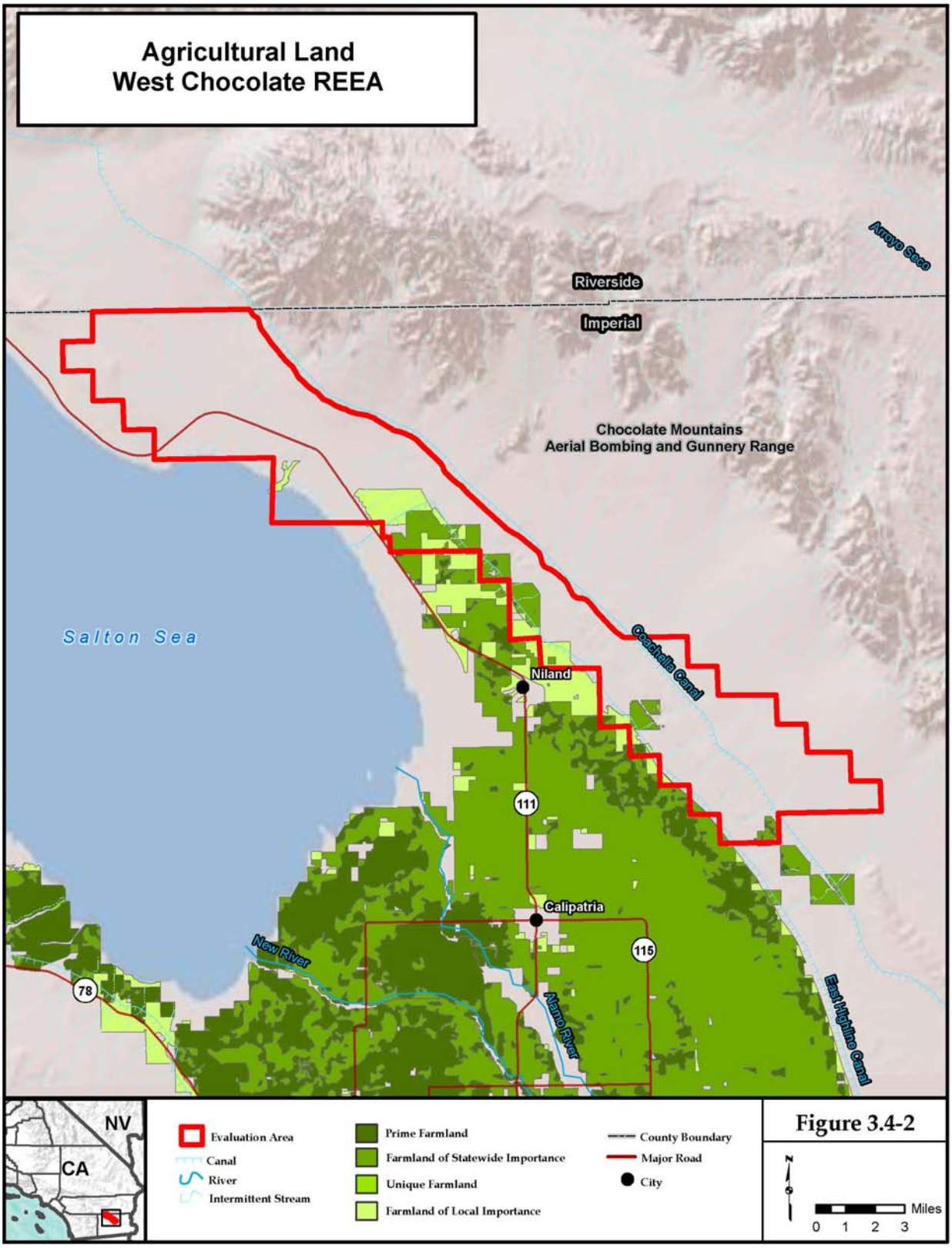
Agricultural Land
West Chocolate REEA
Riverside
Imperial
Arroyo Seco
Chocolate Mountains
Aerial Bombing and Gunnery Range
Salton Sea
Coachella Canal
Niland
111
Calipatria
115
New River
Alamo River
78
East Highline Canal
NV
CA
Evaluation Area
Canal
River
Intermittent Stream
Prime Farmland
Farmland of Statewide Importance
Unique Farmland
Farmland of Local Importance
County Boundary
Major Road
City
Miles
0 1 2 3

Figure 3.4-2

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3.5 Water Resources

This section discusses applicable plans, policies, and regulations for water resources and identifies the existing surface and subsurface water resources. During the scoping period, meetings were conducted with the public and government agencies to identify their concerns. Written comments were also received. Comments regarding water resources included a request that the EIS (1) provide information on Clean Water Act (CWA) Section 303(d) impaired waters in the West Chocolate Mountains REEA, if any, and efforts to develop and revise Total Maximum Daily Loads; (2) quantify the surface water and groundwater required to construct, operate, and maintain the proposed plan; (3) analyze potential impacts to the aquatic resources, associated terrestrial resources, and wildlife species and plants (e.g., avoidance of microphyll woodland areas in Mammoth Wash); and (4) identify measures that would be taken during construction, operations, and maintenance to avoid, minimize, and mitigate impacts to listed and at-risk species that are dependent on surface water and groundwater resources. Commenters also expressed concerns about the proposed plan's impact on available water supplies in the area, the quantity of water that would be required for various project uses, and the quantity of water used by the proposed plan compared with water needed for different solar technologies (i.e., whether water usage could be minimized by using alternative technologies). These comments are addressed in Section 3.5.3, Existing Conditions, and in Chapter 4, Environmental Consequences, Section 4.5.

3.5.1 Definition of the Resource

This section identifies surface water and groundwater resources that would be used during construction, operation and maintenance, and decommissioning within and adjacent to the West Chocolate Mountains REEA. Water use in the REEA may affect drainage, aquifers, water rights, and water quality.

3.5.2 Applicable Plans, Policies, and Regulations

3.5.2.1 Federal

Clean Water Act

In 1972, Congress passed the Federal Water Pollution Control Act, which was reauthorized in 1977, 1981, 1987, and 2000 as the CWA. The goal of the law is to eliminate pollution in the nation's waters by imposing uniform standards on all municipal and industrial wastewater sources based on the best available technology.

Sections 301 and 402 Permitting

Sections 301 and 402 of the CWA prohibit the discharge of pollutants from point sources to "Waters of the U.S.," unless authorized under a National Pollutant Discharge Elimination System (NPDES) permit. NPDES permits can be issued by the EPA or by agencies in delegated states. The NPDES permit program has been delegated in California to the State Water Resources Control Board (SWRCB).

Clean Water Act

The Clean Water Act (CWA) regulates discharges of pollutants into the waters of the United States. Also included are requirements to set water quality standards for all contaminants in surface waters. The CWA makes it unlawful for any person to discharge any pollutant from a point source into navigable waters unless a permit is obtained under its provision. In 1972, Section 404 of the CWA established a program to regulate the discharge of dredged or fill material into waters of the United States. The Rivers and Harbors Act of 1899 defined navigable waters of the United States as "those waters that are subject to the ebb and flow of the tides and/or are presently used, or have been used in the past, or maybe susceptible to use to transport interstate or foreign commerce." The CWA built on this definition and defined waters of the United States to include tributaries to navigable waters, interstate wetlands, wetlands which could affect interstate or foreign commerce, and wetlands adjacent to other waters of the United States.

Section 401(a)(1) of the CWA specifies that any applicant for a federal license or permit to conduct any activity, including but not limited to the construction or operation of facilities that may result in any discharge into navigable waters, shall provide the federal licensing or permitting agency a certification from the state in which the discharge originates or will originate, or, if appropriate, from the interstate water pollution control agency having jurisdiction over the navigable water at the point where the discharge originates or will originate, that any such discharge will comply with the applicable provisions of the CWA. Succinctly, this means that in California, the Regional Board must certify that the project will comply with water quality standards (defined below). In some instances, the need for certification may be waived if the action is shown to have minimal water quality effects.

Safe Drinking Water Act

This Act was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply. The law was amended in 1986 and 1996 and requires many actions to protect drinking water and its sources: rivers, lakes, reservoirs, springs, and groundwater wells. This act authorizes the EPA to set national health-based standards for drinking water to protect against both naturally occurring and man-made contaminants that may be found in drinking water. The act also mandates a Groundwater/Wellhead Protection Program be developed by each state in order to protect groundwater resources that serve as a source for public drinking water.

Consolidated Decree (Arizona v. California 547 U.S. 150 [2006])

The Consolidated Decree in Arizona v. California et al. (547 U.S. 150, 2006) includes the determination of allocations of Colorado River water (consistent with those established in the Colorado River Compact), the approval of the construction of the Boulder Canyon (per the Boulder Canyon Project Act of 1929), the framework for the operation of federally owned dams on the Colorado River and tributaries, and the definition of the system of water rights that characterizes allocation. The Decree states that the consumptive use of water means "diversion from the stream less such return flow thereto as is available for consumptive use in the United States or in satisfaction of the Mexican treaty obligation" and consumptive use "includes all consumptive uses of water of the mainstream, including water drawn from the mainstream by underground pumping."

The Colorado River Compact, signed in 1922, is an agreement that apportions Colorado River water among seven states, including the Upper Division states of Colorado, New Mexico, Utah, and Wyoming, and the Lower Division states of Arizona, California, and Nevada. Each division is allocated 7,500,000 AF/year. The states within each division negotiated their allotments. Currently, California is allotted 4.4 million AF/year. Of this allotment, IID, the nearest water supplier to the West Chocolate Mountains REEA, has agreed to cap its Colorado River water use at 3.1 million AF/year based on the 2003 Quantification Settlement Agreement (QSA).

In 2007, the Department of the Interior (DOI) implemented an interim set of guidelines, in effect until 2026, for managing water allotments to the lower Division states during shortages in response to low River flows related to a multiyear drought (DOI 2007). The guidelines include three levels of shortages contingent on the elevation of Lake Mead, each of which carry a specific allotment reduction to the Lower Division states; however, California retains its 4.4 million AF/year allotment in all three scenarios.

National Flood Insurance Program

The National Flood Insurance Program (NFIP) is administered by the Federal Emergency Management Agency (FEMA), a component of the U.S. Department of Homeland Security. The NFIP is a federal program enabling property owners in participating communities to purchase insurance protection against losses from flooding. Participation in the NFIP is based on an agreement between local communities and the federal government, which states that if a community adopts and enforces a floodplain management ordinance to reduce future flood risks to new construction in Special Flood Hazard Areas, the federal government makes flood insurance available within the community as a financial protection against flood losses.

In support of the NFIP, FEMA identifies flood hazard areas throughout the United States and its territories by producing Flood Hazard Boundary Maps, Flood Insurance Rate Maps, and Flood Boundary and Floodway Maps. Several areas of flood hazards are commonly identified on these maps. One of these areas is the Special Flood Hazard Area, or high-risk area, defined as any land that would be inundated by a flood having a 1 percent chance of occurring in any given year (also referred to as a base flood or 100-year flood).

The CDCA Plan calls for management to minimize degradation of water resources. Best management practices (BMPs), developed by BLM during the planning process and outlined in the CWA, Section 208, will be used to keep impacts on water quality minimal and to comply with EO 12088 (BLM 1980).

Public Water Reserves

In the early 1900s, a number of Public Water Reserves (PWRs) were created by Presidential Executive Orders. PWR No. 107 orders that every legal subdivision of the public land surveys that is vacant, unappropriated, unreserved public land and contains a spring or waterhole, and all land within 0.25 mile of every spring or waterhole located on unsurveyed public land be withdrawn from settlement, location, sale, or entry, and reserved for public use.

3.5.2.2 State

State water quality standards allow water bodies to be managed by establishing goals based on: (1) designated uses of the water; (2) criteria set to protect human and aquatic organism health; and (3) anti-degradation requirements to prevent current water quality from deterioration. Waters listed as 'impaired' do not fully support their designated uses. Section 305(b) of the CWA requires states to submit biennial water quality reports to the EPA that provide a statewide assessment of all waters. Section 303(d) requires states to provide a list of impaired waters only, identifying possible pollutants and prioritizing those waters for further pollution controls.

California Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act was passed in 1969 and regulates surface water and groundwater within the state and also assigns responsibility for implementing CWA §§401 through 402 and 303(d) in California. It established the SWRCB and divided the state into nine regions, each overseen by a Regional Water Quality Control Board (RWQCB). The SWRCB is the primary state agency responsible for protecting the quality of the state's surface and groundwater supplies, but much of its daily implementation authority is delegated to the nine RWQCBs. The West Chocolate Mountains REEA is located within the jurisdiction of the Colorado River Basin RWQCB, Region 7, who is responsible for implementing water quality programs and permits. The regional boards govern the protection of surface waters through the assessment of the attainment of designated beneficial uses, and 23 uses are currently established for surface waters within the state.

Construction General Stormwater Permit

CWA §402 regulates construction-related stormwater discharges to surface waters through the NPDES program. In California, the EPA has delegated authority to the SWRCB for administering the NPDES program through the RWQCBs and has developed a general permit for Storm Water Discharges Associated with Construction Activities, the Construction General Permit (Water Quality Order 99-08-Department of Water Quality [DWQ]).

Projects that disturb one or more acre of soil, or whose projects disturb less than one acre but are part of a larger common plan of development that in total disturbs one or more acres, are required to obtain a General Permit for Discharges of Storm Water Associated with Construction Activity from the Colorado River Basin RWQCB. Construction activities subject to this permit include clearing, grading, and disturbances to the ground, such as stockpiling or excavation, but do not include regular maintenance activities performed to restore the original line, grade, or capacity of the facility. The Construction General Permit requires the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP should contain a site map that shows the construction site perimeter, existing and proposed buildings, lots, roadways, storm water collection and discharge points, general topography both before and after construction, and drainage patterns across the proposed plan. The SWPPP must list BMPs the discharger will use to protect storm water runoff and the placement of those BMPs. Additionally, the SWPPP must contain a visual monitoring program; a chemical monitoring program for "non-visible" pollutants to be implemented if there is a failure of BMPs; and a sediment monitoring plan if the site discharges directly to a water body listed on the 303(d) list for sediment. Section A of the Construction General Permit describes the elements that must be

contained in a SWPPP. However, if hazardous materials are maintained on site constant monitoring is required regardless of the status of BMPs.

Groundwater Protection Areas and Wellhead Protection

The California Department of Public Health established the Drinking Water Source Assessment and Protection Program, which provides guidance to local level agencies for source protection of surface water and groundwater drinking water supplies. The California Department of Pesticide Regulation's Groundwater Protection Program is charged with identifying areas sensitive to pesticide contamination and develops mitigation measures and regulations to prevent pesticide movement into groundwater systems.

California Laws for Conservation of Geothermal Resources

The CDC, Division of Oil, Gas, and Geothermal Resources, is primarily responsible for permitting and regulation of geothermal energy development under the Public Resources Code (Title 14, Division 2, Chapter 4) and the Safe Drinking Water Act (SDWA). The West Chocolate Mountains REEA is within the jurisdiction of the District 1 office. Additionally, the drilling and injection proposal will be submitted to the RWQCB and to the public for review and comment.

3.5.2.3 Local

Basin management for the Imperial Valley is administered by the IID. With more than 3,000 miles of canals and drains, the IID is the largest irrigation district in the nation (IID 2010). IID's water service area extends from the southern half of the Salton Sea to the U.S.-Mexico border (Figure 3.5-1). The IID Water Department is responsible for the timely operation and maintenance of the extensive open channel system, and effectively delivers up to 3.1 million AF of IID's Colorado River entitlement annually to nearly one-half million irrigated acres. Of the water IID transports, approximately 97 percent is used for agricultural purposes (IID 2010).

Imperial Irrigation District Strategic Plan

The IID Strategic Plan was adopted by the IID Board of Directors in 2008 and included an objective to develop an integrated water resources plan by the end of 2009, adopt recommendations outlined in the plan in the first quarter of 2010, and implement the actions by mid-year 2010. IID is currently in the process of developing an Integrated Regional Water Management Plan (IRWMP); however, it has been delayed and is now scheduled for implementation before September 2012. The effort is being managed by the Imperial Regional Water Management Group (RWMG), consisting of elected representatives of the IID, Imperial County, and local cities. The purpose of the IRWMP is to determine an appropriate portfolio of demand and supply management options that will provide a long-term, reliable water supply at the lowest cost and with the greatest potential benefits to customers, economic development, environmental quality, and other local objectives (IID 2010). When completed, the IRWMP will include recommendations for the implementation of various programs and projects, including storage of Colorado River water within the groundwater basin, development of local groundwater supplies, desalination of irrigation drainwater, wastewater reuse, and demand management programs.

Water Allocation Rights/Policy

The IID has promulgated the Interim Water Supply Policy (IWSP) for Non-Agricultural Projects (IID 2009). Under this IWSP, IID has allocated 25,000 AF/year for non-agricultural projects within its service area. All 25,000 AF of water set aside for non-agricultural use are available for renewable energy use; however, the current balance of the IWSP is 23,591 AF. The IWSP is available on a first-come basis and only two contracts have been issued, to date, for four geothermal plants. This allocation is pending the completion of the integrated water resource management plan, when its policies will supersede those of the interim policy.

During years of normal Colorado River flows, the All-American Canal delivers 3.1 million AF to IID (IID 2009). Based on the 2003 QSA, IID is required to transfer approximately 0.3 million AF/year to other parties, including: the San Diego County Water Authority (SDCWA) (10,000 to 200,000 AF/year); the Metropolitan Water District (MWD) (110,000 AF/year); the Coachella Valley Water District (CVWD) (103,000 AF/year); and to the San Luis Rey Settlement Parties (16,000 AF/year). A large proportion of the transfers is planned to be supplied from water generated by increased efficiency and conservation. The remaining water, approximately 2.8 million AF, is used for consumptive uses by the IID (IID 2009). Though the State of California retains its allotment of 4.4 million AF/year under the DOI's interim shortage guidelines previously discussed, the IID's allocation of 3.1 million AF/year may be reduced to 2.6 million AF/year (IID 2008).

Coachella Valley Water Management Plan

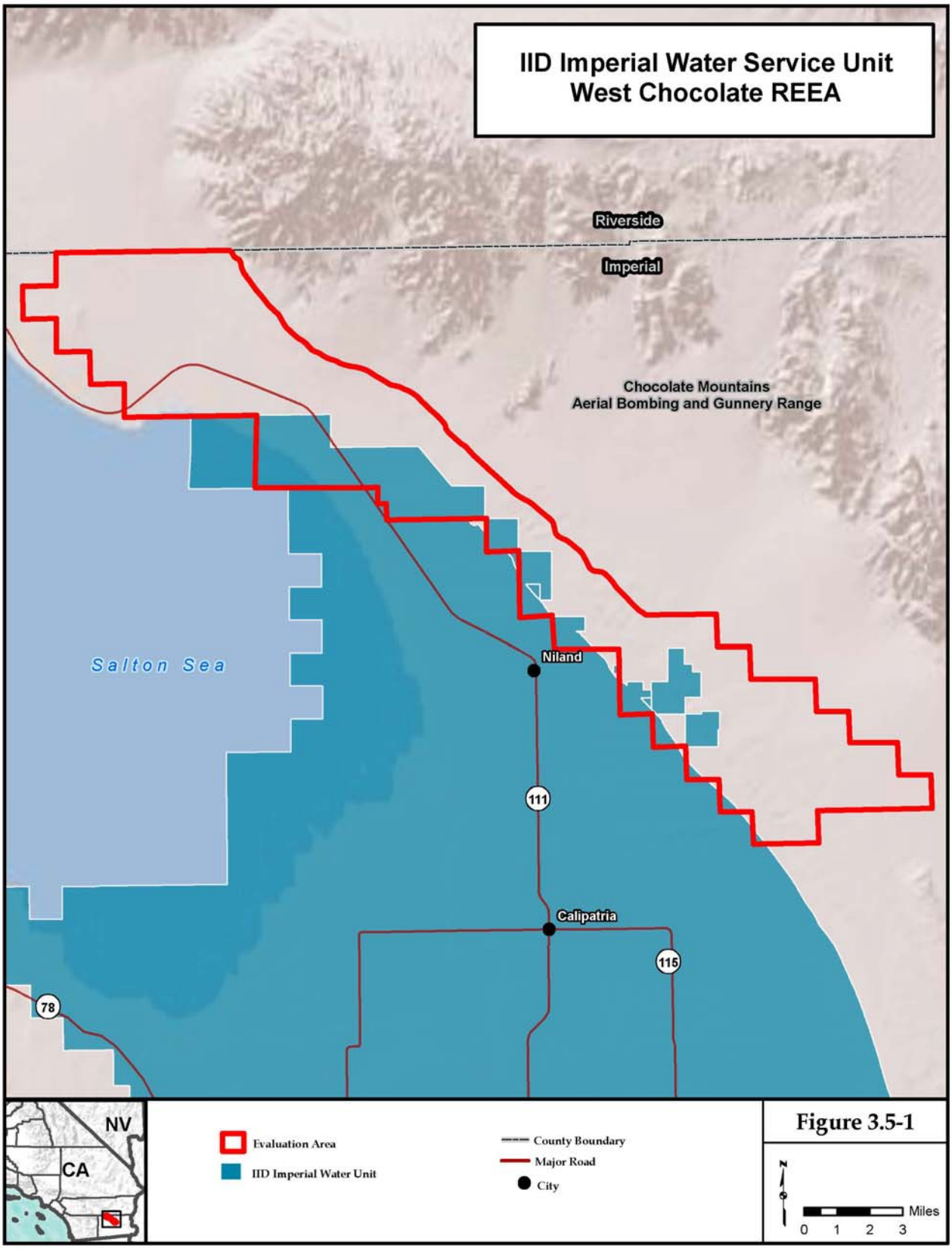
The CVWD prepared the Coachella Valley Water Management Plan to provide an overall program for managing its surface and groundwater resources in the future (BLM 2002). Implementation of the Water Management Plan involves construction of various facilities for treatment of water and development of additional policies to implement increased conservation. There are existing stormwater facilities (training dikes) on this land that are owned in fee by the BOR and operated and maintained by the CVWD. These facilities convey flood flows from the Chocolate Mountains to the Coachella Canal siphons, which allow flows to be conveyed over the siphons to the westerly side of the canal where it is redistributed as sheet flow.

Imperial Irrigation District Water Conservation Plan

The IID Water Conservation and Transfer Project and Habitat Conservation Plan consists of the conservation by IID of up to 300,000 AF of Colorado River water per year, and the subsequent transfer of all or a portion of the conserved water to the SDCWA, CVWD, and/or the MWD of Southern California. The water conservation program includes the voluntary participation of Imperial Valley landowners and tenants to implement on-farm conservation methods that could include alternative water management techniques, water delivery system alternatives, conveyance facility lining, or other measures (BLM 2002).

Floodplain Management

Imperial County requires that a grading/drainage study be conducted to permit building projects. These studies are reviewed by the RWQCB, the IID, and Imperial County Public Works Department. The IID regulates and controls the use of irrigation water throughout Imperial County.


IID Imperial Water Service Unit
West Chocolate REEA
Riverside
Imperial
Chocolate Mountains
Aerial Bombing and Gunnery Range
Salton Sea
Niland
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NV
CA
Evaluation Area
IID Imperial Water Unit
County Boundary
Major Road
City
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Figure 3.5-1

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3.5.3 Existing Conditions

3.5.3.1 Surface Water Resources

The West Chocolate Mountains REEA is located within the Salton Sea Transboundary Watershed (USGS Hydrologic Unit Code [HUC]). Surface water quality is a significant issue within and around the West Chocolate Mountains REEA. The watershed has been identified as a Category I impaired watershed under the 1997 California United Watershed Assessment. Category I watersheds are defined as: Watersheds that are candidates for increased restoration activities due to impaired water quality or other impaired natural resource goals (California Environmental Protection Agency [CalEPA] 2000). Poor surface water quality in the area is generally attributable to agricultural drainage with high concentrations of nutrients and salts, as well as the discharge of two highly polluted rivers, the Alamo and New, into the Salton Sea. The water quality of the Colorado River is degraded due to high salinity from its headwaters to its mouth, carrying an average salt load of approximately nine million tons annually past Hoover Dam, the uppermost location at which numeric criteria have been established (Colorado River Basin Salinity Control Forum 1999).

Local uses of surface waters include agriculture supply for the extensive irrigation of crops in the Imperial Valley, groundwater recharge, recreation, and habitat for fish and wildlife. There are a number of wildlife guzzlers on BLM that have been placed on BLM lands to mitigate for impacts to waters by others: IID, BOR. These guzzlers support game and nongame species of concern to CDFG. Guzzlers are regulated and managed in accordance with CDFG requirements. The IID has implemented an interim water supply policy for non-agricultural projects within their service area that require water supply. The policy designates up to 25,000 AF/year for water supply for non-agricultural projects, and requires the submission of a water supply application, as well as payment of application, reservation, and development fees based on the requested water quantity (IID 2009). This policy is in effect until superseded by the policies of the IRWMP. The IRWMP is expected to be completed and adopted before November of 2012 and is designated for non-agricultural uses. The IID is committed to ensuring there is an adequate water supply for all current and future developments within the service area, subject to the usual reasonable and beneficial use standards. All new non-agricultural water project supply requests are processed in accordance with the IID's Interim Water Supply Policy.

The West Chocolate Mountains REEA is characterized by desert scrub vegetation, desert washes, and some small areas of disturbed soils. The majority of the REEA is sparsely to moderately vegetated, with the remaining area made up of desert wash channels and disturbed areas consisting of roads, canals, and sediment berms scattered throughout. The soils and alluvium are highly erosional as evidenced by the presence of alluvial fans below the West Chocolate Mountains. The desert washes, which are typical in the Colorado Desert Region, are braided in plan view and generally flow southwesterly to the Salton Sea. These washes flow only intermittently during seasonal precipitation events, are unstable, and can migrate laterally during significant runoff. They can also carry destructive bedloads (boulders and gravels) during intense flash flooding rain events. East of the Coachella Canal, the landscape provides less disturbed habitat with denser vegetation and greater tree cover (microphyll woodlands) than west of the Canal.

Although these ephemeral streams and washes do not have beneficial use designations assigned by the State of California, these systems do provide natural distribution of water and sediments on floodplains, as well as providing recharge for groundwater in the region. No information is available as to the surface water quality present on the site during rain events but, due to the nature of flooding that occurs, resulting flood waters would be high in turbidity and contain any contaminants that had been present on the soil surface, including minerals and salt deposits. As this is a rural, undeveloped area, anthropogenic contaminants on the surface are expected to be low to non-existent. The floodplains of many of the drainages in the West Chocolate Mountains REEA are substantial and flooding may occur in these areas during infrequent precipitation events (FEMA 2010). Flood hazards also exist in the REEA along the upstream side of SR 111 and along portions of the Coachella and East Highline canals (FEMA 2010) because they are oriented in a northwestern direction and intersect natural drainages flowing to the southwest. Any new, relocated, upgraded, or reconstructed facilities required for and by the project (which can include, but are not limited to, electrical utility substations, electrical transmission and distribution lines, and water delivery and drainage structures) in these locations will require CEQA, in addition to NEPA, review and environmental impact analysis and mitigation in conjunction with the IID.

Three-hundred-and-one surface water features are identified on the USGS National Hydrography Dataset (NHD) within the West Chocolate Mountains REEA. Of these, 200 are natural drainages, as described above, and 101 are artificial, including canals, laterals, and siphons that deliver irrigation water and drains that transport agricultural drainage and other runoff to the Salton Sea. Twenty-eight of the drainages are named in the USGS NHD dataset, including one natural drainage, the Iris Wash, and 27 artificial drainages. The Iris Wash is located on the southern portion of the REEA and flows westerly, draining into the Salton Sea.

The named artificial surface water features include three canals(the Coachella, East Highline, and R Side Main canal), seventeen laterals, two drains, five siphons, and one natural drainage feature, the Iris Wash (see Figure 3.5-2 and Table 3.5-1). The canals located in the West Chocolate Mountains REEA, which generally run northwesterly, deliver Colorado River water from the All-American Canal for irrigation purposes; the Coachella Canal delivers water to the CVWD; and the Highline-East and R Side Main canals deliver water to IID end users. The agricultural drains are listed as impaired on the regional 303(d) list (State of California RWQCB 2004).

Table 3.5-1 Named Surface Water Features within the West Chocolate Mountains REEA

GNIS_ID	Owner	GNIS_Name	Length (km)	Feature Type
240721	CVWD	Coachella Canal	5.531	Canal Ditch
241774	IID	East Highline Canal	0.585	Canal Ditch
243760	IID	I Lateral	2.198	Canal Ditch
243879	N/A	Iris Wash	1.853	Stream River
243945	IID	J Lateral	2.437	Canal Ditch
244189	IID	K Lateral	3.353	Canal Ditch

Table 3.5-1 Named Surface Water Features within the West Chocolate Mountains REEA

GNIS_ID	Owner	GNIS_Name	Length (km)	Feature Type
244379	IID	L Lateral	3.483	Canal Ditch
245332	IID	M Lateral	4.109	Canal Ditch
246422	IID	N Lateral	12.967	Canal Ditch
255665	IID	Niland Lateral Five	3.186	Canal Ditch
255664	IID	Niland Lateral Four	5.508	Canal Ditch
255663	IID	Niland Lateral Three	6.326	Canal Ditch
255662	IID	Niland Lateral Two	3.479	Canal Ditch
246693	IID	O Lateral	11.777	Canal Ditch
247059	IID	P Lateral	4.194	Canal Ditch
247843	IID	Q Drain	10.924	Canal Ditch
247844	IID	Q Lateral	11.035	Canal Ditch
247899	IID	R Side Main Canal	0.855	Canal Ditch
254268	CVWD	Siphon Five	0.696	Stream River
254251	CVWD	Siphon Fourteen	2.056	Stream River
254261	CVWD	Siphon Seven	1.448	Artificial Path
254266	CVWD	Siphon Three	1.272	Artificial Path
254265	CVWD	Siphon Two	1.783	Artificial Path
251121	IID	W Lateral	0.869	Canal Ditch
251834	IID	X Drain	1.161	Canal Ditch
251835	IID	X Lateral	1.724	Canal Ditch
251836	IID	Y Lateral	5.865	Canal Ditch
251897	IID	Z Lateral	0.334	Canal Ditch

Source: USGS 1999, NHD GIS Data

Key:
CVWD = Coachella Valley Water District
IID = Imperial Irrigation District

A significant off-site surface water feature is the Salton Sea, located immediately adjacent to and downstream from the West Chocolate Mountains REEA. It is one of the world's largest inland seas and lowest spots on earth at -227 feet below sea level (California State Parks 2010). By virtue of its location in the Colorado Desert ecosystem, an area with average annual precipitation of 5.5 inches per year, it receives minimal inflow from rain. The Salton Sea is mainly an agricultural drainage reservoir, with 90 percent of the entire inflow to the Salton Sea being commercial agricultural runoff, containing high concentrations of phosphates, nitrates, and salts, from the Imperial, Coachella, and Mexicali valleys (Salton Sea Authority 2010). Additionally, the Salton Sea's salinity has been increasing due to evaporation in this closed system with no outlet. As a result, water quality conditions continue to decline, and the Salton

Sea cannot meet the beneficial uses assigned to it; the Salton Sea National Wildlife Refuge was designated in 1930, but recent bird die-offs suggest declining water quality is adversely impacting avian populations. (CalEPA 2011). Another substantial off-site, natural, surface water feature 2 miles north of the REEA is Salt Creek, an ephemeral stream flowing into the Salton Sea north of the REEA (Figure 3.5-2).

In addition to natural and artificial surface drainages, a total of approximately 2,286 acres of USFWS designated wetlands were identified on the West Chocolate Mountains REEA. A summary of wetland types and acreages is provided in Table 3.5-2, a map depicting their locations is included in Figure 3.5-3, and list of all wetlands within the REEA is provided in Appendix F. The majority (66 percent) of the wetland acreage is associated with near and offshore areas (Lacustrine, Limnetic, and Littoral) of the Salton Sea. The remaining wetland areas are associated with three areas: the riparian area corresponding with the unnamed perennial stream on the north side of the site; the Coachella and East Highline canals; and a riparian areas corresponding to a southwesterly draining wash near the center of the REEA.

Groundwater in the East Salton Sea Groundwater Basin moves from the recharge areas east of Imperial Valley and the Salton Sea, toward the axis of the valley, and converges upon the Salton Sea or the New and Alamo rivers, which are the principal areas of discharge to the Salton Sea south of the Salton Sea, itself (Alward and Shatz 2009). Recharge to the East Salton Sea Groundwater Basin is highly seasonal and comes primarily from runoff from surrounding mountain ranges. The Coachella Branch canal provides year-round groundwater recharge through the West Chocolate Mountains REEA, and natural seepage from ephemeral streams in the Chocolate Mountains provides additional small amounts of groundwater.

Table 3.5-2 Summary of Wetland Types and Acreage

Wetland Type	Acreage	% of Total
Lacustrine Limnetic/Littoral (L1/L2)	1,516.0	66
Palustrine Aquatic Bed (PAB)	1.4	0
Palustrine Emergent (PEM)	23.5	1
Palustrine Scrub-Shrub (PSS)	146.1	6
Palustrine Unconsolidated Bottom (PUB)	124.4	5
Palustrine Unconsolidated Shore (PUS)	28.4	1
Riverine Lower Perennial (R2)	288.5	13
Riverine Intermittent (R4)	158.5	7
Total	2,286.7	100

Source: USFWS 2010, National Wetlands Inventory (NWI)

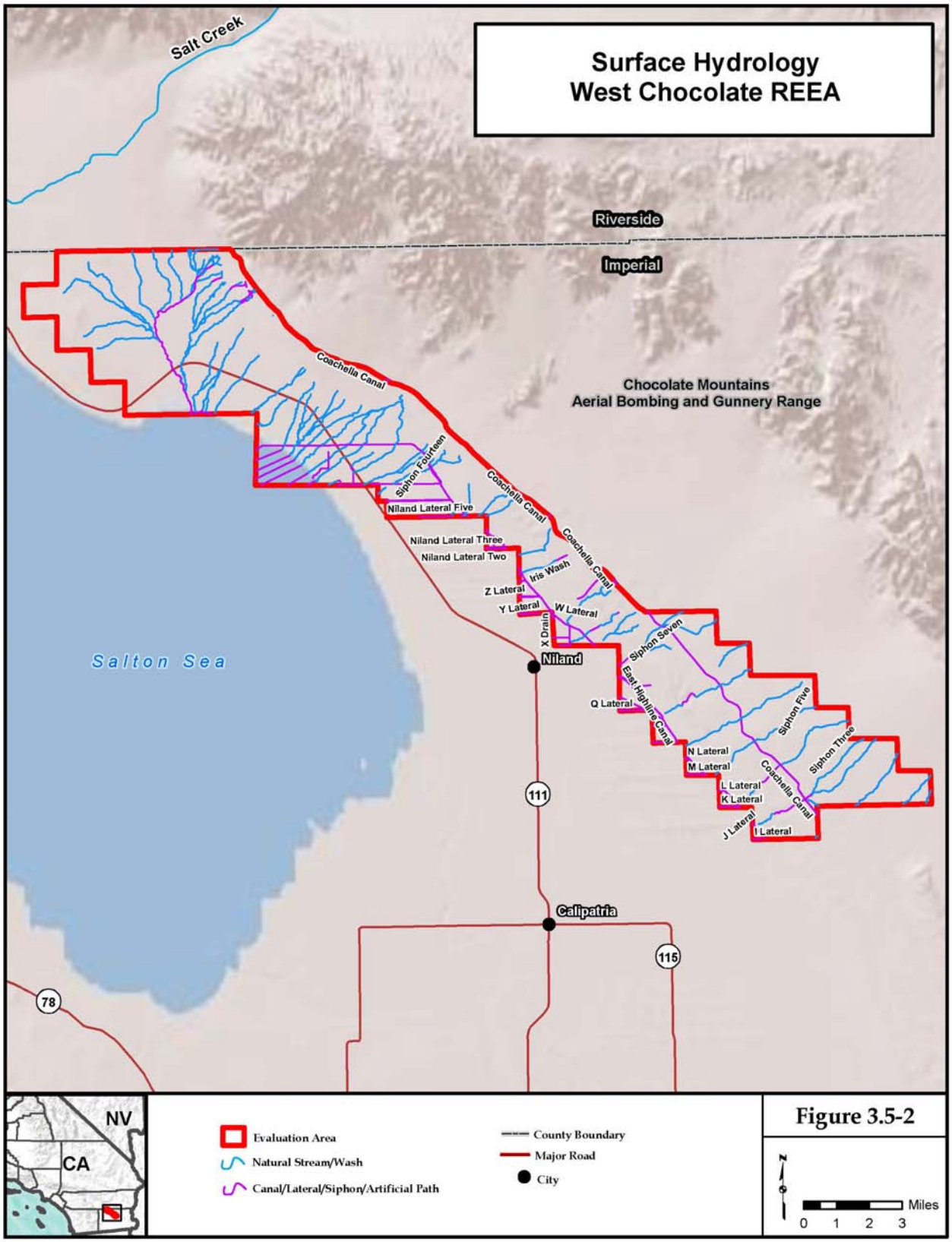
Surface Hydrology
West Chocolate REEA
Salt Creek
Riverside
Imperial
Chocolate Mountains
Aerial Bombing and Gunnery Range
Coachella Canal
Siphon Fourteen
Niland Lateral Five
Niland Lateral Three
Niland Lateral Two
Iris Wash
Z Lateral
Y Lateral
W Lateral
X Drain
Niland
Siphon Seven
East Highline Canal
Q Lateral
N Lateral
M Lateral
L Lateral
K Lateral
J Lateral
I Lateral
Siphon Five
Siphon Three
Salton Sea
111
Calipatria
115
78
NV
CA
Evaluation Area
Natural Stream/Wash
Canal/Lateral/Siphon/Artificial Path
County Boundary
Major Road
City
Miles
0 1 2 3

Figure 3.5-2

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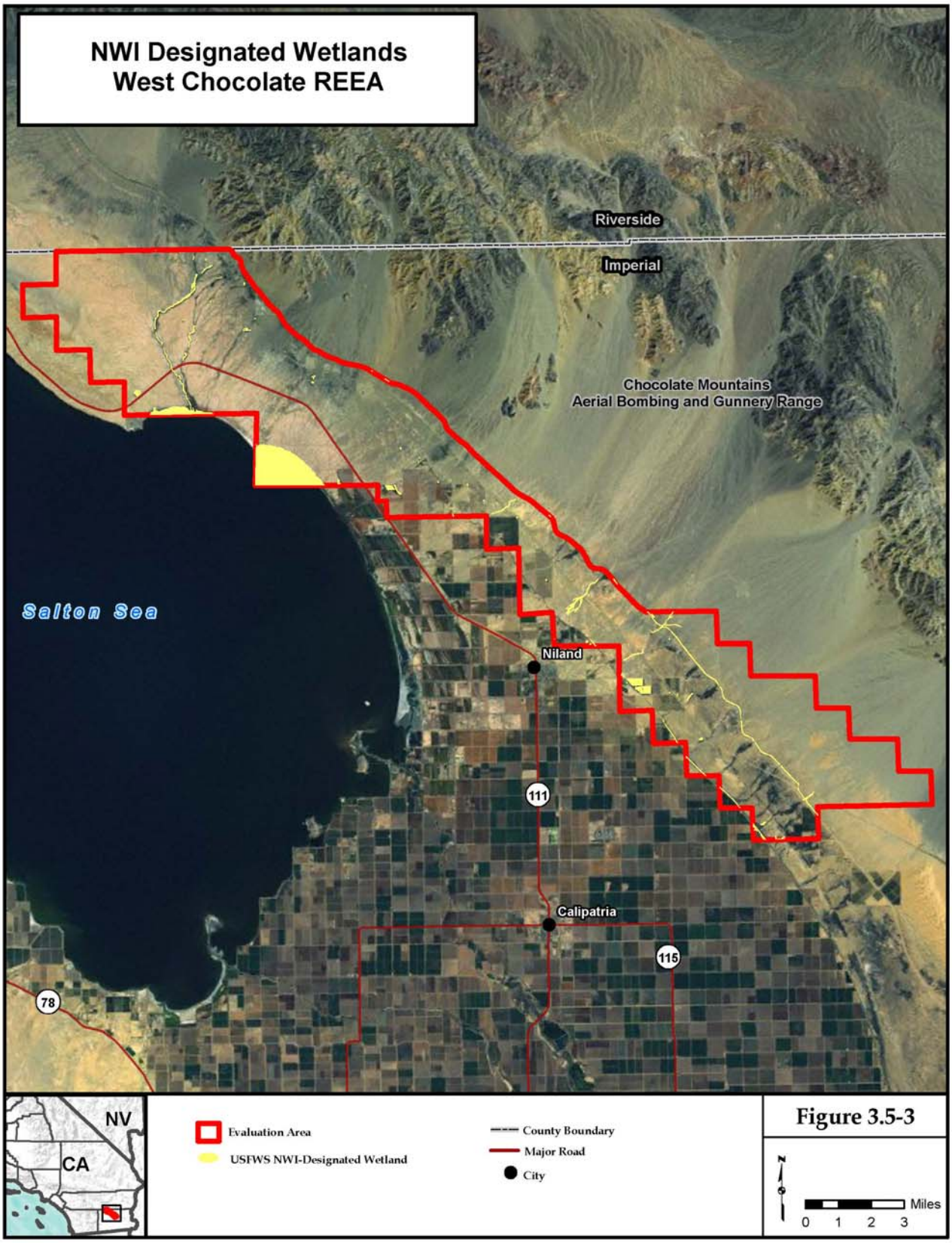
NWI Designated Wetlands
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Evaluation Area
USFWS NWI-Designated Wetland
County Boundary
Major Road
City
Miles
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Figure 3.5-3

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3.5.3.2 Groundwater Resources

The West Chocolate Mountains REEA lies within the Colorado Desert Province which has the following principal aquifer media: volcanic-rocks, carbonates, and basin-fill sediments. Together, these aquifers are called the Basin and Range Aquifer System. The Basin and Range Physiographic Province is broken down at the regional level, depending on geologic drainage features such as the drainage boundaries of a large river or stream, into hydrographic basins. The REEA is underlain by the East Salton Sea Groundwater Basin (DWR 2003). The East Salton Sea Subbasin underlies Chocolate Valley in southern Riverside County and northern Imperial County. The basin is bounded by nonwater-bearing rocks of the Chocolate Mountains on the north and east and by the San Andreas and Banning Mission Creek faults on the west (Jennings 1967).

Data are limited on groundwater in the West Chocolate Mountains REEA, owing to the fact that groundwater in this part of the Colorado Desert and in the Imperial Valley is generally of poor quality and well yields of clean water are relatively quite low (Alward and Shatz 2009). In addition, though it exists in large quantities, historically, there has been little need to investigate and develop the groundwater in the area due to the availability and low cost of imported surface water (Alward and Shatz 2009). Most studies of groundwater conditions in the central area of Imperial Valley focus exclusively on the upper 1,000 feet of water-bearing strata (Alward and Shatz 2009). Studies show that groundwater in the central part of the Imperial Valley generally occurs in two water-bearing zones: (1) a shallow (0 to 300 feet), unconfined aquifer that is bounded at depth by a low permeability clay (aquitard); and (2) an intermediate (300 to 1,500 feet), semi-confined aquifer that is bounded above by the aquitard and at depth by the older marine and non-marine sediments (Alward and Shatz 2009). A third, deeper aquifer has been identified by some authors, and may be present at depths greater than 1,500 feet, but is likely impractical in terms of water supply resources (Alward and Shatz 2009).

The storage capacity of the Imperial Valley has been estimated at approximately 14 million AF of water (Alward and Shatz 2009). The Central Irrigated Area contains a large area of poor quality groundwater that is generally regarded as unsuitable for domestic or irrigation use without treatment. The chemical quality of groundwater differs greatly from place to place, and salinity is the primary water quality issue (Alward and Shatz 2009). Total dissolved solids (TDS) range from a few hundred to more than 10,000 milligrams per liter (mg/L) (Alward and Shatz 2009). Generally, groundwater derived locally from recent precipitation and that has not yet reached the more saline deposits of the central portion of the valley contain only a few hundred mg/L of dissolved solids (Alward and Shatz 2009).

Total recharge to the groundwater system from precipitation within the valley has been estimated to be somewhat less than 10,000 AF per year (Alward and Shatz 2009). In the central portion of Imperial Valley, recharge to the groundwater reservoir by subsurface inflow from tributary areas is small compared to recharge from the imported Colorado River water. The irrigated portions of Imperial Valley contain an extensive network of drainage lateral canals and subsurface tile drains. The tile drains were installed below the fields to prevent water logging of crops and salt buildup in the clay-rich soils. The system of lateral drains and tile drains, therefore, determines and maintains the level of the groundwater table throughout most of the central Imperial Valley (Alward and Shatz 2009).

Average annual precipitation ranges to 4 inches (DWR 2003). The basin deposits derived from the local mountains include unconsolidated younger Quaternary alluvial deposits and the underlying unconsolidated to semi-consolidated older Tertiary to Quaternary alluvial deposits. Maximum depth of the valley fill is at least 400 feet (DWR 1954). Recharge to the basin is primarily attributed to infiltration of runoff through alluvial deposits at the base of the surrounding mountains.

Measurements of groundwater levels, which range between 20 to 48 feet below ground surface (bgs), made between 1963 and 2000, indicate a steady drop in the water table occurred over that period (DWR 2003).Groundwater moves in a southwest direction as underflow to the Salton Sea. Total storage capacity of the East Salton Sea Subbasin is estimated to be 360,000 AF (DWR 1975). Groundwater quality in the basin is characterized by high concentrations of TDS, ranging from 356 mg/L to 51,632 mg/L, and is not suitable for domestic, agricultural, or municipal consumption. Additionally, two active USGS monitoring wells were identified within the region and in close proximity to the West Chocolate Mountains REEA. Data for each well indicate a decrease in groundwater levels over the latter half of the twenty century. Data for well number 331144115231501, located at Latitude 33°11'44", Longitude 115°23'15" indicated that the current groundwater level is approximately 50 feet bgs, a decrease of approximately 30 feet since data collection began circa 1980 (Lawrence Livermore 2008). Data from USGS well 330842115174701, located at Latitude 33°08'42", Longitude 115°17'47" indicate that the 2002 groundwater level was 75 bgs, compared with 135 bgs in 1980 (Lawrence Livermore 2008).

The majority of water use in the basin is supplied by imported Colorado River water; however, groundwater withdrawals for agricultural uses do exist. It is estimated that groundwater withdrawals within the East Salton Sea Basin total approximately 6 AF/year, and well yield within the Imperial Valley varies from 100 to 1,450 gallons per minute (Lawrence Livermore 2008). However, no well yield data is provided by Lawrence Livermore or DWR's Groundwater Bulletin 118.

Geothermal Resources

Plate motion in the Salton Trough along major faults such as the San Jacinto and Imperial faults, create local geothermal hot spots due to magmatic intrusions in the pull-apart regions (Newmark et al. 1988). Several geothermal energy fields, such as the Salton Sea, Cerro Prieto and Brawley geothermal fields, are located at these hot spots. Here, water temperatures at depths of 8,000 feet can exceed 680 °F. While several geothermally active faults penetrate to the surface, most of the tectonically induced faults are located at depth, well below the shallow strata in which most low temperature groundwater is found (Lawrence Livermore 2008).

The Cerro Prieto geothermal field generates 620 MW of electric power and in the process pumps 2.6 million gallons (U.S.) (11,000 metric tons) of brine water from underground per hour that is disposed of in surface ponds. Evaporation removes most of the water quickly leaving approximately 1,300 metric tons of silica waste as the residual product from this hourly production of brine. At present, there is no use for this waste silica. The geothermal fields supply electricity to a large portion of Baja California, Mexico, including the city of Mexicali with a population of approximately 900,000. The Cerro Prieto geothermal area ranks as second largest in the world in terms of geothermal power generated (Alles 2007).

Geothermal fluids below 7,000 feet from the Salton Sea area can vary in TDS from 7,000 to over 200,000 mg/L and can contain some suspended solids. The suspended and dissolved solids that precipitate out of solution for a flash-type geothermal plant could present a disposal challenge, as they could be hazardous waste, but combined solids typically contain designated waste materials not acceptable by municipal landfills. Therefore, most geothermal electrical power plants have waste discharge requirements on surface impoundments and drilling sumps to temporarily store geothermal wastes. The waste discharge requirements are obtained from the Colorado River Basin RWQCB.

According to the State of California's Geothermal Well Location Database, there are 13 geothermal wells located in the West Chocolate Mountains REEA. As summarized in Table 3.5-3, seven are listed as abandoned, five as active, and one as idle. Of the five active wells, four are listed as commercial low temperature (CLT) and one as temperature gradient (TG).

Table 3.5-3. Geothermal Wells Located Within the West Chocolate Mountains REEA

API Number	Operator	Well Type	Status	Year Drill	Section	Township	Range
02590141	Freeport-McMoRan Resource Partners	TG	ABDN	1975	29	9S	13E
02590142	Freeport-McMoRan Resource Partners	TG	ABDN	1975	31	9S	13E
02590143	Freeport-McMoRan Resource Partners	TG	ABDN	1975	33	9S	13E
02590190	MCR Geothermal Corp.	EWT	ABDN	1979	15	9S	12E
02590300	Freeport-McMoRan Resource Partners	TG	ABDN	1980	6	11S	15E
02590358	Chevron U.S.A. Inc.	TG	ABDN	1981	28	10S	14E
02590395	Chevron U.S.A. Inc.	TG	ABDN	1981	26	11S	15E
02591183	Imperial Spa	CLT	ACTV	1938	2	9S	12E
02591184	Imperial Spa	CLT	ACTV	1962	2	9S	12E
02591206	Fish Partners (was FPROD - Fish Partners)	CLT	IDLE	1992	12	11S	14E
02591249	Fish Partners (was FPROD - Fish Partners)	CLT	ACTV	1995	12	11S	14E
02591250	Fish Partners (was FPROD - Fish Partners)	CLT	ACTV	1995	12	11S	14E
02591200	Trily, J. T.	TG	ACTV	1979	13	9S	13E

Source: State of California 2010, Geothermal Well Location Database

Key:
TG = temperature gradient
EWT = exploratory water
CLT = commercial low temperature

3.6 Vegetation

This section discusses applicable plans, policies, and regulations for vegetation and identifies the existing vegetation within the West Chocolate Mountains REEA. During the scoping period, meetings were conducted with the public and government agencies to identify their concerns. Written comments were also received. The following issues related to vegetation were raised during scoping: construction, operation, and maintenance impacts on habitat; protection of high value habitat; creation or preservation of habitat linkages; species/habitat impacts due to shade from solar collectors; habitat loss and fragmentation; fences around REEA; invasive species management; invasive/exotic species, sensitive/rare species habitat; comprehensive review of habitat/corridors; Salton Sea riparian habitat restoration; the Wister Unit of the Imperial Wildlife Area; and appropriate use of lands acquired for conservation. These comments are addressed in Section 3.6.3, Existing Conditions, and in Chapter 4, Environmental Consequences, Section 4.6.

3.6.1 Definition of the Resource

Vegetation refers to all plant life of a given region. Although a common attribute of deserts is the sparseness of vegetation, plants are an essential part of the desert ecosystem. Plants provide essential forage and habitat for wildlife and serve as protective cover from high temperatures and predators (BLM 1980).

3.6.2 Applicable Plans, Policies, and Regulations

3.6.2.1 Federal

Endangered Species Act

The Endangered Species Act of 1973 (ESA), as amended, Section 7 (a)(2) directs that each federal agency shall, in coordination with Secretary of the Interior (Secretary), ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of critical habitat for any endangered or threatened species. The ESA specifically prohibits “take” (i.e., to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct) without a permit. USFWS determines and maintains a list of protected species and is the regulatory agency responsible for implementation and enforcement of the ESA.

Section 404 of the Clean Water Act

The objective of the CWA is to restore and maintain the chemical, physical, and biological integrity of the nation's waters by preventing point and nonpoint pollution sources, providing assistance to publicly owned treatment works for the improvement of wastewater treatment, and maintaining the integrity of wetlands. The EPA is the regulatory agency that is responsible for the implementation and enforcement of the CWA. Section 404 of the CWA is the most significant federal program affecting the protection of wetlands and waters of the United States. This program regulates the discharge of dredged and fill material into waters of the United States and the conversion of wetlands. The basic premise of the Section 404 program is that no discharge of dredged or fill material can be permitted if the discharge would result in

significant degradation to the Nation's waters and wetlands. Another federal mandate regulating wetlands is EO 11990, Protection of Wetlands, which requires federal agencies not only to minimize the destruction of wetlands, but also to initiate action to enhance their natural functional values.

Section 401 of the Clean Water Act

The CWA, through Section 401, provides means for states to control the degree of impact of discharges on state waters (including wetlands). The CWA requires that any applicant wishing to receive a federal license or permit to conduct an activity that might result in a discharge to navigable waters must obtain a Section 401 certification. States are integrating Section 401 into their overall water quality protection programs, which include protecting the physical, chemical, and biological health of state waters. Section 401 certification is granted by states, except in cases where states issue a waiver for the certification requirement.

3.6.2.2 State

California Endangered Species Act

The California ESA (CESA) establishes legal protection for state-designated threatened and endangered plants and wildlife. The protection is administered under the authority of the CDFG. The CDFG also identifies species of concern as those that may become listed as threatened or endangered due to loss of habitat, limited distributions, and diminishing population sizes, or because the species is deemed to have scientific, recreational, or educational value. The CDFG recognizes that plants on California Native Plant Society (CNPS) Lists 1A, 1B, and 2 and some of the plants on Lists 3 and 4 qualify for listing under §§2062 and 2067 of the CESA. The CESA is only triggered when use of non-federal lands are required by and become part of the proposed plan.

California Food and Agriculture Code §§7270-7224

The California Commissioner of Agriculture is granted the authority to regulate and manage non-native invasive weeds.

3.6.3 Existing Conditions

Vegetation within the West Chocolate Mountains REEA is adapted to the arid sub-tropical climate of the Colorado Desert ecoregion (USFS 1998). The elevations within the ecoregion range from 230 feet below sea level at the Salton Sea to 2,200 feet above sea level at the boundary with the Peninsular Ranges. Desert vegetation in the REEA is supported by an average annual precipitation of approximately 5.5 inches. Average high temperatures recorded at El Centro range from 70°F in January to 107°F in July. Average low temperatures range from 40°F in January to 75°F in July (WRCC 2010). The Colorado Desert experiences frequent winds. These winds distribute sand and fine particles and the particles are trapped by and accumulate around large plants and other obstructions. This same process supports the formation of dunes. Although precipitation is sparse in the Colorado Desert, infrequent intense storms bring occasional soakings and occasional flooding within ravines and washes. This water erodes soil, carries and deposits sediment, and distributes plant propagules as well as provides essential moisture to desert plants.

Native plant species that occur in the desert are uniquely and specifically adapted to the environmental conditions found therein. Some species have seeds that may lay dormant for years, if needed, while awaiting sufficient rain to sprout and flourish. Other species have developed extensive root systems designed to maximize absorption of water during the sparse and intermittent rain events. Desert plants provide essential forage and habitat for wildlife.

Vegetation communities in the West Chocolate Mountains REEA consist of drought-tolerant plants including thick-leaved or spiny shrubs, cacti, ephemeral annuals and hard grasses. These plants survive in the desert because they have evolved methods of water conservation and storage or grow immediately after rain events. Many perennial species have evolved extensive root systems that efficiently capture occasional rains or access relatively permanent deep ground water stores. All species conserve or store moisture in their leaves and stems with moisture retentive coatings or hairs that impede water loss. These physiological adaptations are important to protect these plants from the typically intense sunlight, heat, and high winds in the Colorado Desert. Plant populations commonly increase their numbers and distribution through downstream dispersal of seeds and propagules along drainages and washes (Beier and Loe 1992).

Desert vegetation helps moderate the effects of wind, shades the soil surface, and helps stabilize the soil among the root systems. Thus, it helps reduce the potential effects of erosion by wind and water. In addition, bacteria and algae form associations in desert environments in many places where typical plants do not grow. These also play an important role in binding the soil surface particles and help minimize potential erosion.

Major vegetation communities within the West Chocolate Mountains REEA include creosote bush scrub and saltbush scrub (USFS 1998). Creosote bush scrub is the umbrella term for all of the types of scrub habitat that could not be differentiated from each other (Sonoran desert scrub, Mojavean desert scrub, and numerous other scrub habitats). Western parts of the REEA and areas bordering the Salton Sea also include the allscale vegetation community, which is a subset of the saltbush scrub. Another important vegetation community in the REEA is desert wash vegetation which may or may not include wetlands. Individual plants in all these vegetation communities are typically widely spaced and provide less ground cover than is found in more mesic climates. Some portions of the desert may have no visible plants and consist of shifting sand dunes or nearly sterile salt flats. Species composition in all communities may vary considerably from year to year depending on the duration, timing, and intensity of the seasonal rainfall.

3.6.3.1 Vegetation Communities

Creosote Bush Scrub

Creosote bush scrub is the most common plant community in the West Chocolate Mountains REEA (USFS 1998). Elevations within the ecoregion range from 230 feet and occur throughout most of the REEA. Creosote bush scrub occurs on alluvial fans, bajadas, upland slopes, and minor intermittent washes on well drained soils at elevations from -75 to 1,000 meters. Shrubs are less than 3 meters in height and the canopy is intermittent to open. The herbaceous layer is open to intermittent with seasonal annuals or perennial grasses (Sawyer and Keeler-Wolf 2009).

Creosote bush is dominant or co-dominant and may be in association with Shockley's goldenhead (*Acamptopappus shockleyi*), rayless goldenhead (*A. sphaerocephalus*), white bursage (*Ambrosia dumosa*), burrobrush (*Hymenoclea salsola*), shadscale (*Atriplex confertifolia*), desert holly (*A. hymenelytra*), allscale (*A. polycarpa*), wooly brickelbush (*Brickellia incana*), brittlebush (*Encelia farinosa*), California ephedra (*Ephedra californica*), Nevada ephedra (*E. nevadensis*), and Anderson thornbush (*Lycium andersonii*) (Sawyer and Keeler-Wolf 2009).

Saltbush Scrub

Saltbush scrub is common on basin floors, flats, lower slopes, playas, and valley botttoms (USFS 1998). Saltbush scrub alliances are dominated by various species of saltbush (Atriplex spp.), including fourwing saltbush (*A. canescens*), shadscale, big saltbush (*A. lentiformis*), and allscale (Sawyer and Keeler-Wolf 2009). Saltbush species are found within alkaline or salty soils. Allscale scrub, a subset of the saltbush scrub community, may also occur in the West Chocolate Mountains REEA. The allscale plant community is typically found bordering the Salton Sea and may be found within the REEA. This vegetation community occurs in washes, playa lake beds and shore, dissected alluvial fans, rolling hills, terraces, and edges of large, low gradient washes, often with carbonate rich, alkaline, sandy, or sandy clay loam soils (Sawyer and Keeler-Wolf 2009). Allscale is dominant in the shrub canopy with white bursage, burrowbrush, fourwing saltbush, small-seeded spurge (*Chamaesyce polycarpa*), bladderpod (*Cleome isomeris*), alkali goldenbush (*Isocoma acradenia*), and creosote bush (Sawyer and Keeler-Wolf 2009). Shrubs are less than 3 meters and the canopy is open to continuous (Sawyer and Keeler-Wolf 2009). The herbaceous layer is variable and may include seasonal annuals and red brome (*Bromus rubens*) (Sawyer and Keeler-Wolf 2009).

Desert Wash

While limited in extent, desert wash habitats are critically important to wildlife. Several desert washes are present in the West Chocolate Mountains REEA. The most significant one is Iris Wash, which drains southwesterly through the proposed project area and into the Salton Sea. Other smaller desert washes draining out of the Chocolate Mountains are located sporadically throughout the entire West Chocolate Mountains REEA. Desert wash habitats are associated with ephemeral streams, often with braided channels and sandy soils that are formed by seasonal rains and runoff. Vegetation in this habitat is characterized by the presence of arborescent, often spiny, shrubs that are often taller and denser than those of surrounding desert habitats. Arborescent species typically found in washes include blue palo verde (*Parkinsonia floridum*), littleleaf paloverde (*Cercidium microphyllum*), desert ironwood (*Olneya tesota*), smoketree (*Dalea spinosa*), catclaw acacia (*Acacia greggii*), mesquite (*Prosopis* spp.), screwbean mesquite (*Prosopis pubescens*), and saltcedar (*Tamarix* spp.) (CDFG 1988).

Wetlands and Riparian Areas

Wetlands in the West Chocolate Mountains REEA are mainly associated with canal seepage, irrigation ditches, and irrigation runoff. These new irrigation-related water sources have induced wetland vegetation to establish in areas that were previously dry desert (Tetra Tech 1999). USFWS's National Wetland Inventory (NWI) shows riverine, freshwater pond, and freshwater emergent wetlands in the REEA.

Plants commonly associated with wetlands in the Salton Sea area include saltcedar (non-native invasive species), saltbush, California seablite (*Suaeda californica*), iodinebush (*Allenrolfea occidentalis*), arrowweed (*Pluchea sericea*), false willow (*Baccharis sergiloides*), common reed (*Phragmites australis*), timothy (*Phleum pratense*), mesquite (*Prosopis glandulosa*), narrow-leaf willow (*Salix exigua*), bulrush (*Scirpus robustus*), and broad-leaf cattail (*Typha latifolia*). Wetland habitat is used by numerous bird species including red-winged blackbirds (*Agelaius phoeniceus*), great blue herons (*Ardea herodias*), and snowy egrets (*Egretta thula*). Special status species that could utilize wetlands and/or riparian habitat in the West Chocolate Mountains REEA include Couch's spadefoot toad (*Scaphiopus couchii*), San Sebastian leopard frog (*Rana yavapaiensis*), Sonoran desert toad (*Bufo alvarius*), Yuma clapper rail (*Rallus longirostris yumanensis*), California black rail (*Laterallus jamaicensis corturniculus*), gull-billed tern (*Sterna nilotica*), yellow-breasted chat (*Icteria virens*), yellow warbler (*Dendroica petechia brewsteri*), and white-faced ibis (*Plegadis chihi*). These species are discussed in further detail in Section 3.8, Special Status Species.

Wetland areas in the West Chocolate Mountains REEA may also contain ephemeral washes such as numerous streams mostly in the form of ephemeral washes, as discussed in Section 3.5.3.1. Washes typically refer to drainages that do not have perennial flow and are marked by deposits of alluvial material. They are often not confined to a specific channel and are commonly shallow and braided and may cover a wide area. The term "ephemeral" is used to describe washes that experience only brief, seasonal, periods of flow, usually in response to rainfall events and not necessarily every year.

Most streams in the area either dissipate or eventually drain into the Salton Sea which is considered a "Traditionally Navigable Water" by the U.S. Army Corps of Engineers (USACE). The USACE regulates discharge of fill into these waters; therefore, if a hydrological connection can be established between any streams within the West Chocolate Mountains REEA and the Salton Sea, the USACE would regulate those streams via Section 404 permitting under the CWA.

Some streams in the West Chocolate Mountains REEA have associated habitat. This habitat is tied to surface water flow, underground seepage, and/or high water tables. A common riparian habitat in the area is desert wash woodland, also known as microphyll woodland in reference to the small leaves that desert trees often have. Typical desert wash woodland species include blue palo verde, littleleaf, desert ironwood, smoketree, catclaw acacia, honey mesquite (*Prosopis glandulosa*), screwbean mesquite, and saltcedar (CDFG 1988). Desert wash habitat is also discussed in Section 3.6.3.4.

In accordance with the California Fish and Game Code, Section 1602, Streambed Alteration Program, notification to CDFG is required by any person, business, state or local government agency, or public utility that proposes an activity on non-federal lands, that will: (1) substantially divert or obstruct the natural flow of any river, stream, or lake; (2) substantially change or use any material from the bed, channel, or bank of any river, stream, or lake; or (3) deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake. This notification requirement applies to any work undertaken in or near a river, stream, or lake that flows at least intermittently through a bed or channel. This includes ephemeral streams, desert washes, and watercourses with

a subsurface flow. It may also apply to work undertaken within the flood plain of a body of water.

Unusual Plant Assemblages

Unusual plant assemblages are those strands of vegetation within the CDCA that can be recognized as extraordinary due to one or more factors. These factors include unusual age, unusual size, unusually high cover or density, or disjunction from main centers of distribution. Plant associations that are relatively rare in the desert due to their alliance with restricted and discontinuous habitats are also considered unusual plant assemblages. The West Chocolate Mountains REEA contains only one unusual plant assemblage. This plant assemblage is associated with springs, seeps, and near-surface water largely consisting of mesquite thickets in a variety of localities throughout the CDCA (BLM 1980). The unusual plant assemblage covers most of the northern portion of the REEA, south until the REEA is more than 0.25 mile from the Salton Sea (Figure 3.6-1).

Desert Dunes

Active desert dunes occur when prevailing winds carry sands from dry lakes and other areas in sinks and washes to form sand dunes. Vegetation in this community occurs most frequently between active dunes in depressions that are commonly termed “bowls.” The soils in these areas consist primarily of fine sand. As the dunes shift from year to year, the bowls generally shift as well. Vegetation is adapted to relatively high sand mobility and deep water percolation. Most of these plant species are capable of rapid growth given favorable soil moisture conditions. Common vegetation within this community includes Mormon tea, Colorado desert buckwheat, desert dicoria (*Dicoria canescens*), common sandpaper plant (*Petalonyx thurberi*), desert panicum (*Panicum urvilleanum*), and plicate coldenia (*Tiquilia plicata*). Additionally, birdcage evening primrose (*Oenothera deltoids*) and desert lily (*Hesperocallis undulata*) may occur in the relatively stable dunes that form a transitional zone with the creosote bush scrub vegetation community.

3.6.3.2 Invasive Species

Invasive species are considered by BLM to be plants that have been introduced into an environment where they did not evolve (BLM 2009). As a result, these plants usually have few natural competitors to limit their reproduction and distribution. Invasive species are known to disperse in areas of soil disturbance and often spread out of control in favorable environments, especially where native vegetation has been removed or damaged. Invasive species also disperse when environmental conditions such as water or light conditions change that favor invasives over the original natives. Invasive species can have dramatic impacts on natural ecosystems by reducing habitat quality and availability for native vegetation persistence. Invasive species can also reduce forage availability for wildlife and the productivity of healthy rangelands, forest lands, riparian areas, and wetlands. Eradication of these species can be labor intensive, time consuming, and costly.

In California, it is estimated that only 3 percent of plant species growing in the wild are considered invasive species. Despite this small percentage of species, these invasive species have changed the landscape in some areas. These invasive species are distributed most often by seeds borne on wind or carried by flowing water (California Invasive Plan Council [CIPC] 2006).

Known invasive species within the West Chocolate Mountains REEA include Sahara mustard (*Brassica tournefortii*) and saltcedar. Sahara mustard is highly invasive in the Colorado Desert and is dispersed by wind. This species is adapted to dry sandy soils and out-competes native species, particularly desert annuals (CIPC 2006). Saltcedar thrives in riparian areas and wetlands dispersing in floods, but is also tolerant of arid ecosystems where it can access groundwater. Saltcedar out-competes native vegetation by consuming large quantities of groundwater and depositing salts on the soil surface, making the adjacent soil too dry and saline for native vegetation. The BLM El Centro Field Office has an active management plan to address saltcedar.

Several special status native plant species are known to occur or may potentially occur within the West Chocolate Mountains REEA. See Section 3.8, Special Status Species, for a discussion of these species.

3.6.3.3 Wildlife Corridors

Wildlife corridors are narrow strips of habitat linking larger habitats that would otherwise be separated by human or natural barriers such as roads, developed areas, mountains, unsuitable habitats, and water bodies. Wildlife corridors include tracts connecting habitats used by the same population of a species during different seasons, as well as tracts that allow mule deer (*Odocoileus hemionus*) winter and summer habitats and allow individuals to cross between two different populations of a species, thereby enabling genetic exchange between those two populations.

Wildlife corridors provide important functions in the desert ecosystem. Wide-ranging animal species utilize wildlife corridors for migration, travel, and for seeking mates. The few perennial streams in the northern portion of the West Chocolate Mountains REEA and the ephemeral streams and washes throughout the REEA serve as important wildlife corridors that allow for movement between the Salton Sea and higher elevation habitats in the West Chocolate Mountains. However, ecosystem processes in the West Chocolate Mountains REEA, such as the upslope-downslope migration of water and wildlife, are already disturbed and modified by the Coachella Canal, former Camp Dunlap, quarries, and recreational hot springs development discussed in more detail in Sections 3.5 and 3.12. Canals, laterals, and other water features can function as linkages or corridors for animal movement in the West Chocolate Mountains REEA. Canal and siphon structures, washes, and microphyll woodlands that crop up in the washes also function as wildlife corridors and habitat. The South Coast Ecoregion linkages are especially important because they are home to many endangered, threatened, and sensitive species. The linkages provide live-in and move-through habitat for numerous native species such as the American badger, big horn sheep, burro mule deer, and mountain lion (South Coast Wildlands n.d.).

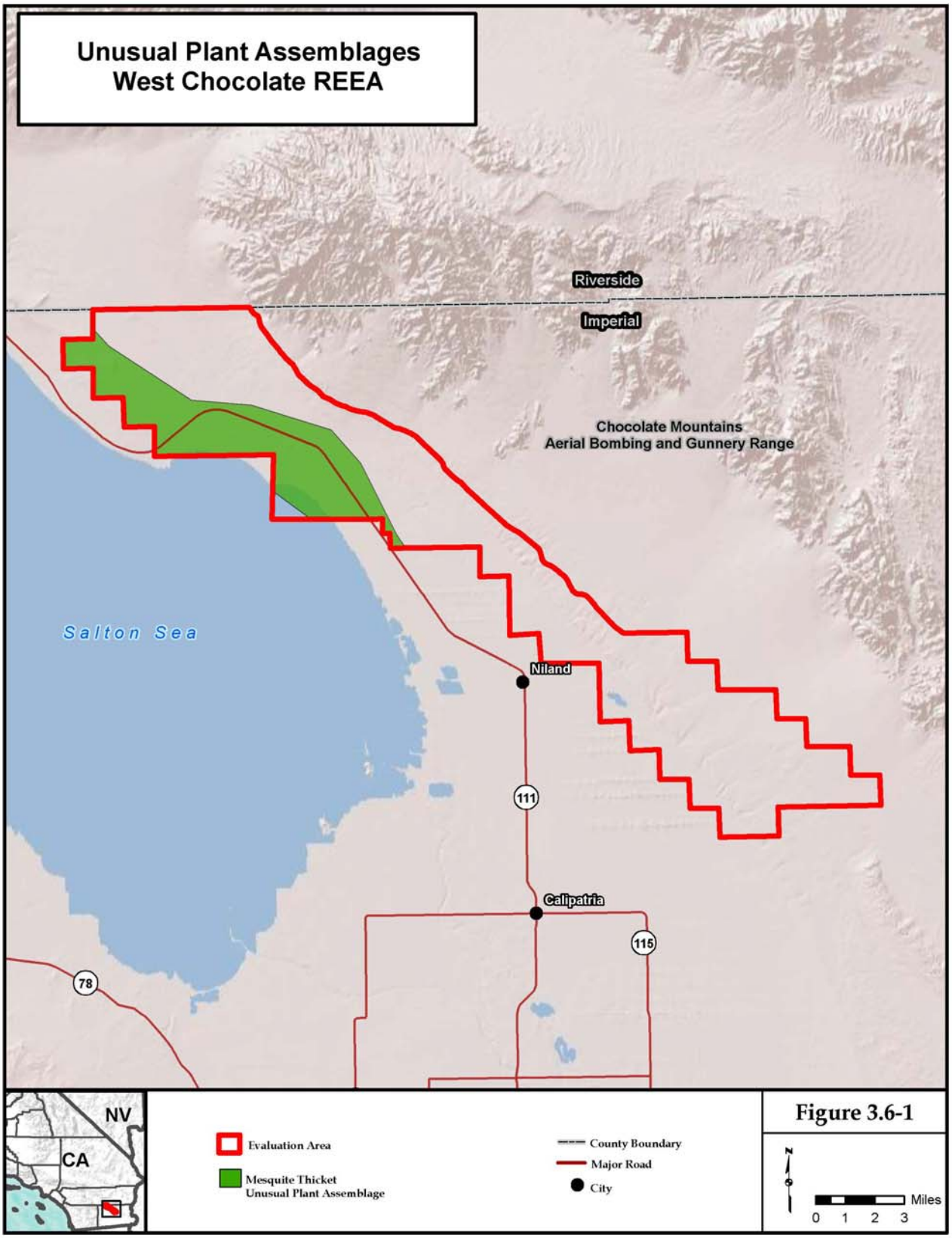
Unusual Plant Assemblages
West Chocolate REEA
Riverside
Imperial
Chocolate Mountains
Aerial Bombing and Gunnery Range
Salton Sea
Niland
111
Calipatria
115
78
NV
CA
Evaluation Area
Mesquite Thicket
Unusual Plant Assemblage
County Boundary
Major Road
City
N
Miles
0 1 2 3

Figure 3.6-1

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Specific wildlife linkages in or near the West Chocolate Mountains REEA include:

Peninsular – Borrego Linkage. Located in San Diego and Imperial Counties, this linkage connects the coastal habitats of Cleveland National Forest and Cuyamaca Rancho State Park in the Peninsular Ranges with the desert communities of Anza-Borrego Desert State Park. The linkage contains a number of rare and sensitive natural communities, including coastal sage scrub, grassland, meadow, palm oasis, coast live oak forest and Engelmann oak woodland, which provide habitat for wildlife species such as mountain lion, black-tailed jackrabbit, grasshopper sparrow, granite night lizard and Sonoran blue butterfly (South Coast Wildlands n.d).

Significant conservation investments already exist in the region, but the resource values they support could be irreparably harmed by loss of connections between them. The Peninsular-Borrego linkage connects two expansive core areas that are largely conserved within Cleveland National Forest, Anza Borrego and Cuyamaca State Parks, and BLM-administered land. There are also several Wilderness Study Areas on lands managed by the BLM, including Beauty Mountain, Los Coyotes, San Felipe Hills, Sawtooth Mountain additions, and Carrizo Gorge additions (South Coast Wildlands n.d).

Parque-to-Park Linkage. Located in Anza-Borrego Desert State Park, San Diego and Imperial counties, and Parque Constitución de 1857, Baja California, this continental-scale linkage along the Peninsular Ranges will ensure cross-border connectivity through the eastern edge of the South Coast Ecoregion and the Sonoran Desert. Completing this linkage will allow the endangered Peninsular bighorn sheep to repopulate the Sierra Juárez in northern Baja, and encourage bi-national collaboration in managing bighorn sheep and other wildlife populations (South Coast Wildlands n.d).

3.6.3.4 Rangeland

Rangelands have been set aside for livestock grazing or management of wild horses or burros on BLM lands across the country. The BLM designates Grazing Allotments and Herd Management Areas (HMAs) in several areas of the arid west. The purpose of BLM rangeland management is to provide oversight of permitted grazing allotments in order to preserve the health of natural ecosystems by limiting the impact of human-introduced livestock (BLM 2008).

The Chocolate-Mule Mountains (CA0671) Herd Area (HA) (unmanaged portion of an HMA where wild horses or burros were found at the time the Wild Horse and Burros Act was passed in 1971), intersects the southeast corner of the West Chocolate Mountains REEA. Approximately 1,184 acres of the Chocolate-Mule Mountains HA is in the REEA. This HA is delineated for wild burros of which there was a population of 90 in 2006 (BLM 2006). The Chocolate-Mule Mountains HA is comprised of approximately 341,000 acres of BLM land, of which approximately 151,000 is managed as an HMA by the BLM. The Appropriate Management Level (AML) is 121 (BLM 2006). Six burros were found outside the HA but within the West Chocolate Mountains REEA when the BLM conducted trapping approximately two years ago (Neibergs 2012).

3.7 Fish and Wildlife

This section identifies existing fish and wildlife resources within the West Chocolate Mountains REEA and discusses applicable regulations. During the scoping period, meetings were conducted with the public and government agencies to identify their concerns. Written comments were also received. The following issues related to fish and wildlife were raised during scoping: new permit regulations for golden eagles (*Aquila chrysaetos*); species/habitat impacts due to shade from solar collectors, particularly to avian species; invasive/exotic species and their management; the need for biological surveys; wildlife movement; comprehensive review of the flat-tailed horned lizard (*Phrynosoma mcallii*); the Wister Unit of the Imperial Wildlife Area; appropriate use of lands acquired for conservation; and compatibility of wind energy with bat and avian species. These comments are addressed in Section 3.7.3, Existing Conditions, and in Chapter 4, Environmental Consequences, Section 4.7.

3.7.1 Definition of the Resource

Fish and wildlife refer to all the vertebrate and invertebrate life forms that occur or have potential to occur in the area.

3.7.2 Applicable Plans, Policies, and Regulations

3.7.2.1 Federal

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703-711) is administered by the USFWS. The Act prohibits the taking, killing, possession, and transportation of migratory birds, their eggs, and nests. Section 3513 of California Fish and Game Code adopts the MBTA's provisions. The MBTA has no provision for allowing unauthorized take. However, the USFWS focuses enforcement on take occurrences where all reasonable, prudent, and effective take avoidance measures were not identified and implemented. Almost all migratory bird species are protected by the MBTA (836 species in all), with the exception of non-native species and certain game birds.

Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (BGEPA) makes it illegal to take bald eagles (*Haliaeetus leucocephalus*), golden eagles, or to trade in eagle parts, eggs, or feathers. Take has also been broadly interpreted to include altering or disturbing nesting habitat. The USFWS has new regulations (FR 74:46836-46879; 11 September 2009) that may eventually allow renewable energy projects to receive bald or golden eagle take permits for programmatic actions that are consistent with the USFWS goal of stable or increasing eagle breeding populations (USFWS 2010). Development of an Avian and Bat Protection Plan can demonstrate that a project is consistent with achieving USFWS goals. The USFWS is concerned by golden eagle population trends shown in long-term studies; therefore, until further data shows that golden eagle populations can withstand additional take, the USFWS will only consider BGEPA take permit issuance for safety emergencies and projects that result in net benefits to golden eagles (USFWS 2010).

United States Fish and Wildlife Service Eagle Permits 50 CFR Part 22.26-27

This section of the CFR will require a federal programmatic permit for the incidental take of bald or golden eagles where the take cannot practicably be avoided in the course of an otherwise lawful activity. The regulations have not yet been implemented, but permits may be required in the near future.

3.7.2.2 State

Although state regulations do not apply on federal lands, any project that crosses non-federal lands (such as an access road) thereby triggers a state nexus. In that case, the project proponent is responsible for following all pertinent state laws and regulations and for securing all relevant state permits.

California Fish and Game Code §§3503 and 3503.5

Code §3503 makes it unlawful to take, possess, or needlessly destroy the nest or eggs of any bird. Code §3503.5 makes it unlawful to take, possess, or destroy any birds in the order Falconiformes or Strigiformes (birds of prey) or to take, possess, or destroy the nest or eggs of any such bird. Construction disturbance during the breeding season that results in the incidental loss of fertile eggs or nestlings, or otherwise leads to nest abandonment, is considered take. Disturbance that causes nest abandonment and/or loss of reproductive effort is also considered take by the CDFG.

California Fish and Game Code §§3511 and 5050

Code §§3511 and 5050 prohibit the take and possession of birds and reptiles listed as "fully protected." The administering agency is the CDFG.

3.7.3 Existing Conditions

Wildlife species abundance and diversity are closely linked with habitat types present, though abundance and distribution may vary by season. In the Colorado Desert and Salton Sea Basin, where the dominant habitat is sparsely vegetated creosote bush scrub, wildlife species have established populations in this unique and seemingly inhospitable landscape. Dominant plant species in creosote bush scrub habitat include creosote bush (*Larrea tridentata*) and bursage (*Ambrosia dumosa*).

Because of limited hydrological connection among water bodies within the desert, fish distribution is also limited. Most native fish species are small and endemic to isolated springs, lakes, and small streams (Moyle and Cech 2004). Some streams continually flow through desert regions, terminating in closed lakes or dissipating in the sand, while other streams originate from subterranean sources, emerging as springs. Springs occur throughout the desert ecosystem, and often emerge as quiet pools or trickles.

3.7.3.1 Wildlife

Desert wildlife species are adapted to survive under extreme environmental conditions, including low, erratic rainfall and highly variable temperatures. Many small desert mammals require no free-standing water, but are able to survive through physiological adaptations and on

behavior strategies that minimize water needs and usage. For example, reptiles and small mammals are active mostly at night and retreat to cool burrows or seek shelter under vegetation or in rock outcrops to avoid the heat of the midday sun and to reduce water loss.

A variety of reptiles and amphibians utilize the West Chocolate Mountains REEA, such as the Great Plains toad (*Anaxyrus cognatus*), Couch's spadefoot toad (*Scaphiopus couchii*), and desert spiny lizard (*Sceloporus magister*). These species are well-adapted to extremely dry conditions in areas with sandy, well-drained soils often occupied by creosote bush and mesquite trees. Desert washes also provide essential habitat to some species that utilize increased moisture and vegetation in these areas (CaliforniaHerps.com 2010).

Talus slopes, cliffs, and rock outcrops provide nesting and feeding habitat, thermal and escape cover, and resting sites for a variety of wildlife. In addition, the extensive root systems of desert plants such as creosote bush provide access to subsurface openings for toads, salamanders, lizards, snakes, and small mammals. Many other small wildlife species may create burrows in open areas to escape the heat or predators. For example, the flat-tailed horned lizard has been observed retreating to a burrow when daytime surface temperatures have approached 120°F (BLM 2003).

Areas of the Salton Sea Basin, including the West Chocolate Mountains REEA, are home to a variety of resident and migrating and wintering birds (USFS 1998). Resident birds, including the cactus wren (*Campylorhynchus brunneicapillus*) and Le Conte's thrasher (*Toxostoma lecontei*), feed on insects (i.e., grasshoppers, large beetles, moths, and crickets) and spiders. Other species, such as the red-tailed hawk (*Buteo jamaicensis*) feed on a vast array of small mammals, including mice, rats, voles, and gophers. Bats are also fairly common in the area. The California leaf-nosed bat (*Macrotus californicus*) is found from Riverside, Imperial, San Diego, and San Bernardino counties south to the Mexico border. Desert populations have declined, but this species is fairly common in some areas along the Colorado River. Habitats occupied include desert riparian, desert wash, desert scrub, desert succulent shrub, alkali desert scrub, and palm oasis (CDFG 2010). The California leaf-nosed bat feeds on a variety of flying and flightless insects, including orthopterans, sphingid and noctuid moths, beetles, and cicadas (CDFG 2010). The California myotis (*Myotis californicus*) is a common species found throughout California. It is common to abundant below 6,000 feet. Optimal habitats for this species include all desert, chaparral, woodland, and forest from sea level up through ponderosa pine, mixed conifer, and Jeffrey pine (CDFG 2010).

The Salton Sea is a vital link in the Pacific Flyway as birds migrate along this coastal corridor. The Sonny Bono Salton Sea National Wildlife Refuge, near Niland on the eastern shore, helps support the bird population. Migratory birds within the West Chocolate Mountains REEA include merlin (*Falco columbarius*), California brown pelican (*Pelecanus occidentalis californicus*), and California black rail (*Laterallus jamaicensis coturniculus*). The Salton Sea Basin is important to these bird species as the area provides ample food sources during migrations north or south.

Important Bird Areas

The Salton Sea is arguably the most important body of water for birds in the interior of California and, as such, is categorized as a global Important Bird Area. Several bird species

occur regularly here and nowhere else in western North America, contributing to the exceptionally high year-round diversity of birds.

Birds that utilize the Salton Sea include the laughing gull, wood stork, yellow-footed gull, and stilt sandpiper. The rare vanrossemii race of gull-billed tern breeds in the U.S. only here and at San Diego Bay. The wintering population of eared grebes on the sea is the largest concentration in the world and they are joined by thousands of western and Clark's grebes. Each summer, tens of thousands of American white pelicans descend on the Salton Sea, in total, about 30 percent of the North American breeding population. Mullet Island, near the mouth of the Alamo River, hosts one of the largest breeding colonies of double-crested cormorants in western North America. About 40 percent of the U.S. population of Yuma clapper rail occurs in marshes here. The resident snowy plovers represent one of the largest aggregations in the interior of the U.S., with most of the birds concentrated along the shoreline and adjacent alkali flats in the southwest and southeast corners of the sea. The thousands of black terns summering on the sea may be the largest concentration in North America. Waterfowl and shorebirds tend to concentrate primarily along the southeast shoreline and secondarily in the north. Waders and their rookeries have also been found to concentrate in the far north and in the southeast. Land bird populations are strongest in remaining areas of native desert scrub or riparian habitat, including along the main rivers and creeks leading into the sea, and within the Torres Martinez Indian Reservation on the north side of the Sea (National Audubon Society 2012).

A variety of mammal species are found in the surrounding habitat as well. These include desert pocket mice (*Perognathus* spp.), desert kangaroo rat (*Dipodomys deserti*), rabbits, and ground squirrels. In addition, large wildlife species such as mule deer seek the protection of the heavier vegetation. Mule deer rarely travel far from water or forage, and tend to bed down within easy walking distance of both. This species typically forages around dawn and dusk while bedding down in protected areas during mid-day; however, in the arid climates (such as the Salton Sea Basin), mule deer may migrate in response to rainfall patterns. Mule deer frequently visit guzzlers and canals in the area, and during hot summers, deer may concentrate along the Coachella Canal where water is available and wash woodland provides cover (BLM 2002). Mule deer is a game species that is actively hunted in the area.

Another larger wildlife species that may occur in the West Chocolate Mountains REEA is the coyote (*Canis latrans*). This opportunistic predator preys upon small mammals such as rabbits and squirrels, which comprise the bulk of its diet. Like the mule deer, coyotes tend to be more active during the early morning and sunset. This inactivity during the heat of the day exhibited by both the coyote and mule deer is a behavioral adaptation to the desert environment that conserves water and maintains the body temperature within livable limits.

3.7.3.2 Fish and Aquatic Species

Surface water resources are limited in the arid environment of the West Chocolate Mountains REEA; however, there are fish-bearing waters including canals, springs, seeps, and small streams within this area. Originally, there was only one native fish adapted to this environment when Euro-Americans arrived: the desert pupfish (*Cyprinodon macularius*) (Moyle 2002), now federally and state listed as endangered (see Section 3.9, Special Status Species, for discussion of this species). Various other fish species have made their way to the Salton Sea watershed via introductions and from the Colorado River. The Salton Sea is considered to have

the most productive fishery in the nation, if not the world (Salton Sea Authority 2010). It has been stocked with several salt-water sportfish: orange mouth corvina (*Cynoscion xanthulus*), sargo (*Anisotremus davidsonii*), and gulf croaker (*Micropogonias megalops*). In the mid to late 1970s, tilapia (*Tilapia* spp.) inadvertently entered the Sea and flourished (Salton Sea Authority 2010). Even though they are subject to die-offs from low temperatures and low oxygen levels, they breed often and their populations reach high levels. Currently the number of tilapia have declined, part of what seems to be a cyclical pattern of expansion and decline. Scientists are studying the population dynamics of the tilapia (Salton Sea Authority 2010). Other nongame fish include sailfin mollies (*Poecilia latipinna*) and various species of carp.

3.8 Special Status Species

This section identifies existing and potential special status species within and adjacent to the West Chocolate Mountains REEA and discusses applicable regulations. During the scoping period, meetings were conducted with the public and government agencies to identify their concerns. Written comments were also received. The following issues related to special status species were raised during scoping: new permit regulations for golden eagles; species/habitat impacts due to shade from solar collectors, particularly to avian species; invasive species management and invasive/exotic species effects on special status species; the need for biological surveys; desert tortoises (*Gopherus agassizii*); a comprehensive review of flat-tailed horned lizards; burrowing owls (*Athene cunicularia*); wildlife movement; the Wister Unit of the Imperial Wildlife Area; appropriate use of lands acquired for conservation; and compatibility of wind energy with bat and avian species.

Comments regarding special status species also included requests to configure the boundary of the West Chocolate Mountains REEA around habitat for desert tortoise, flat-tailed horned lizard, and burrowing owl. These comments are addressed in Section 3.8.3, Existing Conditions, and in Chapter 4, Environmental Consequences, Section 4.8. More specific information would be gathered and considered, as appropriate, during decision making regarding individual projects in the future, when more is known about specific locations and technologies to be used.

3.8.1 Definition of the Resource

Special status plant species include federally-listed endangered, threatened, proposed, and candidate plant species; California state listed endangered, threatened, and rare plant species; and BLM sensitive plant species. Special status wildlife species include federally listed endangered or threatened fish and wildlife; California state listed endangered, threatened, or wildlife species of special concern; and BLM sensitive wildlife species. A special status species is considered to be a potential inhabitant of the West Chocolate Mountains REEA if its known geographical distribution encompasses part of the REEA or if its distribution is near the site. For special status wildlife species, the presence of general habitat requirements (such as roosting, nesting, spawning/mating, or foraging habitat, or a permanent water source) is an additional indicator of a species inhabiting the REEA.

3.8.2 Applicable Plans, Policies, and Regulations

3.8.2.1 Federal

Endangered Species Act

The ESA, as amended, provides for federal protection of plant and animal species listed as threatened or endangered by the federal government. The USFWS administers the ESA on behalf of the United States. The ESA makes it unlawful for anyone to harm a plant or animal listed as threatened or endangered by participating in activities such as authorizing, funding, or carrying out actions that could affect the species itself or its known habitat. The major components of the ESA are as follows:

1. Provisions for the listing of threatened and endangered species;
2. The requirement for consultation with the USFWS on federal projects;
3. Prohibitions against "take" of listed species. Under the ESA, the definition of "take" is to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct;" and
4. Provisions to allow the incidental taking of threatened and endangered species.

Endangered Species Act, Section 7 Consultation

If a proposed plan has the potential to affect a listed species or designated critical habitat, formal consultation is required except when the USFWS concurs, in writing, that a proposed plan "is not likely to adversely affect" listed species or designated critical habitat (50 CFR §§402.02 and 402.13).

During the Section 7 consultation process the USFWS determines whether a proposed plan is likely to jeopardize the continued existence of a listed species or destroy or adversely modify designated critical habitat. The consultation concludes with a biological opinion and an incidental take statement issued by the USFWS.

Migratory Bird Treaty Act

The MBTA prohibits "take" (i.e., killing, harassing, trapping, or attempting to do so) of native migratory bird species. The MBTA implements various treaties and conventions between the United States, Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Birds protected under the MBTA include all common songbirds, waterfowl, shorebirds, hawks, owls, eagles, ravens, crows, native doves and pigeons, swifts, martins, swallows, and others, including their body parts (feathers, plumes, etc.), occupied nests, and eggs. The Act makes it unlawful to pursue, hunt, take, capture, or kill, attempt to take, capture, or kill, possess, offer to or sell, barter, purchase, deliver, or cause to be shipped, exported, imported, transported, carried, or received any migratory bird, part, nest, egg or product, manufactured or not, without a permit.

Bald and Golden Eagle Protection Act

The BGEPA makes it illegal to take bald and golden eagles or to trade in eagle parts, eggs, or feathers. Take has been broadly interpreted to include activities such altering or disturbing nesting habitat. The BGEPA prohibits taking without a permit, or taking with wanton disregard for the consequences of an activity, any bald or golden eagle or their body parts, nests, chicks, or eggs, which includes collection, molestation, disturbance, or killing. The BGEPA protections include provisions not included in the MBTA, such as the protection of unoccupied nests and a prohibition on disturbing eagles. The BGEPA includes limited exceptions to its prohibitions through a permitting process, including exceptions to take golden eagle nests that interfere with resource development or recovery operations.

United States Fish and Wildlife Service Eagle Permits 50 CFR Part 22.26-27

This section of the CFR will require a federal programmatic permit for the incidental take of bald or golden eagles where the take cannot practicably be avoided in the course of an otherwise lawful activity. The regulations have not yet been implemented, but permits may be required in the near future.

California Desert Conservation Area Plan: Wildlife Element

The CDCA Plan contains provisions and guidance for public land use management in the California Desert District under BLM jurisdiction. Specifically it provides delineation of desert tortoise habitat on public land in three management categories as follows:

- Category I Goal: Maintain stable, viable populations and increas populations where possible.
- Category II Goal: Maintain stable, viable populations.
- Category III Goal: Limit declines to the extent possible using mitigation measures.

3.8.2.2 State

California Endangered Species Act

State listed threatened and endangered species are not consulted on with the USFWS if a project remains wholly within the boundaries of federal lands. However, if any portion of a proposed action crosses through any non-federal lands within the state of California, then the proponent must consult with the California Department of Fish and Game through CESA. The CESA establishes legal protection for threatened and endangered plants and wildlife. The CDFG also identifies species of concern as those that may become listed as threatened or endangered due to loss of habitat, limited distributions, and diminishing population sizes, or because the species is deemed to have scientific, recreational, or educational value.

California Fish and Game Codes §§3511 and 5050

Sections 3511 and 5050 of the California Fish and Game Code prohibit the taking and possession of birds and reptiles listed as “fully protected.” The classification of fully protected was California's initial effort in the 1960's (pre-ESA) to identify and provide additional protection to those animals that were rare or faced possible extinction. The California Fish and

Game Code sections dealing with fully protected species state that these species ". . . . may not be taken or possessed at any time and no provision of this code or any other law shall be construed to authorize the issuance of permits or licenses to take any fully protected" species, although take may be authorized for necessary scientific research. This language arguably makes the fully protected designation the strongest and most restrictive regarding the take of these species. In 2003, the code sections dealing with fully protected species were amended to allow the CDFG to authorize take resulting from recovery activities for state-listed species. The administering agency is the CDFG.

3.8.3 Existing Conditions

Numerous plant and wildlife species are considered special status species in California. A literature search for special status plant and wildlife species known to occur or with a potential to occur within West Chocolate Mountains REEA and surrounding region (area from the Salton Sea to the peaks of the Chocolate Mountains) was conducted by consulting the following lists: the CDFG's California Natural Diversity Database (CNDDB), the CNPS's Electronic Inventory, the USFWS Threatened and Endangered Species System database, and the BLM's *California Sensitive Plants* and *Special Status Wildlife Species*. Previously recorded locations of special status species are shown on Figure 3.8-1.

3.8.3.1 Plants

Special status plants include the following:

- Federal Endangered, Threatened, Proposed and Candidate plants;
- BLM Sensitive plants. Plants designated for special management consideration by the BLM. Federal Candidate species, California State Endangered, Threatened, and Rare species, and CNPS List 1B species are considered BLM Sensitive.
- CNPS Inventory of Rare and Endangered Plants of California species are also considered in this document; however, CNPS rare plants are not all included under the BLM definition of "Special Status Plants" (BLM 2010).

It is BLM policy (6840.01-.02) to manage for the conservation of special status plants and their associated habitats and to ensure that actions authorized, funded, or carried out do not contribute to the likelihood or the need to list any sensitive species as threatened or endangered (BLM 2010).

Special status plants reviewed for potential to occur in the West Chocolate Mountains REEA included those on the BLM El Centro Field Office List, those with CNPS or CNDDB occurrence records anywhere in Imperial County, and those with CNPS or CNDDB occurrence records within a 27-quadrangle search area in Riverside County running from the Indio USGS 7.5' quadrangle to the Chuckwalla Spring quadrangle. This large search area for rare plant records was used because Imperial County is severely lacking in both current and historical plant survey data. Several new species range extensions have been discovered due to recent required surveys conducted on behalf of other proposed projects in the county.

Special status plant species reviewed for potential to occur in the West Chocolate Mountains REEA are listed in Table 3.8-1, which is provided at the conclusion of this

subsection. The table provides each species' status, preferred habitat, elevation range, bloom period, occurrence information, source for inclusion on the REEA review list, and potential to occur in the REEA. Potential to occur ranges from 'high' to 'absent' and is based on habitat, elevation, and known occurrences within 5 miles of the REEA. Species with a high potential to occur are those with known occurrences within 5 miles of the REEA and with elevation ranges and habitat requirements that are present in the REEA.

These species include Chaparral sand-verbena (*Abronia villosa* var. *aurita*), Salton milk-vetch (*Astragalus crotalariae*), Harwood's milk-vetch (*Astragalus insularis* var. *harwoodii*), Peirson's milk-vetch (*Astragalus magdalenae* var. *peirsonii*), sand evening-primrose (*Camissonia arenaria*), Abram's spurge (*Chamaesyce abramsiana*), California saw-grass (*Cladium californicum*), Las Animas colubrina (*Colubrina californica*), Wiggins' croton (*Croton wigginsii*), glandular ditaxis (*Ditaxis claryana*), Algodones Dunes sunflower (*Helianthus niveus* ssp. *tephrodes*), slender-spined all thorn (*Koeberlinia spinosa* ssp. *tenuispina*), slender cottonheads (*Nemacaulis denudata* var. *gracilis*), giant Spanish-needle (*Palafoxia arida* var. *gigantea*), sand food (*Pholisma sonorae*), and Orocopia sage (*Salvia greatae*).

Federally Listed Special Status Plants

Four special status plant species were identified, and detailed descriptions of these plants are included below. Species status designations are also provided and are abbreviated as follows: Federal Endangered (FE); Federal Threatened (FT); State Endangered (SE); and State Rare (SR).

Peirson's milk-vetch (*Astragalus magdalenae var. peirsonii*) – FT, SE

Peirson's milk-vetch is a federally threatened and California state listed endangered species found in a very limited range in the United States. It occurs in the desert dune vegetation community and is known only from the Algodones Dune in extreme southeast California. It is a large, short-lived, perennial plant in the pea and bean family. It has the largest seeds of any milk-vetch. Large seeds enable the plant to use a greater amount of stored resources while germinating in the deep sand that is prevalent in the desert dunes they inhabit (BLM 2011). Peirson's milk-vetch has been observed within 5 miles of the REEA (CNPS 2010). This species has a high potential for occurring in the REEA.

Triple-ribbed milk-vetch (*Astragalus tricarinatus*) – FE

Triple-ribbed milk-vetch is a federally endangered species that is endemic to California. This plant is found only in San Bernardino and Riverside counties, with a majority of documented sites occurring in Morongo Canyon, Mission Creek, and Whitewater River areas (NPCP 2007). It is a showy but short-lived perennial with creamy flowers and distinctive seed pods. This species can be found in various vegetation communities including creosote bush scrub, but typically inhabits rocky upland ridges and slopes at elevations of 1,300 to 4,000 feet. They are typically observed in sandy or gravelly soil that is often disturbed and generally adjacent to desert habitat (Sanders, n.d.). Triple-ribbed milk-vetch has been observed within 5 miles of the West Chocolate Mountains REEA (CNDDB 2010). However, as suitable habitat is not prevalent, this species has a moderate potential for occurrence in the REEA.

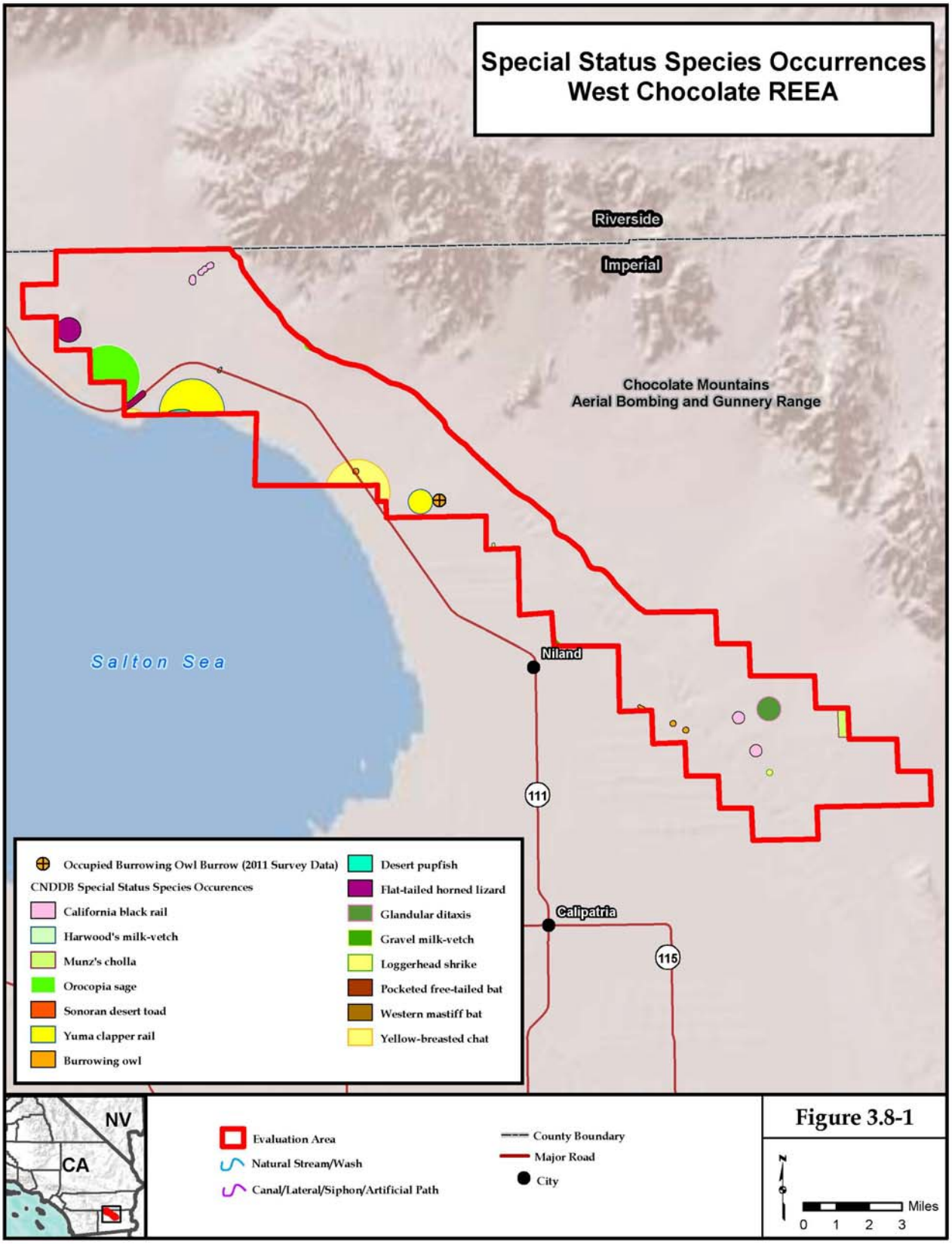
Special Status Species Occurrences
West Chocolate REEA
Riverside
Imperial
Chocolate Mountains
Aerial Bombing and Gunnery Range
Salton Sea
Niland
111
Calipatria
115
Occupied Burrowing Owl Burrow (2011 Survey Data)
CNDDB Special Status Species Occurences
California black rail
Harwood's milk-vetch
Munz's cholla
Orocopia sage
Sonoran desert toad
Yuma clapper rail
Burrowing owl
Desert pupfish
Flat-tailed horned lizard
Glandular ditaxis
Gravel milk-vetch
Loggerhead shrike
Pocketed free-tailed bat
Western mastiff bat
Yellow-breasted chat
NV
CA
Evaluation Area
Natural Stream/Wash
Canal/Lateral/Siphon/Artificial Path
County Boundary
Major Road
City
Miles
0 1 2 3

Figure 3.8-1

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San Diego button-celery (*Eryngium aristulatum var parishii*) – FE, SE

San Diego button-celery is a federally and California state listed endangered species ranging from Mexico, north along the western California border, to the Santa Rosa plateau in Riverside County. It is a perennial herb in the carrot family that spreads and grows erect. The plant appears prickly due to spiny lobes on its toothed leaves (USFWS 1998). This species prefers moist habitat conditions including vernal pools or mima mound areas, and would most likely be found in wetland vegetation communities. It is not entirely vernal pool obligate, and can tolerate living in peripheral vernal pool habitat. Gravelly loams appear to provide optimal soils (Reiser 1994a). No occurrences of San Diego button-celery have been recorded within 5 miles of the West Chocolate Mountains REEA; however, suitable habitat for this species may exist. Therefore, this species has a low potential for occurrence in the REEA.

Mexican flannelbush (*Fremontodendron mexicanum*) – FE, SR

Mexican flannelbush is a federally endangered and California state rare species known only in San Diego County. It is a large shrub that occurs in closed cone coniferous forest and chaparral habitats with rocky silt loams or in the alluvium of watercourses (Reiser 1994b). No occurrences of Mexican flannelbush have been recorded within 5 miles of the West Chocolate Mountains REEA, and preferred habitats, such as woodland or grassland vegetation communities, do not occur for this species. Therefore, this plant is presumed to be absent from the REEA.

BLM Sensitive and California State Listed Plant Species

In addition to the federally listed special status plant species described above, other BLM and state listed plant species may occur in the proposed evaluation area (Table 3.8-1). Many of these species can be found in more than one of the various vegetation communities described in Section 3.6.3. Nearly all of these plants may be found in the pervading creosote bush scrub-type vegetation community, which includes Sonoran desert scrub, Mojavean desert scrub, and other scrub habitats.

These plant species include: pygmy lotus (*Acmispon haydonii; Lotus haydonii*), Watson's amaranth (*Amaranthus watsonii),* desert sand-parsley (*Ammoselinum giganteum),* Salton milk-vetch, Borrego milk-vetch (*Astragalus lentiginosus* var. *borreganus),* Providence Mountains milk-vetch (*Astragalus nutans),* California ayenia (*Ayenia compacta),* little-leaf elephant tree (*Bursera microphylla),* pink fairy-duster (*Calliandra eriophylla),* sand evening-primrose, white pygmy-poppy (*Canbya candida),* saguaro (*Carnegiea gigantean),* Peirson's pincushion (*Chaenactus carphoclinia* var. *peirsonii),* Abram's spurge, Arizona spurge (*Chamaesyce arizonica),* Las Animas colubrine, spiny abrojo (*Condalia globosa* var. *pubescens*), foxtail cactus (*Coryphantha alversonii*), winged cryptantha (*Cryptantha holoptera*), Munz's cholla (*Cylindropuntia munzii; Opuntia munzii*), Wolf's cholla (*Cylindropuntia wolfii*), Colorado Desert larkspur (*Delphinium parishii* ssp. *subglobosum*), Arizona cottontop (*Digitaria californica*), glandular ditaxis, California ditaxis (*Ditaxis serrata* var. *californica*), annual rock-nettle (*Eucnide rupestris*), Utah vine milkweed (*Funastrum utahense; Cynanchum utahense*), Parish's club-cholla (*Grusonia parishii*), curly herissantia (*Herissantia crispa*), pink velvet-mallow (*Horsfordia alata*), Newberry's velvet-mallow (*Horsfordia newberryi*), slender-leaved ipomopsis (*Ipomopsis tenuifolia*), Santa Rosa Mountains leptosiphon (*Leptosiphon floribundus* ssp. *Hallii*), Mountain Springs bush lupine (*Lupinus excubitus* var. *medius*), Parish's desert-thorn (*Lycium*

parishii), Palmer's lyrepod (*Lyrocarpa coulteri* var. *palmeri*), brown turbans (*Malperia tenuis*), spearleaf (*Matelea parvifolia*), hairy stickleaf (*Mentzelia hirsutissima*), Darlington's blazing star (*Mentzelia puberula*), creamy blazing star (*Mentzelia tridentate*), low bush monkeyflower (*Mimulus aridus*), slender-lobed four o'clock (*Mirabilis tenuiloba*), Wiggins' cholla (*Opuntia wigginsii*), San Jacinto beardtongue (*Penstemon clevelandii* var. *conatus*), Thurber's beardtongue (*Penstemon thurberi*), slender-stem bean (*Phaseolus filiformis*), Arizona pholistoma (*Pholistoma auritum* var. *arizonicum*), Thurber's pilostyles (*Pilostyles thurberi*), desert unicorn-plant (*Proboscidea althaeifolia*), Orocopia sage, desert spike-moss (*Selaginella eremophila*), Coves' cassia (*Senna covesii*), mesquite neststraw (*Stylocline sonorensis*), Hall's tetracoccus (*Tetracoccus hallii*), mecca-aster (*Xylorhiza cognate*), and Orcutt's woody-aster (*Xylorhiza orcuttii*).

Additionally, some plant species may also be found in other, less dominant vegetation communities. In the saltbush scrub community, Emory's crucifixion thorn (*Castela emoryi*), Southwestern spiny rush *(Juncus acutus* ssp*. Leopoldii*), Cooper's rush (*Juncus cooperi*), Owens Valley checkerbloom (*Sidalcea covillei*), dwarf germander (*Teucrium cubense* spp. *depressum*), Palmer's jackass clover (*Wislizenia refracta* spp. *palmeri*), and jackass clover (*Wislizenia refracta* spp. *refracta*) may also occur.

In the desert wash vegetation community the Baja California ipomopsis (*Ipompsis effusa*) and Latimer's woodland-gilia (*Saltugilia latmier*) may also occur.

In the wetland vegetation communities, California saw-grass, California satintail (*Imperata brevifolia*), bitter hymenoxys (*Hymenoxys odorata*), Southwestern spiny rush, Cooper's rush, slender-spined all thorn, mud nama (*Nama stenocarpum*), Owen's Valley checkerbloom, and San Bernardino aster (*Symphyotrichum defoliatum*) may also occur.

In the desert dunes vegetation community, chaparral sand verbena (*Abronia villosa* var. *aurita; Abronia umbellata*), Harwood's milk-vetch, flat-seeded spurge (*Chamaesyce platysperma* (*Euphorbia platyspermum*), Wiggins' croton, ribbed cryptantha (*Cryptantha costata*), Gander's cryptantha (*Cryptantha ganderi*), Harwood's woolystar (*Eriastrum harwoodii*), Algodones Dunes sunflower, slender cottonheads, giant Spanish-needle, sand food, dwarf germander, Palmer's jackass clover, and jackass clover may also occur.

Due to lack of suitable vegetative community habitat in the proposed evaluation area, Laguna Mountains aster (*Dieteria asteroides var. lagunensis; Machaeranthera asteroides var. lagunensis*), San Benito poppy (*Eschscholzia hypecoides*), sticky geraea (*Geraea viscida*), Mexican hulsea (*Hulsea mexicana*), and southern jewel-flower (*Streptanthus campestris*) are not expected to occur in the West Chocolate Mountains REEA.

Table 3.8-1. Special Status Plant Species Reviewed for Potential to Occur in the West Chocolate Mountains REEA

Scientific Name	Common Name	Status[1]	Habitat	Elevation (meters)	Bloom Period	Occurrence List[2]	Record within 5 miles of REEA[3]	Potential to Occur[4]
Abronia villosa var. *aurita* (*Abronia umbellata*)	Chaparral sand-verbena	BLMS 1B.1	Sandy Chaparral Coastal scrub Desert dunes	80-1600	Jan-Sep	BLM EC CNPS IC CNDDB IC CNPS RC	CNPS	High
Acmispon haydonii (*Lotus haydonii*)	Pygmy lotus	1B.3	Rocky Pinyon and juniper woodland Sonoran desert scrub	520-1200	Jan-Jun	BLM EC CNDDB IC	none	Absent
Amaranthus watsonii	Watson's amaranth	4.3	Mojavean desert scrub Sonoran desert scrub	20-1700	Apr-Sep	CNPS IC	none	Moderate
Ammoselinum giganteum	Desert sand-parsley	2.3	Sonoran desert scrub	NA	Mar-Apr	CNDDB RC	none	Moderate
Astragalus crotalariae	Salton milk-vetch	4.3	Sonoran desert scrub (sandy or gravelly)	-60-250	Jan-Apr	CNPS IC CNPS RC	CNPS	High
Astragalus insularis var. *harwoodii*	Harwood's milk-vetch	2.2	Sandy or gravelly Desert dunes Mojavean desert scrub	0-710	Jan-May	CNPS IC CNDDB IC CNPS RC	CNPS, CNDDB	High
Astragalus lentiginosus var. *borreganus*	Borrego milk-vetch	4.3	Sandy Mojavean desert scrub Sonoran desert scrub	30-270	Feb-May	CNPS IC CNPS RC	none	Moderate
Astragalus magdalenae var. *peirsonii*	Peirson's milk-vetch	FT SE 1B.2	Desert dunes	-55-250	Dec-Apr	BLM EC CNPS IC CNDDB IC	CNPS	High
Astragalus nutans	Providence Mountains milk-vetch	4.3	Sandy or gravelly Joshua tree woodland Mojavean desert scrub Pinyon and juniper woodland Sonoran desert scrub	450-1950	Mar-Oct	CNPS IC	none	Absent

Table 3.8-1. Special Status Plant Species Reviewed for Potential to Occur in the West Chocolate Mountains REEA

Scientific Name	Common Name	Status[1]	Habitat	Elevation (meters)	Bloom Period	Occurrence List[2]	Record within 5 miles of REEA[3]	Potential to Occur[4]
Astragalus tricarinatus	Triple-ribbed milk-vetch	FE 1B.2	Sandy or gravelly Joshua tree woodland Sonoran desert scrub	450-1190	Feb-May	CNDDB	CNPS	Moderate
Ayenia compacta	California ayenia	2.3	Rocky Mojavean desert scrub Sonoran desert scrub	150-1095	Mar-Apr	CNDDB IC CNPS RC CNDDB RC	none	Low
Bursera microphylla	Little-leaf elephant tree	2.3	Sonoran desert scrub (rocky)	200-700	Jun-Jul	CNPS IC CNDDB IC CNPS RC CNDDB RC	none	Absent
Calliandra eriophylla	Pink fairy-duster	2.3	Sonoran desert scrub (sandy or rocky)	120-1,500	Jan-Mar	CNPS IC CNDDB IC CNPS RC CNDDB RC	none	Low
Camissonia arenaria	Sand evening-primrose	2.2	Sonoran desert scrub (sandy or rocky)	-70-915	Nov-May	CNPS IC CNDDB IC CNPS RC CNDDB RC	CNPS	High
Canbya candida	White pygmy-poppy	4.2	Gravelly, sandy, granitic Joshua tree woodland Mojavean desert scrub Pinyon and juniper woodland	600-1460	Mar-Jun	CNPS IC	none	Absent
Carnegiea gigantea	Saguaro	2.2	Sonoran desert scrub (rocky)	50-1500	May-Jun	CNPS IC CNDDB IC	none	Low
Castela emoryi	Emory's crucifixion thorn	2.3	Gravelly Mojavean desert scrub Playas Sonoran desert scrub	90-670	Apr-Jul	CNPS IC CNDDB IC CNPS RC CNDDB RC	none	Moderate
Chaenactus carphoclinia var. *peirsonii*	Peirson's pincushion	1B.3	Sonoran desert scrub (sandy)	3-500	Mar-Apr	CNPS IC CNDDB IC	none	Moderate

Table 3.8-1. Special Status Plant Species Reviewed for Potential to Occur in the West Chocolate Mountains REEA

Scientific Name	Common Name	Status[1]	Habitat	Elevation (meters)	Bloom Period	Occurrence List[2]	Record within 5 miles of REEA[3]	Potential to Occur[4]
Chamaesyce abramsiana	Abram's spurge	2.2	Sandy Mojavean desert scrub Sonoran desert scrub	-5-915	Sep-Nov	CNPS IC CNDDB IC	CNPS	High
Chamaesyce arizonica	Arizona spurge	2.3	Sonoran desert scrub (sandy)	50-300	Mar-Apr	CNPS IC CNDDB IC	none	Moderate
Chamaesyce platysperma (*Euphorbia platyspermum*)	Flat-seeded spurge	BLMS 1B.2	Desert dunes Sonoran desert scrub (sandy)	65-100	Feb-Sep	BLM EC CNPS IC CNDDB IC	none	Moderate
Cladium californicum	California saw-grass	2.2	Meadows and seeps Marshes and swamps Alkaline or Freshwater	60-600	Jun-Sep	CNDDB RC	CNPS	High
Colubrina californica	Las Animas colubrina	2.3	Mojavean desert scrub Sonoran desert scrub	10-1000	Apr-Jun	CNPS IC CNDDB IC CNPS RC CNDDB RC	CNPS	High
Condalia globosa var. *pubescens*	Spiny abrojo	4.2	Sonoran desert scrub	140-1000	Mar-May	CNPS IC	none	Low
Coryphantha alversonii	Foxtail cactus	4.3	Sandy or rocky, usually granitic Mojavean desert scrub Sonoran desert scrub	75-1525	Apr-Jun	CNPS IC CNPS RC CNDDB RC	none	Moderate
Croton wigginsii	Wiggins' croton	BLMS SR 2.2	Desert dunes Sonoran desert scrub (sandy)	50-100	Mar-May	BLM EC CNPS IC CNDDB IC	CNPS, CNDDB	High
Cryptantha costata	Ribbed cryptantha	4.3	Sandy Desert dunes Mojavean desert scrub Sonoran desert scrub	-60-500	Feb-May	CNPS IC	none	Moderate
Cryptantha ganderi	Gander's cryptantha	1B.1	Desert dunes Sonoran desert scrub (sandy)	160-400	Feb-May	CNPS IC	none	Low

Table 3.8-1. Special Status Plant Species Reviewed for Potential to Occur in the West Chocolate Mountains REEA

Scientific Name	Common Name	Status[1]	Habitat	Elevation (meters)	Bloom Period	Occurrence List[2]	Record within 5 miles of REEA[3]	Potential to Occur[4]
Cryptantha holoptera	Winged cryptantha	4.3	Mojavean desert scrub Sonoran desert scrub	100-1690	Mar-Apr	CNPS IC	none	Moderate
Cylindropuntia munzii (*Opuntia munzii*)	Munz's cholla	1B.3	Sonoran desert scrub (sandy or gravelly)	150-600	May	BLM EC CNPS IC CNDDB IC CNPS RC CNDDB RC	CNPS	Moderate
Cylindropuntia wolfii	Wolf's cholla	4.3	Sonoran desert scrub	100-1200	Mar-May	CNPS IC	none	Moderate
Delphinium parishii ssp. *subglobosum*	Colorado Desert larkspur	4.3	Chaparral Cismontane woodland Pinyon and juniper woodland Sonoran desert scrub	600-1800	Mar-Jun	CNPS IC	none	Absent
Dieteria asteroides var. *lagunensis* (*Machaeranthera asteroides* var. *lagunensis*)	Laguna Mountains aster	BLMS SR 2.1	Cismontane woodland Lower montane coniferous forest	80-2400	Jul-Aug	BLM EC	none	Absent
Digitaria californica	Arizona cottontop	2.3	Rocky Mojavean desert scrub Sonoran desert scrub	290-1490	Jul-Nov	CNPS IC CNDDB IC	none	Absent
Ditaxis claryana	Glandular ditaxis	2.2	Sandy Mojavean desert scrub Sonoran desert scrub	0-465	Oct-Mar	CNPS IC CNDDB IC CNPS RC CNDDB RC	CNPS, CNDDB	High
Ditaxis serrata var. *californica*	California ditaxis	3.2	Sonoran desert scrub	30-1000	Mar-Dec	CNPS IC CNPS RC CNDDB RC	none	Moderate
Eriastrum harwoodii		1B.2	Desert dunes	200-415	Mar-Jun	CNPS RC CNDDB RC	none	Absent

Table 3.8-1. Special Status Plant Species Reviewed for Potential to Occur in the West Chocolate Mountains REEA

Scientific Name	Common Name	Status[1]	Habitat	Elevation (meters)	Bloom Period	Occurrence List[2]	Record within 5 miles of REEA[3]	Potential to Occur[4]
Eryngium aristulatum var parishii	San Diego button-celery	FE SE 1B.1	Mesic Coastal scrub Valley and foothill grassland Vernal pools	20-320	Apr-Jun	CNDDB IC	none	Low
Eschscholzia hypecoides	San Benito poppy	4.3	Serpentinite clay Chaparral Cismontane woodland Valley and foothill grassland	200-1500	Mar-Jun	CNPS IC	none	Absent
Eucnide rupestris	Annual rock-nettle	2.2	Sonoran desert scrub	500-600	Dec-Apr	CNPS IC CNDDB IC	none	Absent
Fremontodendron mexicanum	Mexican flannelbush	FE SR 1B.1	Gabbroic, metavolcanic, or serpentinite Closed-cone coniferous forest Chaparral Cismontane woodland	10-716	Mar-Jun	BLM EC	none	Absent
Funastrum utahense (*Cynanchum utahense*)	Utah vine milkweed	4.2	Sandy or gravelly Mojavean desert scrub Sonoran desert scrub	150-1435	Apr-Jun	CNPS IC	none	Low
Geraea viscida	Sticky geraea	2.3	Chaparral (often in disturbed areas)	450-1700	May-Jun	CNPS IC CNDDB IC	none	Absent
Grusonia parishii	Parish's club-cholla	2.2	Sandy, rocky Joshua tree woodland Mojavean desert scrub Sonoran desert scrub	300-1524	May-Jul	CNPS IC	none	Absent
Helianthus niveus ssp. *tephrodes*	Algodones Dunes sunflower	BLMS SE 1B.2	Desert dunes	50-100	Sep-May	BLM EC CNPS IC CNDDB IC	CNPS	High
Herissantia crispa	Curly herissantia	2.3	Sonoran desert scrub	700-725	Apr-Sep	CNDDB IC	none	Absent

Table 3.8-1. Special Status Plant Species Reviewed for Potential to Occur in the West Chocolate Mountains REEA

Scientific Name	Common Name	Status[1]	Habitat	Elevation (meters)	Bloom Period	Occurrence List[2]	Record within 5 miles of REEA[3]	Potential to Occur[4]
Horsfordia alata	Pink velvet-mallow	4.3	Sonoran desert scrub (rocky)	100-500	Feb-Dec	CNPS IC	none	Low
Horsfordia newberryi	Newberry's velvet-mallow	4.3	Sonoran desert scrub (rocky)	3-800	Feb-Dec	CNPS IC	none	Low
Hulsea mexicana	Mexican hulsea	2.3	Chaparral (volcanic, often on burns or disturbed areas)	not available	Apr-Jun	CNPS IC CNDDB IC	none	Absent
Hymenoxys odorata	Bitter hymenoxys	2	Sandy Riparian scrub Sonoran desert scrub	45-150	Feb-Nov	CNPS IC CNDDB IC	none	Moderate
Imperata brevifolia	California satintail	2.1	Mesic Chaparral Coastal scrub Mojavean desert scrub Meadows and seeps often alkali Riparian scrub	0-500	Sep-May	CNPS IC CNDDB IC	none	Low
Ipomopsis effusa	Baja California ipomopsis	2.1	Sandy Chaparral Sonoran desert scrub (alluvial fan)	0-100	Apr-Jun	CNPS IC CNDDB IC	none	Moderate
Ipomopsis tenuifolia	Slender-leaved ipomopsis	2.3	Gravelly or rocky Chaparral Pinyon and juniper woodland Sonoran desert scrub	100-1200	Mar-May	CNPS IC CNDDB IC	none	Low
Juncus acutus ssp. *leopoldii*	Southwestern spiny rush	4.2	Coastal dunes (mesic) Meadows and seeps (alkaline seeps) Marshes and swamps (coastal salt)	3-900	May-Jun	CNPS IC	none	Moderate

Table 3.8-1. Special Status Plant Species Reviewed for Potential to Occur in the West Chocolate Mountains REEA

Scientific Name	Common Name	Status[1]	Habitat	Elevation (meters)	Bloom Period	Occurrence List[2]	Record within 5 miles of REEA[3]	Potential to Occur[4]
Juncus cooperi	Cooper's rush	4.3	Meadows and seeps (mesic, alkaline or saline)	-260-1770	Apr-Aug	CNPS IC	none	Moderate
Koeberlinia spinosa ssp. *tenuispina*	Slender-spined all thorn	2.2	Riparian woodland Sonoran desert scrub	150-510	May-Jul	CNPS IC CNDDB IC	CNPS, CNDDB	High
Leptosiphon floribundus ssp. *hallii*	Santa Rosa Mountains leptosiphon	1B.3	Pinyon and juniper woodland Sonoran desert scrub	1000-2000	May-Jul	CNDDB RC	none	Absent
Lupinus excubitus var. *medius*	Mountain Springs bush lupine	BLMS 1B.3	Pinyon and juniper woodland Sonoran desert scrub	425-1370	Mar-May	BLM EC CNPS IC CNDDB IC	none	Absent
Lycium parishii	Parish's desert-thorn	2.3	Coastal scrub Sonoran desert scrub	305-1000	Mar-Apr	CNPS IC CNDDB IC	none	Absent
Lyrocarpa coulteri var. *palmeri*	Palmer's lyrepod	4.3	Sonoran desert scrub (gravelly or rocky)	120-795	Dec-Apr	CNPS IC	none	Low
Malperia tenuis	Brown turbans	2.3	Sonoran desert scrub (sandy)	15-335	Mar-Apr	CNPS IC CNDDB IC	none	Moderate
Matelea parvifolia	Spearleaf	2.3	Rocky Mojavean desert scrub Sonoran desert scrub	440-1095	Mar-May	CNPS IC CNDDB IC CNDDB RC	none	Absent
Mentzelia hirsutissima	Hairy stickleaf	2.3	Sonoran desert scrub (rocky)	0-700	Mar-May	CNPS IC CNDDB IC	none	Moderate
Mentzelia puberula	Darlington's blazing star	2.2	Sandy or rocky Mojavean desert scrub Sonoran desert scrub	90-1280	Mar-May	CNPS IC CNDDB IC	none	Moderate
Mentzelia tridentata	Creamy blazing star	1B.3	Rocky, gravelly, sandy Mojavean desert scrub	700-1160	Mar-May	CNPS IC	none	Absent
Mimulus aridus	Low bush monkeyflower	4.3	Chaparral (rocky) Sonoran desert scrub	750-1200	Apr-Jul	CNPS IC	none	Absent
Mirabilis tenuiloba	Slender-lobed four o'clock	4.3	Sonoran desert scrub	300-1095	Mar-May	CNPS IC	none	Absent

Table 3.8-1. Special Status Plant Species Reviewed for Potential to Occur in the West Chocolate Mountains REEA

Scientific Name	Common Name	Status[1]	Habitat	Elevation (meters)	Bloom Period	Occurrence List[2]	Record within 5 miles of REEA[3]	Potential to Occur[4]
Nama stenocarpum	Mud nama	2.2	Marshes and swamps (lake margins, riverbanks)	5-500	Jan-Jul	CNPS IC CNDDB IC	none	Moderate
Nemacaulis denudata var. *gracilis*	Slender cottonheads	2.2	Coastal dunes Desert dunes Sonoran desert scrub	-50-400	Mar-May	CNPS IC CNDDB IC CNPS RC CNDDB RC	CNPS	High
Opuntia wigginsii	Wiggins' cholla	3.3	Sonoran desert scrub (sandy)	30-885	Mar	CNPS IC CNDDB IC	none	Moderate
Palafoxia arida var. *gigantea*	Giant Spanish-needle	BLMS 1B.3	Desert dunes	15-100	Feb-May	BLM EC CNPS IC CNDDB IC	CNPS	High
Penstemon clevelandii var. *connatus*	San Jacinto beardtongue	4.3	Rocky Chaparral Pinyon and juniper woodland Sonoran desert scrub	400-1500	Mar-May	CNPS IC	none	Absent
Penstemon thurberi	Thurber's beardtongue	4.2	Chaparral Joshua tree woodland Pinyon and juniper woodland Sonoran desert scrub	500-1220	May-Jul	CNPS IC	none	Absent
Phaseolus filiformis	Slender-stem bean	2.1	Sonoran desert scrub	NA	Apr	CNPS RC CNDDB RC	none	Moderate
Pholisma sonorae	Sand food	BLMS 1B.2	Desert dunes Sonoran desert scrub (sandy)	0-200	Apr-Jun	BLM EC CNPS IC CNDDB IC	CNPS, CNDDB	High
Pholistoma auritum var. *arizonicum*	Arizona pholistoma	2.3	Mojavean desert scrub	275-835	Mar	CNPS IC CNDDB IC	none	Absent
Pilostyles thurberi	Thurber's pilostyles	2.2	Sonoran desert scrub	0-365	Jan	CNPS IC CNDDB IC	none	Moderate

Table 3.8-1. Special Status Plant Species Reviewed for Potential to Occur in the West Chocolate Mountains REEA

Scientific Name	Common Name	Status[1]	Habitat	Elevation (meters)	Bloom Period	Occurrence List[2]	Record within 5 miles of REEA[3]	Potential to Occur[4]
Proboscidea althaeifolia	Desert unicorn-plant	4.3	Sonoran desert scrub (sandy)	150-1000	May-Aug	CNPS IC	none	Low
Saltugilia latimeri	Latimer's woodland-gilia	1B.2	Rocky or sandy, often granitic, sometimes washes Chaparral Mojavean desert scrub Pinyon and juniper woodland	400-1900	Mar-Jun	CNDDB RC	none	Absent
Salvia greatae	Orocopia sage	1B.3	Mojavean desert scrub Sonoran desert scrub	-40-825	Mar-Apr	CNPS IC CNDDB IC CNPS RC CNDDB RC	CNPS, CNDDB	High
Selaginella eremophila	Desert spike-moss	2.2	Sonoran desert scrub (gravelly or rocky)	200-900	May-Jun	CNDDB IC CNPS RC CNDDB RC	none	Absent
Senna covesii	Coves' cassia	2.2	Sonoran desert scrub (sandy)	305-1070	Mar-Jun	CNPS IC CNDDB IC CNDDB RC	CNPS	Absent
Sidalcea covillei	Owens Valley checkerbloom	1B.1	Alkaline, mesic Chenopod scrub Meadows and seeps	1095-1415	Apr-Jun	CNPS IC	none	Absent
Streptanthus campestris	Southern jewel-flower	1B.3	Rocky Chaparral Lower montane coniferous forest Pinyon and juniper woodland	900-2300	Apr-Jul	CNPS IC CNDDB IC	none	Absent
Stylocline sonorensis	Mesquite neststraw	1A	Sonoran desert scrub (sandy)	NA	Apr	CNDDB RC	none	Moderate

Table 3.8-1. Special Status Plant Species Reviewed for Potential to Occur in the West Chocolate Mountains REEA

Scientific Name	Common Name	Status[1]	Habitat	Elevation (meters)	Bloom Period	Occurrence List[2]	Record within 5 miles of REEA[3]	Potential to Occur[4]
Symphyotrichum defoliatum	San Bernardino aster	BLMS 1B.2	Near ditches, streams, springs Cismontane woodland Coastal scrub Lower montane coniferous forest Meadows and seeps Marshes and swamps Valley and foothill grassland (vernally mesic)	2-2040	July-Nov	BLM EC CNPS IC CNDDB IC	none	Absent
Tetracoccus hallii	Hall's tetracoccus	4.3	Mojavean desert scrub Sonoran desert scrub	30-1200	Jan-May	CNPS IC	none	Moderate
Teucrium cubense ssp. *depressum*	Dwarf germander	2.2	Desert dunes Playas margins Sonoran desert scrub	45-400	Mar-Nov	CNPS IC CNDDB IC CNPS RC CNDDB RC	none	Moderate
Wislizenia refracta ssp. *palmeri*	Palmer's jackass clover	2.2	Chenopod scrub Desert dunes Sonoran desert scrub Sonoran thorn woodland	0-300	Jan-Dec	CNPS RC CNDDB RC	none	Moderate
Wislizenia refracta ssp. *refracta*	Jackass-clover	2.2	Desert dunes Mojavean desert scrub Playas Sonoran desert scrub	600-800	Apr-Nov	CNDDB RC	none	Absent
Xylorhiza cognata	Mecca-aster	1B.2	Sonoran desert scrub	20-400	Jan-Jun	CNPS RC CNDDB RC	none	Moderate
Xylorhiza orcuttii	Orcutt's woody-aster	BLMS 1B.2	Sonoran desert scrub	0-365	Mar-Apr	BLM EC CNPS IC CNDDB IC	none	Moderate

Table 3.8-1. Special Status Plant Species Reviewed for Potential to Occur in the West Chocolate Mountains REEA

Scientific Name	Common Name	Status[1]	Habitat	Elevation (meters)	Bloom Period	Occurrence List[2]	Record within 5 miles of REEA[3]	Potential to Occur[4]

Sources: [2]CNPS 2011, [3]BLM 2010, and [3]CNDDB 2011

[1] **Status:**

BLMS = BLM Sensitive, **FE** = Federally Endangered, **FT** = Federally Threatened, **SE** = State Endangered, **ST** = State Threatened, **SR** = State Rare.

CNPS Designation: 1A = plants presumed extinct in California; **1B** = plants rare and endangered in California and throughout their range; **2** = plants rare, threatened, or endangered in California but more commons elsewhere in their range. **Threat Code**: **0.1**: seriously endangered in California; **0.2**: fairly endangered in California; **0.3**: not very endangered in California. According to CNPS, plants on Lists 1B and 2 meet definitions for listing as threatened or endangered under Section 1901, Chapter 10, of the California Fish and Game Code.

[2] **Occurrence List:** Species occurs one or more of the following lists: **BLM EC** = BLM El Centro Field Office List of Special Status Plants, **CNPS IC** = CNPS occurrence records in Imperial County**, CNDDB IC** = CNDDB occurrence records in Imperial County**, CNPS RC** = CNPS in 27 Riverside County quadrangles (Mecca, Red Canyon, Pilot Mountain, and all adjacent), **CNDDB RC** = CNDDB occurrence records in Riverside County quadrangles (Mecca, Red Canyon, Pilot Mountain, and all adjacent).

[3] **Records within 5 miles of West Chocolate Mountains REEA:** CNDDB occurrence records within 5 miles of REEA and CNPS occurrence records by quadrangle within 5 miles of REEA.

[4] **Potential to Occur:** : **High**: Both a historical record exists of the species within the REEA or its immediate vicinity (approximately 5 miles) and the environmental conditions (including soil and elevation factors) associated with species presence occur within REEA; **Moderate**: either a historical record exists of the species within the immediate vicinity of REEA (approximately 5 miles) or the environmental conditions (including soil and elevation factors) associated with species presence occur within REEA; **Low**: no records exist of the species occurring within REEA or its immediate vicinity (approximately 5 miles) or the environmental conditions (including soil type and elevation factors) associated with species presence are marginal within the REEA; **Absent**: the species was not observed during focused surveys conducted at an appropriate time for identification of the species or environmental conditions (including soil and elevation factors) associated with species presence do not occur on site.

3.8.3.2 Wildlife

Twenty-eight special status wildlife species were determined to have the potential to occur in the West Chocolate Mountains REEA, as listed in Table 3.8-2 and described in detail below. Species status designations are also provided and are abbreviated as follows: Federal Endangered (FE); Federal Threatened (FT); Federal Proposed Threatened (PT); State Endangered (SE); State Rare (SR); State Threatened (ST); California Species of Special Concern (SC); and BLM Sensitive Species (BLM Sensitive).

Table 3.8-2 Special Status Wildlife Species that Potentially Occur in the West Chocolate Mountains REEA

Common Name (Scientific Name)	Status[1]	Potential to Occur in the REEA[2]
Amphibians and Reptiles		
Desert tortoise (*Gopherus agassizii*)	FT, ST	Moderate
Barefoot banded gecko (*Coleonyx switaki*)	ST, BLM sensitive	Low
Flat-tailed horned lizard (*Phrynosoma mcallii*)	PT, SC, BLM sensitive	High
Couch's spadefoot toad (*Scaphiopus couchii*)	SC	High
Colorado Desert fringe-toed lizard (*Uma notata notata*)	SC, BLM sensitive	Moderate
San Sebastian leopard frog (*Rana yavapaiensis*)	SC	Low
Sonoran desert toad (*Bufo alvarius*)	SC	Low
Fish		
Desert pupfish (*Cyprinodon macularius*)	FE, SE	Moderate
Razorback sucker (*Xyrauchen texanus*)	FE, SE	Low
Birds		
Southwestern willow flycatcher (*Empidonax traillii extimus*)	FE, SE	Moderate
Least Bell's vireo (*Vireo bellii pusillus*)	FE, SE	Moderate
California brown pelican (*Pelecanus occidentalis californicus*)	FE, SE, BLM sensitive	Low
Yuma clapper rail (*Rallus longirostris yumanensis*)	FE, ST	High
California black rail (*Laterallus jamaicensis corturniculus*)	ST, BLM sensitive	Moderate
Burrowing owl (*Athene cunicularia*)	SC, BLM sensitive	High
Black skimmer (*Rynchops niger*)	SC	Moderate
Crissal thrasher (*Toxostoma crissale*)	SC	Moderate

Table 3.8-2 Special Status Wildlife Species that Potentially Occur in the West Chocolate Mountains REEA

Common Name (Scientific Name)	Status[1]	Potential to Occur in the REEA[2]
Gila woodpecker (*Melanerpes uropygialis*)	ST, BLM sensitive	Moderate
Golden eagle (*Aquila chryseatos*)	SC	Moderate
Gull-billed tern (*Sterna nilotica*)	SC	Moderate
Le Conte's thrasher (*Toxostoma lecontei*)	SC	Moderate
Merlin (*Falco columbarius*)	SC	Moderate
Mountain plover (*Charadrius montanus*)	PT, BLM sensitive	Moderate
Yellow-breasted chat (*Icteria virens*)	SC	High
Yellow warbler (*Dendroica petechia brewsteri*)	SC	High
White-faced ibis (*Plegadis chihi*)	SC	Moderate
Mammals		
American badger (*Taxidea taxus*)	SC	Moderate
California leaf-nosed bat (*Macrotus californicus*)	SC, BLM sensitive	High
Pallid bat (*Antrozous pallidus*)	SC, BLM sensitive	Moderate
Palm Springs pocket mouse (*Perognathus longimembris bangsi*)	SC, BLM sensitive	Moderate
Pocketed free-tailed bat (*Nyctinomops femorosaccus*)	SC	Moderate
Western mastiff bat (*Eumops perotis californicus*)	SC, BLM sensitive	Moderate
Western yellow bat (*Lasiurus xanthinus*)	SC	Moderate
Nelson's bighorn sheep (*Ovis Canadensis nelsoni*)	BLM sensitive	High

Sources: BLM 2010 and CNDDB 2011

Notes:

[1] FE = Federal endangered; FT = Federal threatened; PT = Federal proposed threatened; SE = State endangered; ST = State threatened; SC = California Species of Special Concern.

[2] The potential for occurrence ranking is based on the following criteria: **High** = there is either a recent or historical record of the species occurring within the REEA or its immediate vicinity and/or the diagnostic habitat requirements strongly associated with the species occur within the REEA or its immediate vicinity; **Moderate** = either a historical record exists of the species within the immediate vicinity of the REEA and/or the habitat requirements associated with the species occur within the REEA; **Low** = no recent or historical records exist of the species occurring within the REEA or its immediate vicinity, and/or the habitats needed to support the species on the site are of poor quality; **Absent** = species is restricted to habitats that do not occur within the REEA or a focused survey failed to detect the species.

Amphibians and Reptiles

Desert tortoise (*Gopherus agassizii*) – FT, ST

Desert tortoise is a federally and California state listed threatened species found from southern Nevada and extreme southwest Utah, west through southeastern California, and east through southern Arizona and northern Mexico (CaliforniaHerps.com 2010). In California, this species is found throughout the Mojave Desert and Colorado Desert regions, including along the east side of the Salton Sea Basin. Desert tortoises require firm ground in order to dig burrows or rocks to provide shelter. They are commonly observed in habitats known to occur in the West Chocolate Mountains REEA, including sandy or gravelly locations along riverbanks, washes, alluvial fans, canyon bottoms, and creosote flats and hillsides (CaliforniaHerps.com 2010). They have been observed near the eastern edge of the REEA (CNDDB 2010). Therefore, this species has a moderate potential of occurring in the REEA.

Barefoot banded gecko (*Coleonyx switaki*) – ST, BLM Sensitive

Barefoot banded gecko is a California state listed threatened species and is also on the BLM list of sensitive species in California. This species is found on arid desert slopes of the eastern side of the Peninsular Ranges from near Borrego Springs south to the Baja California border. An isolated population occurs in the Coyote Mountains of Imperial County. This species is typically observed in arid, rocky areas on flatlands, canyons, thornscrub, especially where there are large boulders and rock outcrops, and where vegetation is sparse. It is typically observed at elevations from near sea level to over 2,000 feet (CaliforniaHerps.com 2010). Because this species' range in California is only in the westernmost part of Imperial County, this species has a low potential to occur in the West Chocolate Mountains REEA.

Flat-tailed horned lizard (*Phrynosoma mcallii*) – SC, BLM Sensitive

Flat-tailed horned lizard is a California species of concern, found throughout most of the Colorado Desert, from northern Coachella Valley to northeastern Baja California, Mexico (CaliforniaHerps.com 2010). In California, the flat-tailed horned lizard was designated a sensitive species by the BLM in 1980. This designation provides increased management attention to prevent population declines and habitat loss or degradation within the Salton Sea Basin.

In 1993, the USFWS published a proposed rule to list the flat-tailed horned lizard as a threatened species (68 FR 31). This proposed rule was withdrawn in 2003, but reinstated in 2010, making the flat-tailed horned lizard a current candidate for listing.

Local populations of this lizard fluctuate greatly between years because of winter/spring precipitation and production of annuals in spring; as a result, these populations are very susceptible to anthropogenic activities (BLM 2003). The flat-tailed horned lizard occupies areas with fine, wind-blown sand deposits and has been recorded in several vegetative communities where this substrate occurs, including the very common creosote bush. The presence of flat-tailed horned lizards has been recorded within the West Chocolate Mountains REEA and throughout the surrounding area. Therefore, this species has a high potential to occur in the in the REEA.

Couch's spadefoot toad (*Scaphiopus couchii*) – SC

Couch's spadefoot toad is a California species of special concern found in southeast California east of the Algodones Dunes and north to San Bernardino County. This species is typically observed in deserts and arid regions of grassland, prairie, mesquite, creosote bush, thorn forest, and sandy washes that are able to maintain temporary rain pools that last at least seven days for breeding and metamorphosis (CaliforniaHerps.com 2010). It is typically observed at elevations from sea level to 5,900 feet. Couch's spadefoot toads have been observed within the West Chocolate Mountains REEA and habitat conditions occur as well (CNDDB 2010). Therefore, this species has a high potential of occurring in the REEA.

Colorado Desert fringe-toed lizard (*Uma notata notata*) – SC, BLM Sensitive

Colorado Desert fringe-toed lizard is a California species of special concern that occurs from northeastern San Diego County, through the southern two-thirds of Imperial County to the Colorado River. It is also on the BLM list of sensitive species in California. While no observations have been recorded in West Chocolate Mountains REEA, this species is found in the Colorado Desert from the Salton Sea and Imperial sand hills east to the Colorado River at elevations below sea level to 1,600 feet (CaliforniaHerps.com 2010). Therefore, it has a moderate potential of occurring in the REEA. It is most likely to be found in areas with fine wind-blown sand such as dunes, flats with sandy hummocks formed around the bases of vegetation, washes, and banks of streams (CaliforniaHerps.com 2010).

San Sebastian leopard frog (*Rana yavapaiensis*) – SC

San Sebastian leopard frog is a California species of special concern. This frog historically ranged from San Felipe Creek east to the lower Colorado River Valley. Isolated populations may remain in the Imperial Valley and the San Felipe Creek drainage, but it is likely that it has been extirpated from the California portion of its range (CaliforniaHerps.com 2010). It has been observed in the past in slackwater aquatic habitats, such as in the San Sebastian Marsh approximately 30 years ago, but has not been reported in that area since (CaliforniaHerps.com 2010). Slackwater aquatic habitat occurs within the in the West Chocolate Mountains REEA. Therefore, this species has a low potential to occur in the in the REEA if it has not been extirpated.

Sonoran desert toad (*Bufo alvarius*) – SC

Sonoran desert toad is a California species of special concern. It is thought to be extirpated and no specimens have been collected or observed in California since 1955. It has been observed in the West Chocolate Mountains REEA historically in desert lowland washes, irrigation ditches, temporary pools, and in upland areas. This species inhabits elevations between sea level and 5,770 feet (CaliforniaHerps.com 2010). Because it has not been observed in over 50 years, this species has a low potential to occur in the REEA.

Fish

Desert pupfish (*Cyprinodon macularius*) – FE, SE

Desert pupfish is a federal and California state listed endangered species. The desert pupfish range includes the basin of the lower Colorado and Gila rivers, from southern Arizona to

southeastern California and eastern Baja California, and the Sonoyta River of northern Sonora, Mexico (Sutton 1999). Pupfish are observed throughout the Salton Sink Basin, inhabiting springs, seeps, and slow-moving streams. Desert pupfish populations are remnants of those that inhabited ancient Lake Cahuilla. The range of this species has been dramatically reduced by habitat modifications and introductions of exotic fishes. Desert pupfish have been recorded in a few saline pools along the Salton Sea's edge, some irrigation drains flowing into the Salton Sea, and portions of the Salt and San Felipe creeks, which are both tributaries to the western side of the Salton Sea and not in the West Chocolate Mountains REEA. Aquatic habitat necessary for the desert pupfish occurs in the REEA. Therefore, this species has a moderate potential to occur in the REEA.

Razorback sucker (*Xyrauchen texanus*) – FE, SE

Razorback sucker is a federal and California state listed endangered species. It is one of the largest suckers in North America, growing up to 13 pounds and over 3 feet long. It is known to occur in the lower Colorado River watershed only in Lake Mojave, upstream in Lake Mead and the Grand Canyon, and downstream sporadically on the mainstem and associated impoundments and canals (USFWS 1991). It has been observed in the West Chocolate Mountains REEA approximately 1.5 miles east of Niland in the East Highline Canal in 1974 (CNDDB 2010). However, this fish is restricted to aquatic habitat with at least intermittent connection to the Colorado River. Because of the distance of the REEA from the Colorado River, the potential for this species to occur in the REEA is low.

Birds

Southwestern willow flycatcher (*Empidonax traillii extimus*) – FE, SE

Southwestern willow flycatcher is a federal and California state listed endangered species. This small bird requires dense riparian habitats with microclimatic conditions dictated by the local surroundings for nesting and utilizes habitat not suitable for nesting for migration and foraging (USFWS 2012). This species has not been observed within the West Chocolate Mountains REEA (CNDDB 2010), but suitable habitat exists, particularly in riparian areas. Therefore, this species has a moderate potential to occur in the REEA.

Least Bell's vireo (*Vireo bellii pusillus*) – FE, SE

Least Bell's vireo is a federal and California state listed endangered species. This small bird inhabits low, dense riparian growth along water or along dry parts of intermittent streams and is typically associated with willow, cottonwood, baccharis, wild blackberry, or mesquite in desert localities. It is a rare, local, summer resident from sea level to approximately 2,000 feet in elevation along the western edge of the deserts in desert riparian habitat (CDFG 2010). This species was not observed in the West Chocolate Mountains REEA, but suitable habitat exists. Therefore, this species has a moderate potential to occur in the REEA.

California brown pelican (*Pelecanus occidentalis californicus*) – FE, SE

California brown pelican is a federally and California state listed endangered species, although the USFWS is in the process of delisting the California brown pelican federally. This species nests in areas from the Channel Islands of Southern California, along the Baja California

coast, and in the Gulf of California and coastal southern Mexico. While this species has been observed to nest at the Salton Sea in the past, populations usually gather at the Salton Sea during the post-breeding season and may be a transient through northern portions of the West Chocolate Mountains REEA adjacent to the Salton Sea. This species has not been observed within the REEA, but it has been observed adjacent to the Salton Sea to the south of the area (CNDDB 2010). Therefore, it has a low potential to occur in the REEA.

Yuma clapper rail (*Rallus longirostris yumanensis*) – FE, ST

Yuma clapper rail is federally listed as endangered and state listed as threatened in California. This freshwater marsh bird typically inhabits mosaics of vegetated areas interspersed with shallow open water areas (USFWS 2010). Yuma clapper rails have been observed in the West Chocolate Mountains REEA and suitable habitat exists near water sources (CNDDB 2010). Therefore, Yuma clapper rails have a high potential to occur in the REEA.

California black rail (*Laterallus jamaicensis corturniculus*) – ST

California black rail is a state listed threatened species. It is found throughout the San Francisco Bay Area, from the Sacramento and San Joaquin river deltas to the coast, to Baja California, the Salton Sea, and the lower Colorado River. At the Salton Sea and along the lower Colorado River, north of Yuma, this species typically inhabits saltwater, brackish, and freshwater marshes (CDFG 2010). Marshes occur in a few areas in the West Chocolate Mountains REEA. Therefore, this species has a moderate potential to occur in the REEA.

Burrowing owl (*Athene cunicularia*) – SC, BLM Sensitive

Burrowing owl is listed as a California species of special concern and is found throughout the state. It is also a BLM sensitive species. Historically, this species occurred in pasturelands and grasslands throughout California, but it has in recent times been found in agricultural and desert areas with open vegetation communities. Suitable habitat and recorded sightings exist for burrowing owls in the West Chocolate Mountains REEA (CNDDB 2010). Therefore, this species has a high potential to occur in the REEA.

IID conducted burrowing owl population surveys within of a subset of their ROW in March and April 2012. Grid number 113, which is located within the West Chocolate Mountains REEA, had a total of three owl observations and two primary burrow observations in the March survey. Nine owls were observed in the April survey as were eight primary burrows (AECOM 2012).

Black skimmer (*Rynchops niger*) – SC

Black skimmer is a California species of special concern. This species is a fairly common summer resident of the Salton Sea that forages on small fishes and crustaceans in shallow water. Roosting takes place on sandy beaches or gravel bars and this species is unlikely to wander far from the Salton Sea (CDFG 2010). Observations have not been recorded in the West Chocolate Mountains REEA, but observations have been recorded nearby (CNDDB 2010). Because this species is fairly common in the Salton Sea, this species has a moderate potential to occur in the REEA.

Crissal thrasher (*Toxostoma crissale*) – SC

Crissal thrasher is a California species of special concern. This species typically inhabits dense thickets of shrubs or low trees in desert riparian and desert wash habitats (CDFG 2010). It has not been documented in the West Chocolate Mountains REEA (CNDDB 2010) but suitable habitat exists in all of the wash areas. Therefore, Crissal thrasher has a moderate potential to occur in the REEA.

Gila woodpecker (*Melanerpes uropygialis*) – SE

Gila woodpeckers are a California endangered species. The species is currently found only at scattered locations along the Colorado River from Needles to Yuma, and has disappeared in the Imperial Valley, except for a few pairs in Brawley (BLM 2002). Gila woodpeckers could occur in desert wash woodland or residential palm tree groves in the West Chocolate Mountains REEA.

Golden Eagle (*Aquila chrysaetos*) – SC

Golden eagles are a California species of concern and protected by the BGEPA. Golden eagles nest on cliffs in mountainous areas and forage over rolling foothills and valleys. Potential golden eagle foraging habitat occurs in the West Chocolate Mountains REEA (BLM 2002). They are most likely to occur in the area during migration in the spring and fall.

Gull-billed tern (*Sterna nilotica*) – SC

Gull-billed tern is a California species of special concern. This summer resident of the U.S. is typically observed in salt marshes, estuaries, lagoons, and open coastal areas while foraging over marshes, pastures, farms, and plowed fields (CDFG 2010). This habitat occurs within the northwestern portions of the West Chocolate Mountains REEA and gull-billed terns have been observed in the Salton Sea near the area (CNDDB 2010). Therefore, this species has a moderate potential to occur in the REEA.

LeConte's thrasher (*Toxostoma lecontei*) – SC

LeConte's thrasher is a California species of special concern. This thrasher occurs primarily in open desert wash, desert scrub, alkali desert scrub, and desert succulent scrub vegetation communities. It is typically observed from Inyo County to the Mexican border, in the western and southern portions of the San Joaquin Valley, and in Joshua tree communities with scattered shrubs (CDFG 2010). There are recorded occurrences of LeConte's thrasher in the area surrounding the West Chocolate Mountains REEA, but no recorded observations within the area, itself (CNDDB 2010); however, desert wash habitat is frequently utilized by this species, sometimes for reproduction (CDFG 2010), and this habitat occurs in the REEA. Therefore, LeConte's thrasher has a moderate potential to occur in the REEA.

Merlin (*Falco columbarius*) – SC

Merlin is a California species of concern. Although this species is seldom found in open deserts, its range extends throughout most of the western half of the state below 4,900 feet and it is a rare winter migrant in the desert. It has been observed at multiple locations within the West Chocolate Mountains REEA (CNDDB 2010) and is probably more common in the Salton Sea area than it is in other parts of the desert because merlin typically frequent shorelines in winter to

catch shorebirds as prey. Although this species remains a rare inhabitant of the Colorado Desert, it has a moderate potential of occurring due to multiple observations in the REEA.

Mountain plover (*Charadrius montanus*) – SC

Mountain plover is a California species of special concern. This winter resident frequents open plains with low, herbaceous or scattered shrub vegetation, open grasslands, and plowed fields (CDFG 2010). It has been observed to the west of the West Chocolate Mountains REEA, but not within the area, itself (CNDDB 2010). Suitable habitat is present within the REEA. Therefore, this species has a moderate potential to occur in the REEA.

Yellow-breasted chat (*Icteria virens*) – SC

Yellow-breasted chat is a California species of special concern. It is commonly found in riparian habitats and is dependent on thickets of willow and other brushy tangles near watercourses for cover (CDFG 2010). This species has been observed in the West Chocolate Mountains REEA (CNDDB 2010) in wash habitats where the vegetation is thicker than in the surrounding open desert. Suitable riparian habitat is present within the REEA. Therefore, this species has a high potential to occur in the REEA.

Yellow warbler (*Dendroica petechia brewsteri*) – SC

Yellow warbler is a California species of special concern. This species is commonly found in riparian deciduous habitats in summer and, when migrating, yellow warblers utilize woodland, forest, and shrub habitats as cover (CDFG 2010). This species has been observed both within the West Chocolate Mountains REEA and in surrounding areas (CNDDB 2010). This species has a high potential to occur in riparian habitat in the desert washes of the REEA.

White-faced ibis (*Plegadis chihi*) – SC

White-faced ibis is a California species of special concern. It is a medium-sized wading bird and has been observed along margins of the Salton Sea near the West Chocolate Mountains REEA. It is typically observed in estuarine, marsh, and low gradient riverine habitat (CDFG 2010). Because it has been observed near the REEA and suitable habitat exists along northwestern portions of the area, this species has a moderate potential of occurring in the REEA.

Mammals

American badger (*Taxidea taxus*) – SC

American badger is a California species of concern. This species is an uncommon but permanent resident of much of California and is most abundant in the drier, open stages of most shrub, forest, and herbaceous habitats (CDFG 2010). Badgers frequently use new and old burrows for cover. American badgers have not been documented in the West Chocolate Mountains REEA, but they have been observed nearby (CNDDB 2010) and suitable habitat exists throughout much of the area. Therefore, this species has a moderate potential to occur in the REEA.

California leaf-nosed bat (*Macrotus californicus*) – SC

California leaf-nosed bats are a California species of concern. These bats occur in lowland desert habitat near desert wash vegetation and are dependent on either caves or mines for roosting habitat (BLM 2002). All major maternity, mating, and overwintering sites are in mines or caves (BLM 2002). They are known to use mine shafts in the Chocolate Mountains and could forage in the West Chocolate Mountains REEA.

Pallid bat (*Antrozous pallidus*) – SC

Pallid bat is listed as a California species of concern. This species occurs throughout the Southwest, in rocky outcrops in regions where the dominant vegetation consists of scattered desert scrub (CDFG 2010). Daytime roosts are common in rock crevices and buildings and less common in mines, caves, and hollow trees. Pallid bats are intolerant of disturbance and may abandon a roost when disturbed and not return for years (CDFG 2010). Rocky outcrops occur within the West Chocolate Mountains REEA and recorded occurrences exist in the area. Therefore, this species has a moderate potential of occurring in the REEA.

Palm Springs pocket mouse (*Perognathus longimembris bangsi*) – SC

Palm Springs pocket mouse is a California species of concern. This species is found in level to sloping topography with sparse to moderate vegetative cover, and loosely packed or sandy soils. This species has been observed near the northern end of the West Chocolate Mountains REEA and suitable habitat exists in many portions within the area (CNDDB 2010). Therefore, Palm Springs pocket mice have a moderate potential of occurring in the REEA.

Pocketed free-tailed bat (*Nyctinomops femorosaccus*) – SC

Pocketed free-tailed bat is a California species of concern. This bat is known to occur in semi-arid desert lands in Southern California, south Arizona, southeast New Mexico, and the Big Bend area of Texas. Common roosts of this species are in caves, crevices in cliffs, and under roof tiles of buildings. Associated roosting conditions are present within the West Chocolate Mountains REEA and there is a recorded occurrence in the vicinity of the area (CNDDB 2010). Therefore, this species has a moderate potential of occurring in the REEA.

Western mastiff bat (*Eumops perotis californicus*) – SC

Western mastiff bat is a California species of concern. This bat species is a large free-tailed bat that typically inhabits crevices in rocks that form vertical or nearly vertical cliffs. This species has been observed near the eastern end of the West Chocolate Mountains REEA (CNDDB 2010). Suitable habitat is available in the West Chocolate Mountains. Therefore, this species has moderate potential for occurring in the REEA.

Western yellow bat (*Lasiurus xanthinus*) – SC

Western yellow bat is a California species of concern. It is uncommon in California, but has been observed below 2,000 feet in elevation in desert habitats including desert riparian, desert wash, and palm oasis habitats (CDFG 2010). Desert wash and desert riparian habitats occur in several drainages within the West Chocolate Mountains REEA and western yellow bats have been observed in the West Chocolate Mountains. Therefore, this species has a moderate potential of occurring in the REEA.

Nelson's bighorn sheep (*Ovis Canadensis nelsoni*) – BLM Sensitive

Nelson's bighorn sheep is a BLM sensitive species that is fairly uncommon in California. This species typically utilizes several habitat types including desert scrub and desert riparian habitat present within the West Chocolate Mountains REEA (CDFG 2010). Nelson's bighorn sheep have been observed both within the REEA and surrounding areas (CNDDB 2010), and suitable habitat exists throughout the area. Surveys for the CMAGR (Section 2507) bighorn sheep herd were conducted on May 12, 2008. The purpose of that flight was an investigatory survey to access overall herd health which resulted from the recovery of a ewe that succumbed to bronchopneumonia from the Drop 20 area adjacent to the Coachella canal. A total 29 animals were observed:

- 4 lambs;
- 6 ewes; and
- 19 rams (one Class I, one Class II, four Class III, and 13 Class IV).

All animals observed appeared to be in good physical shape and without evidence of any obvious disease process. The lambs appeared healthy and robust and approximately six to eight weeks of age (CDFG 2008)

Therefore, this species has a high potential of occurring in the REEA.

3.9 Cultural Resources

Data for the cultural resources sections of this document have been provided from a Class I Cultural Resources Inventory produced by ASM Affiliates (Laylander 2010). This document is incorporated by reference and, unless otherwise cited, the information provided below is from this document.

3.9.1 Definition of the Resource

The BLM 8100 series document titled "The Foundations for Managing Cultural Resources" defines cultural resources as "…a definite location of human activity, occupation, or use identifiable through field inventory (survey), historical documentation, or oral evidence. The term includes archaeological, historic, or architectural sites, structures, or places with important public and scientific uses, and may include definite locations (sites or places) of traditional cultural or religious importance to specified social and/or cultural groups." Types of archaeological sites often found in the Imperial Valley include lithic scatters, ceramic scatters, human burials, habitation sites, hearth features, architectural features, cairns and other rock features, trails, historical refuse scatters, water conveyance systems, foundations, rail road grades, standing structures and foundations.

3.9.2 Applicable Plans, Policies, and Regulations

3.9.2.1 Federal

The BLM is required by federal policy to consider the effects of their actions on cultural resources. Cultural resources include prehistoric or historic era archaeological sites, traditional cultural properties (which can be defined as properties that are important to a community's practices and beliefs and that are necessary for maintaining a community's cultural identity), historic buildings, battle fields, and engineered structures, such as bridges or dams. They can include both man-made and natural physical features associated with human activity, such as landscapes. Cultural resources are usually finite, unique, fragile, and nonrenewable (BLM 2004). To accommodate the task of protecting such resources, the BLM operates under the federal regulations listed below.

Code of Federal Regulations Title 36 Section 800

This statute protects historic properties and pertains to implementation of the regulations of Section 106 of the National Historic Preservation Act (NHPA). Section 106 requires federal agencies to take into account the effects of a proposed plan on historic properties.

National Environmental Policy Act

This statute requires federal agencies to consider potential environmental impacts of projects with federal involvement and to consider appropriate mitigation measures.

Federal Land Policy and Management Act

This statute requires the Secretary of the Interior to retain and maintain public lands in a manner that will protect the quality of scientific, scenic, historic, ecological, environmental, and air and atmospheric water resources, as well as archaeological values.

Native American Graves Protection and Repatriation Act

This statute requires all federal agencies and museums receiving federal funds to inventory their collections, notify appropriate parties of sensitive collections, acknowledge requests from native groups for repatriation, review the collections and the requests, and, if appropriate, repatriate human remains, grave associations, sacred objects, and items of cultural patrimony to affiliated tribes or individuals. It establishes that Native American human remains legally belong to the nearest affiliated Indian tribe or family of known individuals, rather than with the owner of the land on which they were found. This statute also requires that archaeologists consult with land management officials prior to conducting field work on federal land or in a federal undertaking.

Executive Order 11593

This order requires federal agencies to inventory their cultural resources and to record to professional standards, any cultural resource that may be altered or destroyed. It also mandates the protection and enhancement of the cultural environment through providing leadership, establishing state offices of historic preservation, and developing criteria for assessing resource values.

Archaeological and Historic Preservation Act

The Archaeological and Historic Preservation Act directly addresses impacts on cultural resources resulting from federal activities that would significantly alter the landscape. The focus of the law is data recovery and salvage of scientific, prehistoric, historic, and archaeological resources that could be damaged during the creation of dams and the impacts resulting from flooding, worker housing, creation of access roads, etc.; however, its requirements are applicable to any federal action.

American Indian Religious Freedom Act

This statute protects Native American religious practices, ethnic heritage sites, and land uses, protects the right of Native Americans to have access to their sacred places, and requires consultation with Native American organizations if any agency action will affect a sacred site on federal lands.

Executive Order 13007

This order requires that an agency allow Native Americans to worship at sacred sites located on federal property.

Executive Order 13175

This order requires federal agencies to coordinate and consult with Indian tribal governments whose interests might be directly and substantially affected by activities on federally administered lands.

Executive Order 13287, Preserve America (Federal Register 68:10635, March 5, 2003)

E.O. 13287 encourages the promotion and improvement of historic structures and properties to encourage tourism.

American Indian Religious Freedom Act

This act protects the rights of Native Americans to have access to their sacred places. It requires consultation with Native American organizations if an agency action will affect a sacred site on federal lands.

Archaeological Resources Protection Act

The Archaeological Resources Protection Act (ARPA), as amended, prohibits the excavation or removal of an archaeological resource from federal or traditional Native American lands without a permit from the appropriate land management agency. Under ARPA, the sale, purchase, exchange, transport, or possession of an archaeological resource removed without permission of the land management agency is forbidden. ARPA established civil and criminal penalties for the destruction or alteration of cultural resources and established professional standards for excavation.

Antiquities Act

This law made it illegal to remove cultural resources from any federal land without express permission to do so. This law also gave the President authority to establish historical monuments and landmarks.

National Historic Preservation Act

The NHPA, as amended, creates the framework within which cultural resources are managed in the United States. The law requires that each state appoint a State Historic Preservation Officer (SHPO) to direct and conduct a comprehensive state-wide survey of historic properties and maintain an inventory of such properties, and it created the Advisory Council on Historic Preservation (ACHP), which provides national oversight and dispute resolution. Section 106 of the NHPA defines the process for identifying and evaluating cultural resources and determining whether a project will result in an adverse effect on the resource. It also addresses the appropriate process for resolving (mitigating) adverse effects to historic properties. Section 110 of the NHPA directs the heads of all federal agencies to assume responsibility for the preservation of listed or eligible historic properties owned or controlled by their agency. Federal agencies are directed to locate, inventory, and nominate properties to the NRHP, to exercise caution to protect such properties, and to use such properties to the maximum extent feasible. Additional provisions of Section 110 include documentation of properties adversely affected by federal undertakings, the establishment of trained federal preservation officers in each agency, and the inclusion of the costs of preservation activities as eligible agency project costs. The NHPA also establishes the processes for consultation among interested parties, the lead agency, and the SHPO, and for government-to-government consultation between U.S. government agencies and Native American tribal governments.

Bald and Golden Eagle Protection Act

Section 668a of this act allows the Secretary of the Interior to permit the taking, possession, and transportation of bald eagle or golden eagle specimens for the religious purposes of Native American tribes, as well as other scientific or exhibition purposes. Otherwise, the act prohibits the take, possession, sale, purchase, or transportation of any bald eagle or golden eagle (alive or dead), or any part, nest, or egg thereof.

BLM Guidance Regarding Cultural Resource Management

- BLM 8100 Series Manuals and Handbooks;
- 8100 Manual: *The Foundations for Managing Cultural Resources*;
- 8110 Manual: *Identifying and Evaluating Cultural Resources*;
- 8120 Manual: *Tribal Consultation under Cultural Resource Authorities*;
- H-8120-1: *General Procedural Guidance for Native American Consultation*;
- 8130 Manual: *Planning for Uses of Cultural Resources*;
- 8140 Manual: *Protecting Cultural Resources*;
- 8150 Manual: *Permitting Uses of Cultural Resources*; and
- 8170 Manual: *Interpreting Cultural Resources for the Public.*

3.9.3 Existing Conditions

The West Chocolate Mountains REEA is located in the Colorado Desert, a subset of the Sonoran Ecozone, and is a part of the Salton Rift. These ecological and geomorphological characteristics determine what resources were available for human use, and how the area would have been used by past human populations in the region. The Salton Rift is characterized as a trough formed by the ongoing movement of faults along the boundaries of the North American and Pacific tectonic plates. The trough has been filled with immense quantities of colluvial and alluvial sediments and has been subjected to periodic flooding by the Colorado River which formed ancient Lake Cahuilla in the low-lying areas.

The West Chocolate Mountains REEA ranges in elevation from approximately 400 feet above sea level in the east to -235 feet below sea level at the Salton Sea. The REEA is transected by several minor washes including Iris Wash, which traverse the REEA from northeast to southwest. A number of small, isolated springs are visible on the USGS 1:24,000 topographic maps that may have provided water resources during prehistoric times; however, the major water source would likely have been ancient Lake Cahuilla.

Most of the West Chocolate Mountains REEA can be characterized as being comprised of tertiary and quaternary sediments. Exceptions to this are intermittent exposures of older Pleistocene non-marine sediments found in the southwest portions of the REEA, and in the west from the 40 feet above sea level contour line are Holocene deposits laid down by the various in filling and recessional stages of Lake Cahuilla.

3.9.3.1 Prehistoric Background

The Colorado Desert, within which the West Chocolate Mountains REEA is located, has a documented cultural history that spans more than 10,000 years. This cultural history is divided into six major periods:

- Hypothetical Early Man (Malpais) (50,000 to 12,000 B.P.);
- Paleoindian (San Dieguito) (12,000 to 7,000 B.P.);
- Archaic (Pinto and Amargosa) (7,000 to 1,500 B.P.);
- Late Prehistoric (Patayan) (1,500 to 300 B.P);
- Ethnohistoric Tipai (Kumeyaay) and Cahuilla (300 B.P. to present); and
- Historic Euro-American (300 B.P. to present).

Although the Paleo Indian period has been documented in adjacent areas such as San Diego County, the Mojave Desert, and Baja California, there is no local evidence for a PaleoIndian occupation in the REEA. It is commonly accepted that the Colorado Desert areas must have also witnessed human occupation during this time.

Traces of Archaic period occupation are found in the West Chocolate Mountains REEA in the form of diagnostic projectile points. It has been speculated that some of the non-ceramic bearing sites that do not have diagnostic lithic artifacts may represent Archaic occupation;

however this has not been substantiated with empirical evidence. The largest number of sites currently recorded date to the Late Prehistoric and Ethnohistoric periods.

Most of the Late Prehistoric and Ethnohistoric period sites appear to be associated the maximum stands of ancient Lake Cahuilla. The lake was over 100 miles long, 35 miles wide, and over 300 feet deep. The height of the Colorado River Delta that formed a natural dam at the south end of the lake determined the maximum shoreline of Lake Cahuilla and created a variety of wetland habitats that may have attracted Native Americans from the surrounding areas to fish, hunt migratory waterfowl, and gather marsh plants such as cattail and bulrush roots. Eventually, siltation on the north side of the Colorado River Delta enabled the river to reestablish a route back to the Gulf of California. Each time this happened, Lake Cahuilla receded from the maximum shoreline to the bottom of the Salton Trough at elevations lower than 200 feet below sea level. After each infilling, Native Americans likely followed the receding shoreline to establish temporary fish camps and to use the emerging vegetation that colonized the drying lake bed. Some Archaic period Lake Cahuilla human occupation is known, but most archaeological sites date to the last four phases of Lake Cahuilla infilling that occurred during the last 1,000 years. The final phase of inundation and recession occurred at the transition from the Late Prehistoric to the Ethnohistoric period between A.D. 1650 and 1700 (Laylander 1997; Shaefer 1994).

3.9.3.2 Ethnographic Background

The West Chocolate Mountains REEA is situated at the traditional boundary between two distinct ethnolinguistic groups: the Kumeyaay to the south, and the Cahuilla to the north. Colorado Yuman groups, such as the Quechan, identify the REEA as part of their traditional lands. Other evidence of Colorado Yuman habitation of the REEA is indicated by ceramic types most characteristic of the eastern groups. Ethnic boundaries may well have shifted through time, and the ethnographies of several groups are reviewed here.

During the Ethnohistoric period the Imperial Valley was utilized by the Kumeyaay (Kamia, Tipai), the Cahuilla, Quechan and the Halchidhoma.

Kumeyaay (Kamia, Tipai)

The desert manifestation of the Kumeyaay group is seen as the Kamia. The Kamia are the focus of this discussion due to their specific adaptation to the wetlands of the Colorado River valley, and the prominence of Ancient Lake Cahuilla in the Kamia origin myth. This adaptation is likely analogous to the Lake Cahuilla archaeological land use patterns of the West Chocolate Mountains REEA. The home base of the Kamia included areas along the New and Alamo Rivers, as well as springs and walk-in wells in Imperial Valley. During the ethnohistoric period, the Kamia were politically and militarily allied with the Quechan-Mohave alliance in opposition to the Cocopah and Halchidhoma.

The built environment of the Kamia included rectangular semi-subterranean structures of post-and-beam construction with thatch and earthen roofs. They also built ramadas, lean-tos and conical sweat houses. House pits lined with sandstone slabs may represent individual household units. The Kamia built their dwellings some distance apart, on or adjacent to arable alluvial terraces and as close as possible to running water, wells or sloughs. There were no permanent

villages and residential moves were dependent on the availability of floodwater farming areas and the seasonal ripening of wild plants.

The Kamia practiced a mixed economy of horticulture and hunting and gathering. Mesquite (*Prosopis pubescens*) was the most important wild staple crop, just as with other groups in the Colorado Desert. Acorns were either obtained directly in the Peninsular Ranges or through trade with the Kumeyaay in exchange for cultigens, especially watermelons. The Kamia also procured baked and dried agave cakes from the Kumeyaay but otherwise did not participate in the early spring agave harvest. Those living in the West Chocolate Mountains REEA, however, had greater direct access to agave areas and other upland resources.

Cahuilla

The Cahuilla and related Takic ("Shoshonean") speakers are members of the Uto-Aztecan linguistic stock. While the Santa Rosa and San Jacinto mountains and the Coachella Valley were the center of the ethnohistoric Cahuilla territory, the Imperial Valley was also used extensively. Portions of the West Chocolate Mountains REEA were owned by a dozen or more independent, politically autonomous landholding clans. Each of these territories ideally ranged from the desert floor to the mountains and encompassed several biotic zones. Each lineage owned residential areas and various food collecting, hunting and other areas. In addition to lineage ownership, certain individuals could also own specific resources.

Cahuilla villages were occupied year-round and a large number of their inhabitants left at specific times to exploit seasonally ripening foods in different environmental zones. Temporary camps would be established in these differing areas and resource surpluses would be transported back to the main village.

Mountain Cahuilla would move to the upper desert areas and establish temporary camps to process agave in late winter-early spring, and then move to lower desert areas to harvest mesquite beans in the late spring. Conversely, the Desert Cahuilla ascended the mountains in the fall for the pinyon and acorn harvests. Cahuilla traditions indicate that when Lake Cahuilla dried up, it was the mountain people who resettled the desert floor.

Quechan and Halchidhoma

The Quechan identify the West Chocolate Mountains REEA as within their traditional territory. Although the REEA is outside Halchidoma traditional territory, both Yuman groups may have simultaneaouly occupied the eastern shore of Lake Cahuilla when it was present. During the late 1700s the Halchidhoma, who were allies to the Cahuilla, were in a nearly constant state of warfare with the Quechan and the Mohave who were united in an alliance against them. By around 1825 the Halchidhoma had left the Colorado River area and the Chemehuevi moved into the newly vacated territory.

The Quechan had tumultuous relationships with the Spanish in the 1780s. A century later the Gold Rush increased the Euro-American presence in the area and hostilities ensued. These hostilities resulted in the establishment of Fort Yuma in 1852 and Fort Mohave in 1859. The Quechan settlement pattern focused on riverine subsistence resources and a mixed foraging way of life. Small scale agriculture was practiced as a supplement to the seasonal round strategy of

hunting, fishing and gathering. Cultivated crops included maize, beans, squash, melon and various wild grasses, and were planted in newly deposited sediments after the floodwater had receded. The Quechan settlement pattern included a seasonally based bi-modal strategy that included spring and summer settlements on mesas near the Colorado River, above the seasonal flood zones of the river. The winter homes were more protective earth-covered lodges on upper river terraces, lower bajadas and lower mountain slopes.

3.9.3.3 Historical Period

The Historic Euro-American period in the West Chocolate Mountains REEA begins with the 1774–1775 and 1775–1776 Anza expeditions. These brought Spanish colonists from Sonora to coastal California via a route across the Colorado Desert at Yuma west to the foot of the Peninsular Ranges, then north and up San Felipe Creek to Borrego Valley, and from there northwest to the coast. The first detailed historic accounts of nearby Native Americans living at San Sebastian Marsh and Borrego Springs were made at this time. The Anza expedition opened what would become a branch of the Southern Immigrant Trail that brought Euro-Americans through the area during the Gold Rush and after.

Travel and transportation are two major themes of historical development for Imperial Valley. Historic activities in the West Chocolate Mountains REEA were minimal but included the U.S. Army Corps of Topographic Engineers' scientific and topographic survey in 1853 for a proposed transcontinental railroad route. The U.S. General Land Office (GLO) conducted surveys in 1856 which recorded the locations of several historic trails. The Southern Pacific Railroad (SPRR) line was constructed in 1877. Several SPRR stations were established in the current REEA. In the early twentieth century, SR 111 was constructed through the REEA.

In 1900 the first diversion canal and irrigation system began construction with the intent of bringing water from the Colorado River into Coachella and Imperial Valleys. By 1901 over 1,500 acres were in agricultural production. By 1902 over 100,000 acres were irrigated in the Imperial Valley. The East Highland Canal was completed in 1914 and the Coachella Canal was completed by 1949. These features shaped today's economy in the Imperial Valley.

The Salton Sea was created in 1905 when flooding of the Colorado River breached irrigation control facilities on the river and directed its flow into the Salton Trough. Before the flow was finally controlled, an extensive inland sea had been created in the lower portions of the Imperial and Coachella valleys. This water body created opportunities for recreation and was highly used. This use has declined along with the receding water levels of the Sea.

In 1942 the Desert Training Center (DTC) was opened. The DTC included areas of southern California and western Arizona. These areas were targeted for military training exercises during World War II and were under the command of George S. Patton, Jr. The DTC's purpose was to condition troops to desert warfare conditions and tactics in preparation for the North African Campaign. While the DTC was located to the east and north of the West Chocolate Mountains REEA, Camp Dunlap Naval Reserve was established by the Department of the Navy in 1942 within the REEA. Facilities constructed for Camp Dunlap are still in existence.

3.9.3.4 Summary of Cultural Resources Recorded within the West Chocolate Mountains REEA

Portions of the West Chocolate Mountains REEA have been the subject of 30 cultural resources studies and reports on file at the South Coastal Information Center. These studies represent approximately five percent of the total REEA. This is not representative of the total number of studies conducted through the REEA however, as the earliest studies and site inventories were conducted between the 1920s and 1950s and were not written up in reports. This early work is also not represented in the calculation of total acreage surveyed.

Human occupation created a substantial corpus of archaeological resources, 156 of which have been previously recorded within the West Chocolate Mountains REEA. Of these resources, 106 are prehistoric sites, 19 are prehistoric isolates, and 21 are historic period sites, two historic-period isolates, one site containing both prehistoric and historic components, and seven GLO mapping features. Six sites contain documented evidence of human burials that bear special significance and sensitivity for modern Native Americans. Presumably other habitation sites also contain human remains. While ceramic scatters are the most common resource type documented within the REEA, lithic scatters are also very common, as are hearth pits and sites with habitation debris.

The Imperial Valley shows a strong example of spatial patterning in the locations of prehistoric sites. There is a strong concentration of prehistoric sites along the maximum shoreline of Lake Cahuilla. Sites are also strongly correlated in lower elevations presumably as the inhabitants established their work and living areas adjacent to the receding shoreline. The EA that was written for the WECO Plan Amendment (BLM 2002) states that the majority of prehistoric cultural resources are located within 0.4 to 0.5 mile of one of the last shorelines for Lake Cahuilla. Forty-six of the sites are classed as habitation sites with midden deposits, hearth or cooking features, fish and animal bone; and a variety of artifact types, including ceramics, flaked stone, and milling tools.

Historic-period sites tend to be concentrated along modern infrastructure lines, including the SPRR, SR 111, and the Coachella and East Highline canals.

3.9.3.5 Native American Concerns

While geothermal and wind projects are not new for southern California, solar projects are only now becoming significant issues for local Native American tribes. Impacts on cultural resources, visual impacts on spiritual sites, and impacts on animals and plants considered sacred to the tribes are being cited as issues of tribal concern.

Unidentified Cultural Resources and Other Sacred Spaces and Resources

It is likely that, in the vicinity of the West Chocolate Mountains REAA, there are spaces and resources considered sacred to local tribes that have not been formally documented, such as landforms and trails related to dream travel. In the vicinity of the REEA, Corn Springs, Eagle Mountain, Obsidian Butte, the Imperial Sand Dunes, Cargo Muchacho Mountains, Black Mountain, Pilot Knob, Picacho Peak, and the many trails that connect sacred mountains and communities have documented as spiritually significant to Native Americans (Russell et al. 2002). BLM policy, in accordance with Section 106 of the NHPA, requires project-specific

inventories and consultation with Native American tribes to identify previously unidentified cultural resources or issues of tribal concern for each proposed project. Management decisions, such as project micrositing or the establishment of environmentally sensitive areas to protect cultural resources, would be made based on the results of the inventories and consultations with Native American tribes.

Visual Resource Impacts to Known Cultural Resources

Archaeological resources documented in the REEA primarily consist of prehistoric archaeological sites, historic debris scatters, and historic transportation routes (see Sections 3.9.3.1 to 3.9.3.4). These resources could not only be subjected to physical effects resulting from renewable energy project construction, but effects on the visual character of a resource, or a change in setting or feeling from the resource, i.e. when noise from a renewable energy project is introduced into the setting. These types of effects must be analyzed under Section 106 of the NHPA, specifically when there is an incidence in which the property is isolated or altered from its natural setting. This would be considered an adverse effect in the event the character which is altered is a contributing element to the property's qualification for the National Register. Additionally, under 36 CFR 800.9 (b)(3), an adverse effect is defined as "…introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting."

Traditional Cultural Landscapes (see (Parker and King 1998) can be particularly sensitive to visual and noise impacts. Obstructions to the viewshed of a Traditional Cultural Landscape can impact the setting and feeling of a sacred place. Additionally, night lighting of a facility can add light pollution that obscures the view of stars in the night sky; such an obstruction could impact traditional or ceremonial activities that occur at night and/or involve a clear view of stars, plants, etc. Comments received by the Quechan Tribe on March 12, 2012, have indicated that wind towers are particularly intrusive as a visual impact. Geothermal and solar projects can also include cooling towers and solar power towers that could also impact the viewshed.

The BLM acknowledges that without knowing the precise locations of projects that could be built within the REEA, an analysis of project-specific visual impacts is not possible. Required project-specific analyses and consultations with Native American tribes will be needed to characterize impacts to cultural resources, including obstructions to sacred viewsheds and audible impacts to sacred areas resulting from future project activities.

Tribally Sensitive Plant and Animal Species

Several plant and animal species in the REEA, including creosote, desert tortoise, and flat-tailed horned lizard, are considered significant to Native American tribes. Project-specific inventories for plants and animals would be completed, and management decisions for species made, in consultation with Native American tribes.

3.10 Paleontological Resources

This section identifies known paleontological resources within the West Chocolate Mountains REEA and discusses applicable regulations.

3.10.1 Definition of Resource

Paleontological resources (i.e., fossils) are the buried remains of prehistoric organisms (i.e., animals, plants, and microbes). Fossils include bones, teeth, shells, leaves, and wood; as well as traces of tracks, trails, burrows, and footprints found in geologic deposits (formations). Evidence of paleontological resources can be found in fossils.

3.10.2 Applicable Plans, Policies, and Regulations

Paleontological resources are recognized as nonrenewable scientific resources and are afforded protection by federal, state, and local statutes, and policies for the management of paleontology on public lands.

3.10.2.1 Federal

National Environmental Policy Act

NEPA (42 United States Code [U.S.C.] 4321 et seq.) was signed into law on January 1, 1970. The Act establishes national environmental policy and goals for the protection, maintenance, and enhancement of the environment and it provides a process for implementing these goals within the federal agencies. Section 101 (42 U.S.C. 4331) states "preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity, and variety of individual choice". Section 102 of NEPA requires federal agencies to incorporate environmental considerations in their planning and decision making through a systematic interdisciplinary approach. The NEPA process consists of an evaluation of the environmental effects of a federal undertaking including its alternatives. There are three levels of analysis, including a categorical exclusion determination, preparation of an environmental assessment/finding of no significant impact, and preparation of an EIS. An EIS is a more detailed evaluation of the proposed plan and alternatives; this analysis includes the effects on paleontological resources. The BLM is responsible for NEPA analysis.

Federal Land Policy and Management Act

The FLPMA established policies and goals to be followed in the administration of public lands by the BLM. The intent of the Act is to protect and administer public lands within the framework of a program of multiple-use and sustained yield, and the maintenance of environmental quality. Under the Land Use Planning section, particular emphasis is placed on the protection of the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resources, and archeological values. This Act dictates how the BLM regulates mineral resources extraction on BLM land.

California Desert Conservation Area Plan

The CDCA Plan defines multiple-use classes for BLM-managed lands in the CDCA, which includes the land area encompassing the West Chocolate Mountains REEA.

Paleontological resources, including vertebrate and invertebrate fossils, represent a sensitive, nonrenewable resource subject to a wide range of potential impacts. With respect to paleontological resources, the CDCA Plan aims to maximize their protection, systematic and scientific material recovery, and the development of education and interpretative programs.

Antiquities Act

The Antiquities Act of 1906 was the first law enacted to specifically establish that archaeological sites on public lands are important public resources, and it obligated federal agencies that manage public lands to preserve the scientific, commemorative, and cultural values of such sites. The Act does not refer to paleontological resources specifically; however, the protection of "objects of antiquity" (understood to include paleontological resources) by various federal agencies, including the BLM and NPS, is included in the Act.

Paleontological Resources Preservation Act

The 2009 Omnibus Public Land Management Act created the Paleontological Resources Preservation Act (PRPA) into law. The law requires the Secretaries of the Interior and Agriculture to manage and protect paleontological resources on federal lands. New penalties were established for fossil theft and vandalism on federal lands.

Standards and Guidelines

BLM Manual 8270 and BLM Handbook H-8270-1 provide guidance on managing paleontological resources and provide procedures for permits, required qualifications, classification, and planning for the protection of paleontological resources.

3.10.3 Existing Conditions

The following presents a discussion of the geology and paleontology in the West Chocolate Mountains REEA. Additional information about the geology of the REEA is provided in Section 3.3, Topography, Geology, and Geologic Hazards. Data collection for this analysis consisted of identifying and collecting readily available paleontology literature from local, state, and federal agency sources; and reviewing readily available geologic and topographic maps.

3.10.3.1 Geologic Setting

Topography

The elevation within the West Chocolate Mountains REEA ranges from a low of -235 below sea level in the area of the shoreline of the Salton Sea, to approximately 400 feet msl along the front of the alluvial fans of the Chocolate Mountains (Jennings 1967). Much of the REEA lies between an elevation of approximately -100 feet msl and 100 feet msl. Three distinct physiographic areas within the REEA include Chocolate Mountain alluvial fans, Imperial Valley, and Durmid Hills. Further discussion on these areas is provided in Section 3.3, Topography, Geology, and Geologic Hazards.

Regional Geology

The West Chocolate Mountains REEA lies within the Colorado Desert geomorphic province (Norris and Webb 1990). A geomorphic province is a naturally defined geologic region

with distinct and unique landforms that have developed due to a specific combination of geology units, faults and fault zones, and climate. The Colorado Desert geomorphic province is represented as a low-lying barren desert basin, about 235 feet below sea level in part, and is dominated by the Salton Sea. The province is a depressed block (Salton Trough) between active branches of alluvium-covered San Andreas Fault with the southern extension of the Mojave Desert on the east. The ancient beach lines and silt deposits of extinct Cahuilla Lake are a characteristic feature of this province. The Colorado Desert geomorphic province is bounded on the west by the Peninsular Ranges, to the north by the Transverse Ranges, and to the east by the Mojave Desert geomorphic provinces (California Geological Survey [CGS] 2002).

Local Geology

There has been a long history of inland seas filling the Salton Trough. As recently as 400 A.D., ancient Cahuilla Lake was approximately ten times larger (at about 3,900 square miles, or the size of the state of Delaware) than the present Salton Sea, as indicated by the paleo (old) shorelines left on the rocks of the surrounding mountains. These old shorelines are expressed as deposits of Travertine, a fresh water limestone. The Salton Trough held a great deal of glacial melt from the last Ice Age. At its zenith, Cahuilla Lake was an enormously rich ecosystem. Fossil remains show that it was probably a fresh water lake which, over time, would have become saline due to evaporation.

3.10.3.2 Paleontology

Paleontological resources are important scientific and educational resources because of their use in: (1) documenting the presence and evolutionary history of particular groups of now extinct organisms; (2) reconstructing the environments in which these organisms lived; and (3) determining the relative ages of the strata in which they occur. Fossils are also important in determining the geologic events that resulted in the deposition of the sediments in which they were buried.

The BLM established the Potential Fossil Yield Classification (PFYC) system to quantify the occurrence of and risk of impact to paleontological resources on public lands (BLM 2007). Geologic units are assigned a classification between one (lowest) and five (highest). The BLM's PFYC system rates the sensitivity of geologic units. The five basic classes are:

- **Class 1 - Very Low:** Not likely that a geologic unit has recognizable fossil remains.
- **Class 2 - Low:** Not likely to contain vertebrate fossils or scientifically significant nonvertebrate fossils.
- **Class 3 - Moderate or Unknown:** Various significance, abundance, and predictable occurrence or unknown fossil potential.
- **Class 4 - High:** High occurrence of significant fossils.
- **Class 5 - Very High:** Highly fossiliferous and predictable or significant fossils that are at risk of adverse impacts or degradation.

The BLM uses the PYFC system to classify paleontological resource potential on public lands to assess possible impacts and mitigation needs related to federal actions that involve land-use planning, surface disturbance, and/or land tenure adjustments.

The West Chocolate Mountains REEA has numerous geologic units ranging in age from Pliocene to late Quaternary. Likewise, the classifications of the units crossed include three levels: Class 2 - Low, Class 3 - Moderate, and Class 4 - High.

Quaternary paleospring deposits

There are a number of fault-caused springs in the West Chocolate Mountains REEA with the potential to yield significant animal fossils. Elsewhere in Southern California, spring deposits have contained Late Pleistocene fossils (Reynolds and Reynolds 1991). Under the BLM PFYC, the spring mound sedimentary deposits are rated Class 4 - High (BLM 2007).

Quaternary cave deposits

In the more rigid areas of the Durmid Hills, there is a possibility for occurrence of small caves and rock shelters (Jefferson 1995). In the past, these caves were often open at the surface and accumulated bones of various kinds of animals from raptors and other predators dropping remains into the opening, or from the remains of animals that inhabited the cave. Other animals, such as pack rats, built nests and also collected bones from around the cave entrance. Many of these caves deposits are older than 10,000 years and, in the Mojave Desert, have yielded the remains of large, extinct, late Pleistocene mammals such as camel, horse, and sloth (Mead and Murray 1991; Reynolds et al. 1991; Whistler 1991) as well as smaller mammals, amphibians, reptiles, and birds (Goodwin and Reynolds 1989; Force 1991). A packrat midden from the west side of the Chocolate Mountains yielded abundant vertebrate material (Salton Sea 2006). Under the BLM PFYC, the cave deposits are rated Class 4 - High (BLM 2007).

Quaternary sand (Qs)

Under the BLM PFYC, these deposits are rated Class 2 - Low (BLM 2007; Jefferson 2010a).

Quaternary lake/playa deposits (Ql)-Lake Cahuilla beds

In many areas around the Imperial Valley, the very top of the Lake Cahuilla beds at the surface have preserved the last dated stand of Lake Cahuilla at 400 years before present (Waters 1980, 1983). Often, these deposits at the surface consist of abundant shells of freshwater clams and snails. Evidence of earlier inundations by the Colorado River has been found at depth (Waters 1983). Because of faulting along the San Andreas Fault Zone, the Lake Cahuilla beds could be thinner or thicker depending on which side of the fault the sediments are on. These sediments tend to be highly fossiliferous and often preserve late Pleistocene and Holocene invertebrates (diatoms, pollen, ostracods, freshwater clams, and snails), smaller vertebrates (fish, amphibians, reptiles, birds, and small to medium sized mammals), and larger mammal fossils.

In Chocolate Mountain alluvial fans, the Lake Cahuilla beds are perched on the distal end of the alluvial fans and are at a higher elevation (Jennings 1967) and may be older than the Lake Cahuilla beds present at the surface in the Imperial Valley. Under the BLM PFYC, these deposits are rated Class 4 - High (BLM 2007; Jefferson 2010a).

Brawley Formation (Ql)

As discussed in more detail in Section 3.3, the Pleistocene Brawley Formation (mapped as Ql-Quaternary Lake Deposits) was mapped by Jennings (1967) at the surface and at depth over a large portion of the West Chocolate Mountains REEA. Sediments of the Brawley Formation tend to be fossiliferous (Maloney 1986). Under the BLM PFYC, these deposits are rated Class 3 - Moderate (BLM 2007; Jefferson 2010a).

Quaternary alluvium (Qal)

Quaternary alluvium have been repeatedly demonstrated to be highly fossiliferous, yielding the remains of large, extinct, Ice-Age (Pleistocene) mammals such as mammoths, mastodons, camels, saber-toothed cats, tapirs, sloths, and horses, as well as amphibians (salamanders, frogs, toads), reptiles, birds, and small mammals. Under the BLM PFYC, these deposits are rated Class 4 - High (BLM 2007; Jefferson 2010a).

Quaternary nonmarine deposits (Qc)

Like the younger Quaternary alluvium, these deposits are throughout Southern California (Jefferson 1991a,b) and the Mojave Desert (Jefferson 1989, 1991a,b) and these units have been repeatedly demonstrated to be highly fossiliferous, yielding the remains of large, extinct, Ice-Age (Pleistocene) mammals such as mammoths, mastodons, camels, saber-toothed cats, tapirs, sloths, and horses, as well as amphibians (salamanders, frogs, toads), reptiles, birds, and small mammals. Under the BLM PFYC, these sediments are rated Class 4 - High (BLM 2007; Jefferson 2010a).

Shavers Well Formation (QP) – Palm Spring Formation of Dibblee 2008

Although no diagnostic fossils are known, the finer grained sediments of the Shaver Wells Formation could yield significant fossils due to their sedimentary facies associations. Recent field reconnaissance by Anza-Borrego Desert State Park paleontologists in the upper Skeleton Canyon Member has noted unidentifiable fossil bone fragments (Jefferson 2010b). Any identifiable vertebrate fossils from the Shavers Well Formation would be considered significant. Under the BLM PFYC, the rocks are rated Class 3 - Moderate (BLM 2007; Jefferson 2010a).

Borrego Formation of the Palm Spring Group

On the western side of the Salton Trough, the Borrego Formation has yielded microfossils that include ostracods (water fleas), micro mollusks (clams and snails), diatoms (microscopic plants with glass shells), rare planktonic (floating) foraminifers (microscopic one-celled animals with calcium carbonate [lime] shells) and plant fragments (Kirby et al. 2007). In the West Chocolate Mountains REEA, where the Borrego Formation meets the Arroyo Diablo Formation, large mammal bone scraps have been found (Jefferson 2010b). Under the BLM PFYC, these sediments are rated Class 3 - Moderate (BLM 2007; Jefferson 2010a).

Arroyo Diablo Formation of the Palm Spring Group

On the western side of the Salton Trough, the Arroyo Diablo Formation has yielded several types of fossils including petrified wood (Remeika 2006), fish (Gensler et al. 2006), and other rare and significant vertebrate remains (Jefferson 2010a). Any identifiable vertebrate

fossil(s) recovered from the Arroyo Diablo Formation would be considered extremely significant.

In the Durmid Hills area, this rock unit may be the lower 1,200 feet of hard, buff sandstones with interbeds of gray claystone originally called Palm Spring Formation by Dibblee (1954). Later, Babcock (1974) and Baldwin et al. (1997) mapped this area as Borrego Formation. Under the BLM PFYC, these rocks are rated Class 3 - Moderate (BLM 2007; Jefferson 2010a).

3.10.4 Records Search

Paleontological records and literature searches conducted at the Stout Research Center at Anza Borrego State Park, the San Diego Natural History Museum, and the Museum of Paleontology at the University of California - Berkeley, revealed the presence of 24 known paleontological resources localities within the REEA and another 25 located within a 1-mile radius of the REEA. Additionally, a database search of Late Pleistocene vertebrate localities for California, which includes institutional records and published references, produced information about several paleontological resource localities recorded within 1 mile of the REEA (Jefferson 1991a,b). The records and literature searches indicate no previous paleontological resource surveys have been conducted in the West Chocolate Mountains REEA (Jefferson 2010a; Randall 2010).

3.11 Visual Resources

The baseline visual setting was developed based on the BLM guidelines for visual resource management (VRM) and the El Centro Field Office's Visual Resources Inventory (Otak, Inc. 2010, Appendix E). Figure 3.11-1 shows the boundaries of the REEA, which is also the visual REEA considered in this analysis.

The BLM's VRM system provides a framework for describing visual resources, establishing appropriate management goals for those resources, assessing the impact of an action on those resources, and determining whether such an action would conflict with established management goals. Visual resources for the West Chocolate Mountains REEA are described in two ways in this section. The Visual Resources Inventory (VRI) subsection describes the existing scenic elements in the landscape and assesses their sensitivity. The VRI report is included in Appendix E. The VRM subsection describes the visual resource management goals associated with the REEA; because there are no VRM classes established for the REEA, interim VRM (iVRM) classes were established based in part upon the VRI.

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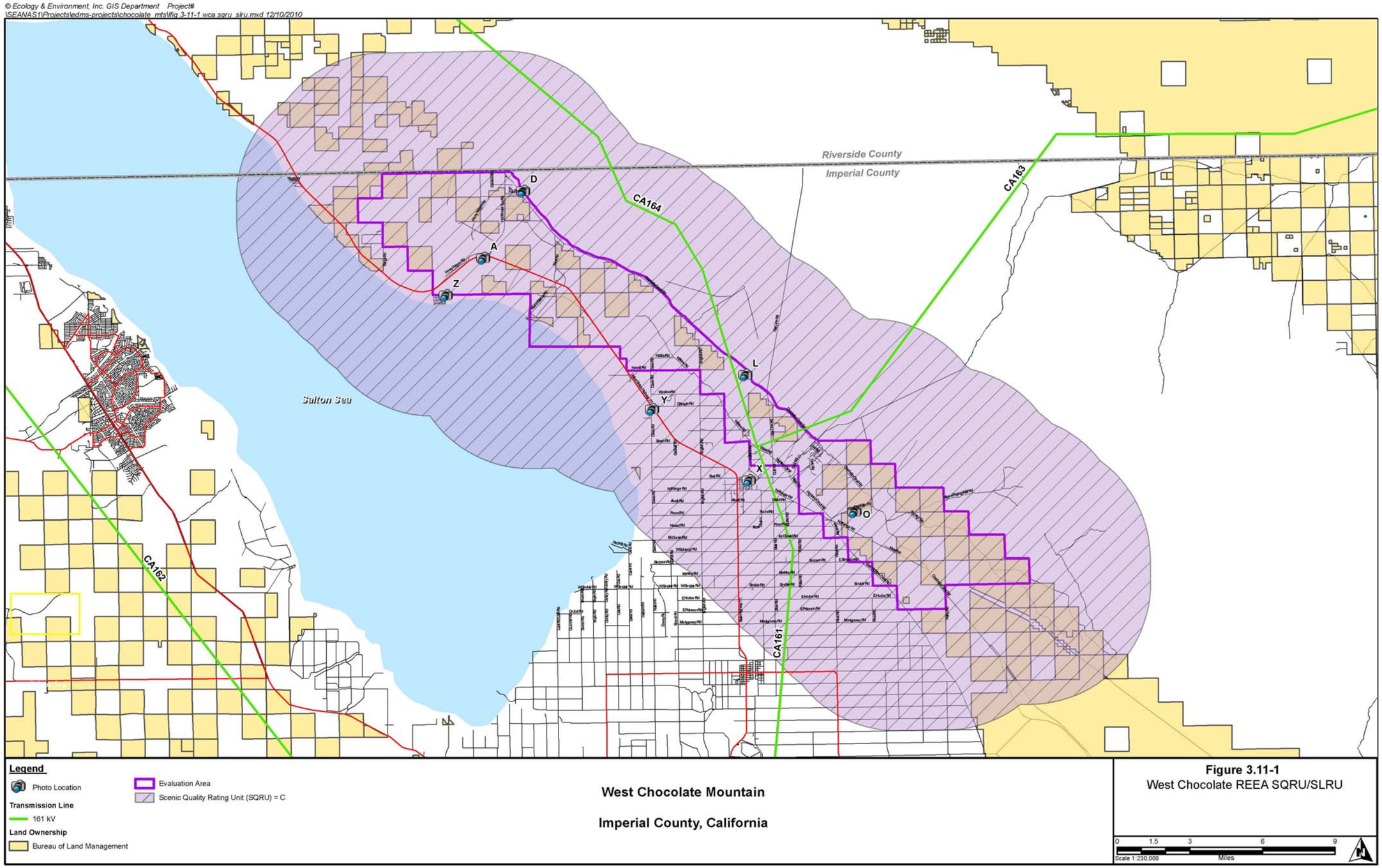
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3.11.1 Definition of the Resource

3.11.1.1 Visual Resources Inventory

The BLM's VRI process, as outlined in the BLM's Handbook H 8410-1 Visual Resource Inventory (BLM 1986), determines visual values and classifies BLM land according to those values. The inventory consists of a scenic quality evaluation, viewer sensitivity level analysis, and a delineation of distance zones. Considering these three factors, BLM-administered lands are placed into one of four VRI classes (Class I through IV). These factors are defined as follows:

- **Scenic Quality:** Scenic quality measures the visual appeal of the land. An assessment of visual quality considers landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications present in a landscape. Scenic quality is considered higher for landscapes with greater variety and harmony of these elements.
- **Viewer Sensitivity:** The sensitivity of a location takes into account the types of users, the number of users or frequency of use, public concern for maintaining visual resources, any scenic designations or management plans designed to protect visual resources, and adjacent land uses.
- **Distance Zones:** Landscapes are divided into three distance zones: foreground-middleground, background, and seldom seen. The foreground-middleground zone includes areas that are less than 3 to 5 miles away from a viewpoint or viewing corridor. Seen areas between 5 and 15 miles away are in the background zone. Areas beyond 15 miles are considered within the seldom seen zone.

The three factors are mapped individually and then combined as layers on a single map. The relationships between the rated values of scenic quality, sensitivity level, and visibility are cross-referenced with the VRI Matrix to determine the VRI Class. There are four VRI Classes which represent relative visual value, with VRI Class I and II having highest value and VRI Class IV having the lowest. VRI Class I is reserved for special congressional designations or administrative decisions such as Wilderness Areas, visually sensitive Areas of Critical Environmental Concern (ACECs), Wild and Scenic Rivers, etc.

VRI classes are used in the BLM planning process as the basis for establishing management goals and are intended for informational purposes to describe the existing visual character of the landscape (BLM 1986). The BLM manages the land within the West Chocolate Mountains REEA under the CDCA Plan (BLM 1980). The CDCA was inventoried for visual values in the early 1980s, but the results were never integrated into the CDCA Plan. Given the three decades of change that have occurred within region, the VRI was updated for the El Centro Field Office area to reflect current conditions. This update is included in Appendix E.

3.11.2 Applicable Plans, Policies, and Regulations

3.11.2.1 Federal

<u>Federal Land Policy and Management Act</u>

The following sections of the FLPMA relate to the management of aesthetic and visual resources on the public lands:

- **Section 102(a):** "The public lands [shall] be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values."
- **Section 103 (c):** Identifies "scenic values" as one of the resources for which public lands should be managed.
- **Section 201(a):** "The Secretary shall prepare and maintain on a continuing basis an inventory of all public lands and their resources and other values (including . . . scenic values)."
- **Section 505(a):** "Each right-of-way shall contain terms and conditions which will . . . (ii) minimize damage to the scenic and esthetic values."

Federal regulations regarding aesthetics and visual resources related to the proposed plan are outlined in BLM-published resource management plans and are enacted through the application of VRM classifications described in Section 3.11.2, Definition of the Resource.

California Desert Conservation Area Plan

The West Chocolate Mountains REEA is located on land managed according to the CDCA Plan, as amended (BLM 1980). The CDCA Plan does not include VRM classifications but does include Multiple Use Classes (MUCs), which restrict the level of use and development for lands managed under the CDCA Plan. All BLM lands covered by the CDCA Plan have been categorized into four MUCs based on the sensitivity of resources and types of uses for each geographic area. The REEA is designated as Unclassified Lands as identified within the BLM's multiple use class designation of the CDCA Plan which have not been placed in one of the MUCs. Unclassified Lands are scattered and isolated parcels of public land in the CDCA. The BLM manages these parcels on a case-by-case basis, as explained in the Land Tenure Adjustment Element section of the CDCA Plan (BLM 1980). There are no provisions to protect visual resources within unclassified lands in the Land Tenure Adjustment Element of the CDCA Plan (BLM 1980).

3.11.2.2 State

California Department of Transportation State Scenic Highway Program

California Department of Transportation (Caltrans) administers the State Scenic Highway Program to preserve and protect scenic highway corridors from change that would diminish the aesthetic value of lands adjacent to highways (California Streets and Highways Code, Section 260, et seq.). The State Scenic Highway Program includes a list of highways that have been designated as or are eligible for designation as scenic highways. These highways are identified in the Streets and Highways Code, Section 263. The program provides guidance regarding land uses and density of development; the design of sites and structures, the design and placement of signs, landscaping, and grading; and specifies other restrictions. Local jurisdictions are responsible for adopting and implementing such regulations. If a highway is listed as eligible for official designation, it is also part of the Scenic Highway System and care must be taken to preserve its eligibility status. SR 111 is not officially designated as a scenic highway but is

eligible for the California State Scenic Highway System within the West Chocolate Mountains REEA (Caltrans 2010).

California State Lands Commission School Lands

Portions of the property within the West Chocolate Mountains REEA are known as "school lands" and are under the jurisdiction of the California State Lands Commission (CSLC). There are no development restrictions on CSLC school lands associated with visual resources.

3.11.3 Existing Conditions

3.11.3.1 Regional Setting

The West Chocolate Mountains REEA is located in central Imperial County, California, within the boundaries of the CDCA (BLM 1980). The REEA is situated south of Riverside County, north of the city of Calipatria, east of the Salton Sea, and west of the Chocolate Mountains.

There are no scenic areas within the project area; however, several California state parks located just north of the Town of Bombay Beach are accessible by SR 111. Some of these state parks including New Camp, Corvina Beach, and Bombay Beach, and the upper loop of Mecca Beach have been temporarily closed. Caltrans has deemed this segment of the highway eligible for consideration as a state scenic highway, but it has not been officially designated as such (Caltrans 2010). The segment of eligible highway extends from Bombay Beach to Mecca and is approximately 40 miles north of the West Chocolate Mountains REEA. This portion of the highway closely parallels the seashore and offers uninterrupted scenic views, unlike the portions of the highway that occur southward within the REEA.

3.11.3.2 Built Environment

The built environment includes rural residential land use within the visual West Chocolate Mountains REEA. The rural town of Niland is located 6 miles southwest of the REEA and has a population of 1,290 residents. The town of Bombay Beach is in the northwest corner of the REEA and has a population of 412 residents. The closest significant commercial land uses are located in El Centro, the county seat for Imperial County, which is located approximately 30 miles south of the REEA. El Centro has approximately 40,000 residents and has commercial shops and facilities for outdoor recreation activities.

Several high-voltage electric transmission lines are prominently visible in the visual study area. Also noticeable is the railroad, which parallels SR 111 from the northwest until Niland, where the highway turns directly south but the railroad continues southeast along the west edge of the West Chocolate Mountains REEA. The Coachella Canal borders the eastern region of the visual REEA. This canal also serves as a border between the BLM land and the adjacent Chocolate Mountains Aerial Gunnery Range (CMAGR), which is located east of the visual REEA.

Approximately 5 miles below the southern boundary of the West Chocolate Mountains REEA is the Calipatria State Prison, which is visually dominant due to its scale and extensive night lighting amongst a dark rural setting.

3.11.3.3 Physical Geography

The West Chocolate Mountains REEA is characterized by gently undulating alluvial fans extending from the West Chocolate Mountains to the Salton Sea. The topographic diversity of the REEA is characterized by several bajadas in the central portion, with a distinct slope in the north and sand dunes in the south. The vegetation is dominated by creosote bush and white bursage communities which give the appearance of both soft and course textures.

3.11.3.4 Viewer Groups

Viewer groups in the West Chocolate Mountains REEA include motorists on roadways within or adjacent to the area, including motorists on SR 111, which is an eligible State Scenic Highway, residents of the towns and communities in the REEA, visitors to the area, dispersed rural residents, and viewers along the Coachella Canal.

3.11.3.5 Visual Resource Management Classes

VRM classes are designated during the land use planning process. VRM classes are similar to VRI classes in that they range from I to IV; however, they differ in that VRM classes are management decisions that dictate allowable levels of visual change that may occur on the landscape. VRM objectives are established under each class designation, with VRM Class I being the most restrictive and VRM Class IV allowing for the greatest amount of visual change.

- **VRM Class I:** The objective of this class is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.
- **VRM Class II:** The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
- **VRM Class III:** The objective of this class is to partially retain the existing character of the landscape. The level of change to characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
- **VRM Class IV:** The objective of this class is to provide for management activities that allow major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high.

The VRM policy requires that VRM classes are assigned to all BLM-administered lands during the land use planning process with effects disclosed during analysis of the management alternatives; however, there are older land use plans, such as the CDCA Plan, that are still in effect and do not designate VRM classes. If VRM classes are absent, then iVRM classes are assigned when analyzing individual proposed plans of development. These classes are developed using the guidelines in the BLM Visual Resource Inventory Manual (Manual H-8410-1) and

must conform to the land use allocations set forth in the RMP which covers the West Chocolate Mountains REEA. Interim VRM class designations must consider both VRI values and existing land use decisions.

Based on the visual inventory described above and in conformance with both the CDCA Plan and the BLM Visual Resource Inventory Manual, the BLM has designated the West Chocolate Mountains REEA as iVRM Class IV. The objective of iVRM Class IV is to provide for management activities which require major modification of the existing character of the landscape, and high levels of changes to the landscape are allowed. High levels of change are defined as changes that may dominate the view and would be the major focus of viewer attention. These changes should, nonetheless, adhere to basic design principles and repeat the basic visible elements in the existing landscape (BLM 1986).

3.11.4 Landscape Character

The complete VRI is included in Appendix E. The information below is a summary of the information included in the VRI.

The West Chocolate Mountains REEA is located entirely within the Mammoth landscape unit. A landscape unit is a contiguous area that is characterized by uniform landform, vegetation, visual character, and quality. Scenic quality is determined by rating the landform, vegetation, water bodies, and color visible in existing views, while simultaneously considering adjacent scenery, scarcity, intactness of views, and cultural modifications. Table 3.11-1 shows a summary of the ratings for the REEA. The visual quality of the area is Class C, which is the lowest ranking for visual quality (BLM 1986). Figure 3.11-1 shows the sensitivity level rating and scenic quality rating for the REEA.

Table 3.11-1 Summary of Visual Quality for the Mammoth Scenic Quality Rating Unit

Factor	Rating (0-5)	Explanation or Rationale
Landform	2	Deep, wide washes add variety
Vegetation	3	Agricultural lands/orchards, vegetation near Salton Sea; paloverde, ironwood, creosote
Water bodies	0	Frink Spring, canal but not always noticeable
Color	2	Some variety
Adjacent Scenery	3	Salton Sea, Chocolate Mountains, Imperial Valley
Scarcity	2	Orchards, agricultural lands; deep, wide washes
Cultural Modifications	-1.5	Development and Mine Detract
Total:	10.5	A scenic quality rating of 11 or below is considered a rating of C, which is the lowest rating for scenic quality.

Source: Otak, Inc. 2010

3.11.5 Sensitive Viewers

Visual sensitivity levels are a measure of public concern for landscape aesthetics found within a particular region. Overall, higher degrees of visual sensitivity correlate with areas where people live and with people who are engaged in outdoor recreational pursuits. Areas with low to moderate visual sensitivity are areas not greatly affected by landscape aesthetics.

Within the Mammoth landscape unit, the sensitivity rating is low. The predominant types of users include farmers, recreationists, residents, motorists on SR 111, and military access; the sensitivity of these users is considered low. The amount of use for the Mammoth landscape unit is also considered low and comprises predominately locals, some small communities, dispersed agricultural productions, and people passing through the area. Public interest is considered moderate because Slab City and Salvation Mountain draw some local and regional tourists, and residents of Bombay Beach are considered to have a moderate level of public interest. Adjacent uses were ranked low and include the Salton Sea, military lands, and Imperial Valley. The VRI report notes that, within the Mammoth landscape unit, development is haphazard and discordant, and there is no evidence of attention to scenic quality preservation.

Within the West Chocolate Mountains REEA, representative viewpoints were categorized by sensitivity level. Those with a moderate or high visual sensitivity are included in this analysis. Seven groups of sensitive viewers would be able to see the REEA and would have a moderate or high level of visual sensitivity (Table 3.11-2). The sensitivity ratings listed in Table 3.11-2 are higher than those discussed above for the Mammoth landscape unit as a whole (e.g., Slab City residents are considered to have a high degree of sensitivity). The ratings below take into consideration the volume and duration of views, which results in a more conservative sensitivity rating. Figure 3.11-1, provided previously, shows the sensitivity level rating and scenic quality rating of the REEA.

Table 3.11-2 Viewer Sensitivity in the West Chocolate Mountains REEA

Viewer Group	Expectation of Views	Usage Volume	Duration of Views	Sensitivity
Residents adjacent to REEA	High	Low	Long	High
Residences within Communities[1]	High	Moderate	Long	High
Residents within Slab City	High	Moderate	Long	High
SR 111 Motorists	High to Moderate	Moderate	Short	High (north of Bombay Beach); Moderate (south of Bombay Beach)
Eastern shore of the Salton Sea	High	Low	Short	Moderate
Temporary visitors to the REEA	Moderate	Low	Short	Moderate

Table 3.11-2 Viewer Sensitivity in the West Chocolate Mountains REEA

Viewer Group	Expectation of Views	Usage Volume	Duration of Views	Sensitivity
Motorists within the REEA, including Coachella Canal Road	Moderate	Low	Short	Moderate

Note:
[1] Communities include Bombay Beach, Niland, Wister, Mineral Springs, and Estelle.

All of the viewpoints or viewer groups described above are within 5 miles of the West Chocolate Mountains REEA; therefore, all viewers would have foreground-middleground views of the visual REEA.

3.12 Lands and Realty

During the scoping period, meetings were conducted with the public and government agencies to identify their concerns. Written comments were also received. The following issues related to lands and realty were raised during scoping: (1) discuss how renewable energy fits in with public use of land; (2) provide references and descriptions of land use plans and resource management plans associated with areas that have been identified as premium geothermal, solar, or wind resource areas; (3) discuss how the proposed plan would support or conflict with the objectives of federal, state, tribal, and local land use plans, policies, and controls in the selected areas; (4) describe the procedures necessary to amend or revise these plans as necessary to allow for solar, geothermal, or wind resource development; (5) provide direction on how to balance competing demands for uses; (6) discuss whether any of this land is classified as disturbed, and describe to what extent the land could be used for other purposes; (7) identify how this process relates to and would complement the PEISs for geothermal, wind, and solar energy and associated SEZs, as well as to the Northern and Eastern Colorado Plan, the Imperial Sand Dunes Recreation Area Management Plan, and other planning efforts in the general area, including the IID Habitat Conservation Plan/Natural Community Conservation Plan; (8) identify how this process fits in with the Desert Renewable Energy Conservation Plan (DRECP) and transmission planning processes; (9) describe impacts from construction and/or expansion of transmission infrastructure in relation to renewable energy development; and (10) discuss casinos nearby on any tribal land and explain effects of transmission or extraction (geothermal).

One comment recommended that the EIS evaluate the acquisition history of the Catellus lands that were acquired for conservation purposes and suggested these lands should be protected from surface-disturbing activities. Another comment indicated that all the public lands north and east of the Coachella Canal are relatively undisturbed, and suggested that the Coachella Canal be used as the boundary of the evaluation area.

These comments are addressed in Section 3.12.3, Existing Conditions, and in Chapter 4, Environmental Consequences, Section 4.12.

3.12.1 Definition of the Resource

Lands and realty actions can be divided between land ownership adjustments and land use authorizations. Land ownership adjustments focus primarily on land acquisition and disposal (including easement acquisition), while land use authorizations consist of ROWs, utility corridors, communication sites, and other leases or permits.

3.12.2 Applicable Plans, Policies, and Regulations

3.12.2.1 Federal

California Desert Conservation Area Plan

Designated by the FLPMA in 1976, the CDCA is a 25-million acre expanse of land in Southern California. About 10 million acres are administered by the BLM. Congress directed BLM to prepare and implement a comprehensive, long-range plan for the management, use, development, and protection of the public lands within the CDCA. The Plan is based on the concepts of multiple use, sustained yield, and maintenance of environmental quality. The Plan establishes goals for protection and for use of the desert. It designates distinct multiple use classes for the lands involved, and it establishes a framework for managing the various resources within these classes. These lands are managed in a controlled balance between higher intensity use and protection. A wide variety of uses, such as mining, livestock grazing, recreation, energy, and utility development, are allowed. Any damage that permitted uses cause must be mitigated (BLM 1980a).

The West Chocolate Mountains REEA is located on land managed according to the CDCA Plan, as amended (BLM 1980a). All BLM lands covered by the CDCA Plan have been categorized into four MUCs based on the sensitivity of resources and types of uses for each geographic area. The REEA is designated as Unclassified Lands as identified within BLM's multiple use class designation of the CDCA Plan which have not been placed in one of the MUCs. Unclassified Lands are scattered and isolated parcels of public land in the CDCA. The BLM manages these parcels on a case-by-case basis, as explained in the Land Tenure Adjustment Element section of the CDCA Plan (BLM 1980a).

Western Colorado Desert Routes of Travel Designations Amendment

As discussed in Section 3.2.2.1**,** the WECO Plan Amendment designated preferred routes of travel across public lands managed by the BLM in the WECO Planning Area. Following the CDCA Plan as amended, the BLM manages the type and level of OHV use to create an environment that promotes the health and safety of visitors and employees and alleviates conflict between nearby residents and recreational users.

Federal Land Policy and Management Act

The FLPMA provides the BLM with an overarching mandate to manage the public lands and resources under its stewardship under 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, 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 (FLMPA §103(c)). Energy production is one of the intended uses of federal land.

Federal Land Transaction Facilitation Act

The Federal Land Transaction Facilitation Act (FLTFA), also known as the Baca Act, was passed by Congress and signed into law on July 25, 2000 and directs revenues generated from sale or disposal of certain public lands to "an acquisition account" (BLM 2008c). The four agencies, including the BLM, U.S. Forest Service (USFS), NPS, and the USFWS, can use the acquisition account to purchase lands located within federally designated areas from willing sellers, and the account can be used by BLM to place public lands up for sale.

The agencies entered into a national MOU in May of 2003 for land purchases governed under the FLTFA. In the State of California, under a Statewide Interagency Implementation Agreement, the agencies entered into an MOU among the regional offices of the agencies on November 7, 2005 (BLM 2008c).

Federal Aviation Administration

Federal Aviation Administration (FAA) regulations address potential aircraft obstruction for structures taller than 200 feet or within 20,000 feet of an airport. Specifically, Federal Regulation Title 14, Part 77 (14 CFR Part 77), established standards and notification requirements for objects that have the potential to affect navigable airspace. These standards are intended to: (1) evaluate the effect of the construction or alteration of structures on airport operating procedures; (2) determine if there is a potential hazard to air navigation; and (3) identify measures to enhance safety. Specifically, the FAA requires notification through the filing of FAA Form 7460, Notice of Proposed Construction or Alteration, if any of the following criteria are met with regards to a proposed plan (Title 14, Part 77.13).

The applicable regulations regarding airspace management include the following:

- **FAA Regulation, 14 CFR Part 71 (Designation of Class A, Class B, Class C, Class D, and Class E Airspace Areas; Airways; Routes; and Reporting Points):** Delineates the designation of federal airways, area low routes, controlled airspace, and navigational reporting points.
- **FAA Regulation, 14 CFR Part 73 (Special Use Airspace):** Defines special use airspace and prescribes the requirements of the use of that airspace.
- **FAA Order 7490.XX, Policies and Procedures for Air Traffic Environmental Actions (Draft):** Includes procedures and guidance for processing special use airspace (SUA) environmental issues between the FAA and the DOD.
- **FAA Order 7610.4H, Special Military Operations:** Specifies procedures for air traffic control planning, coordination, and services during defense activities and special military operations conducted in airspace controlled by or under the jurisdiction of the FAA.
- **MOU between the FAA and the DOD Concerning SUA Environmental Actions (26 January 1998):** The purpose of this MOU is to provide guidelines for compliance with NEPA and CEQ regulations without unnecessary duplication of effort by the

FAA and DOD. It promotes early coordination between the FAA and DOD during the environmental review process associated with the establishment, designation, and modification of SUA; permits the application of lead and cooperating agency procedures; and provides for the issuance of environmental documents for the development, designation, and use of SUA.

The management of aviation and airspace within the United States and its territories is the responsibility of the FAA and is governed by federal legislation and federal and military regulations and procedures. The ultimate authority in assigning and managing airspace is the FAA, which has acknowledged the military need for conducting certain training operations within airspace that is separated from other aircraft, such as civilian and commercial, and sets aside such airspace for military operations.

Airspace is defined in physical terms vertically and horizontally, and also by duration of use. Because airspace is a finite resource, it must be managed and used equitably to serve commercial, general, and military aviation needs. The FAA manages all airspace and has established various airspace designations to protect aircraft while operating near and between airports/airfields or operating within airspace identified for defense-related purposes.

According to the Interagency Air Cartographic Committee (IACC), the West Chocolate Mountains REEA is located within the Kane East Military Operations Area (MOA), Kane West MOA, and Abel South MOA. The permitted altitude (floor of MOA) for the Kane East MOA and Kane West MOA is 10,000 feet, and the time of aircraft use is 5:00 a.m. to 9:00 p.m. (seven days per week). The Abel South MOA's permitted altitude is 7,000 feet, and the time of aircraft use 5:00 a.m. to 10:00 p.m. Monday through Friday (FAA 2012).

The closest civilian airport is the Calipatria Municipal Airport located approximately 7 miles west of the West Chocolate Mountains REEA.

3.12.2.2 State

California State Lands Commission School Lands

Portions of the West Chocolate Mountains REEA are known as "school lands" and are under the jurisdiction of the CSLC. Shortly after it became a state, California received a significant land grant from the federal government to be used for the benefit of the public school system, and these lands were called school lands (CSLC 2008). According to the CDCA Plan, the CSLC has sought to exchange the CSLC sections of land for BLM-managed lands elsewhere in California and elsewhere in the CDCA (BLM 1980a). The primary objective of this exchange program would be to maintain and establish manageable tracts of land for the state and federal governments which would provide ease of administration and cost efficiency in management (BLM 1980a).

Statewide, the CSLC manages 1,190 fee-owned parcels containing a total of approximately 469,250 acres of school lands and the reserved mineral interests on approximately 790,000 acres of school lands where the surface estate previously has been sold. School lands were placed into a statutory trust in 1984 by the California State Legislature under the School Land Bank Act, which created the School Land Bank Fund, and designated the CSLC as trustee

of the fund. Pursuant to Public Resources Code §6217.5, all net revenues derived from the use of school lands (for example, royalties, rents, and interest generated from mineral leasing or energy development) are deposited into the State Treasury to the credit of the Teachers' Retirement Fund, which benefits the State Teachers' Retirement System. The vast majority of school land is located within the desert regions of Southern California and is difficult to develop for surface uses due to poor access, rugged terrain, and lack of basic infrastructure and utilities, such as paved roads, electricity and water (CSLC 2008). Fee-owned lands include areas where the CSLC has the surface rights and rights to the underlying minerals (CSLC 2010). The following are the fee-owned CSLC school lands within the West Chocolate Mountains REEA:

- Section 12, T9S, R11E, 640 acres (all);
- Section 30, T9S, R13E,303.93 acres (N1/2 of NE1/4; Lots 3,5, and 6; Lot 1 of NW1/4); and
- Section 36, T10S, R14E, 640 acres (all).

3.12.2.3 Local Regulations

Imperial County

Lands under private ownership exist within and adjacent to the West Chocolate Mountains REEA boundary. Applicable management plans and policies for these lands include the Imperial County General Plan (County of Imperial 2003) and Imperial County zoning regulations. As Imperial County has no direct land use jurisdiction over public lands, neither the General Plan nor Imperial County zoning regulations are directly applicable to activities proposed on public lands; however, private lands scattered throughout and adjacent to the REEA are under Imperial County's jurisdiction and, therefore, would be subject to the General Plan and county ordinances if they are used in any future geothermal, solar, or wind development (County of Imperial 2003).

Figure 3.12-1 presents a land use map that depicts existing land use development patterns within the West Chocolate Mountains REEA and surrounding region.

3.12.3 Existing Conditions

The West Chocolate Mountains REEA is approximately 59,095 acres within Imperial County. Of this area, 17,900 acres of land are federal surface/federal minerals and are managed under BLM jurisdiction, specifically the California Desert District's El Centro Field Office and 3,200 acres of land are under the jurisdiction of the CSLC. Other land holdings include split estate lands (both private surface and federal subsurface), as explained below, and non-BLM land owned by Caltrans located along SR 111.

The West Chocolate Mountains REEA contains approximately 19,162 acres of federal mineral estate land (acquired lands not included). Split estate land, defined as lands where the surface land owner does not own the underlying mineral estate, comprise 1,782 acres, which includes 1,182 acres designated as all minerals, 520 acres as oil and gas only, and 80 acres as geothermal only. The 1,782 surface acres of split estate lands are private surface and the same underlying mineral estate acreage is owned by the BLM.

The acquired lands (both surface and subsurface lands) include 2,862 acres, and the two existing geothermal leases encompass 3,322 acres. The 2,862 acres of acquired lands were acquired. The BLM does not hold the mineral rights to the acquired lands.

There are a total of 1,800 acres of BOR withdrawn lands in the West Chocolate Mountains REEA near the Coachella Canal. These withdrawn BOR lands will not be available for geothermal leasing, or solar or wind projects. The purpose of the BOR land withdrawals was to aid in the planning for the Coachella Canal and East Highline Canal.

Within the West Chocolate Mountains REEA, the CVWD operates and maintains the Coachella Canal under contract with the BOR, has fee-owned land, and CVWD's service area boundary overlaps the REEA within which CVWD may own and operate domestic water, sanitation, reclamation, and irrigation facilities. On CVWD property, BLM coordinates all project land and ROW acquisitions, as well as proposed project improvements, with CVWD.

The withdrawal of lands may be held by one federal agency for the benefit of another agency (federal, state, or local). For example, a wildlife management area may be held by the USFWS as the holding agency for the benefit of the CDFG. Multiple withdrawals of land for various purposes may be placed on the same land. The extent of jurisdiction by each holding agency involved is determined by language in the withdrawal orders, the chronological order of the withdrawals, or by formal agreement between the federal agencies involved.

The West Chocolate Mountains REEA covers approximately 59,095 acres. A small portion of the REEA is located within the Salton Sea. The land use types throughout the area include undeveloped and developed desert alluvial valleys, desert washes, agricultural land, and SR 111.

The surrounding land uses to the west include the Salton Sea, and agricultural crop land. A narrow sliver of land sandwiched between the desert and Salton Sea, known as the Wister Unit of the Imperial Wildlife Area, is located immediately west of the West Chocolate Mountains REEA and falls under the jurisdiction of the CDFG. The CMAGR is a restricted area used by the Department of the Navy and U.S. Marine Corps for aerial bombing and live fire aerial gunnery practice, and is located to the east of the REEA. A combination of BLM land and private land is located to the north and south of the REEA.

The BNSF parallels SR 111 on the east side. The nearest Airport is the Calipatria Municipal Airport located 7 miles to the west.

Because the Salton Sea and Imperial Valley area is a hotspot for geothermal activity, a few hot springs, spas, and fish farms are located within the West Chocolate Mountains REEA and surrounding area. The Bashford’s Hot Mineral Spa, Pacific Aquafarms (fish farm), and Fountain Youth Spa are located less than one mile from the northeastern boundary of the REEA. The Fish Partners fish farm is located within the southwest portion of the REEA and approximately 2.2 miles southeast of Niland, California.

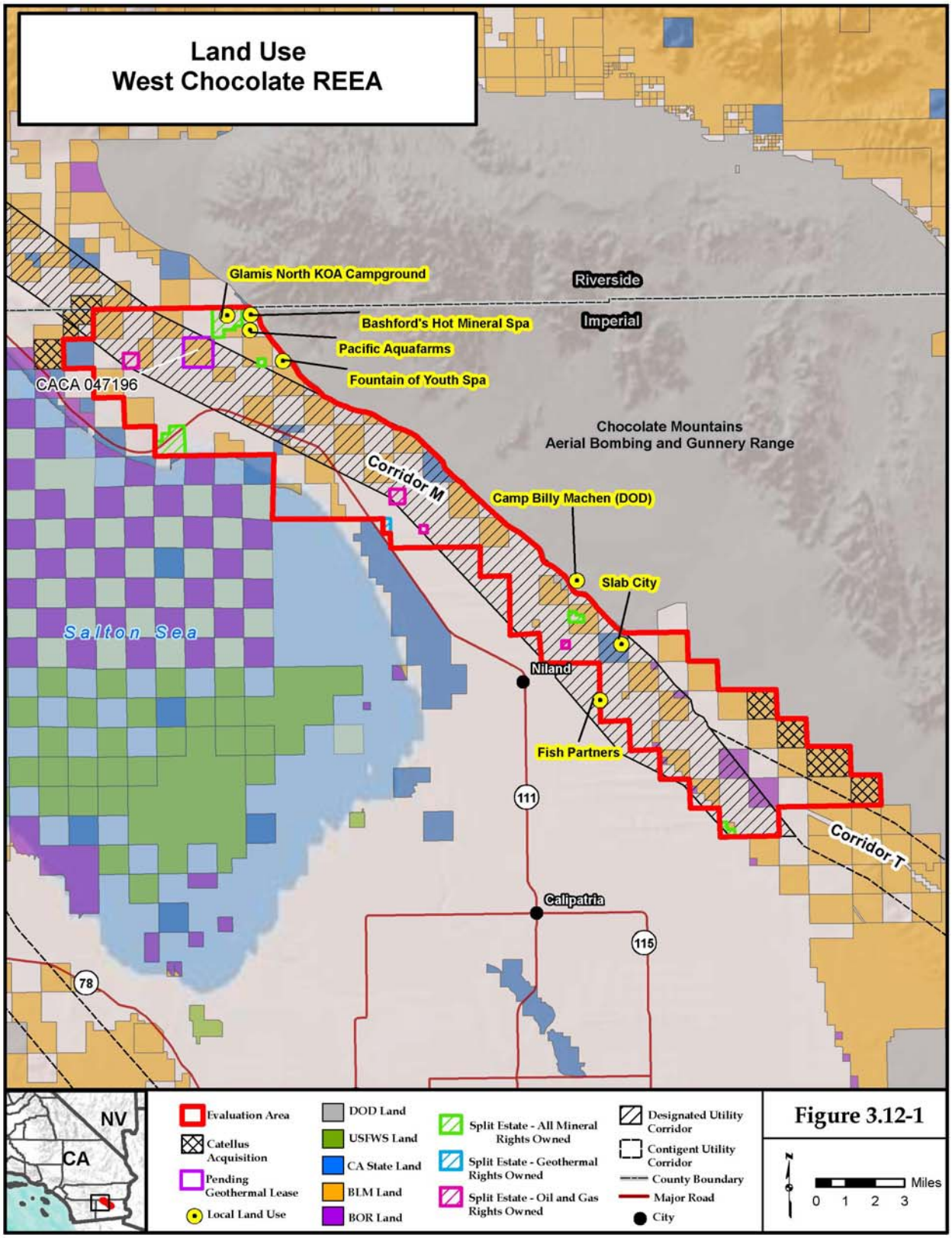
Land Use
West Chocolate REEA
Glamis North KOA Campground
Riverside
Imperial
Bashford's Hot Mineral Spa
Pacific Aquafarms
Fountain of Youth Spa
CACA 047196
Chocolate Mountains
Aerial Bombing and Gunnery Range
Corridor M
Camp Billy Machen (DOD)
Slab City
Salton Sea
Niland
Fish Partners
111
Corridor T
Calipatria
115
78
NV
CA
Evaluation Area
Catellus Acquisition
Pending Geothermal Lease
Local Land Use
DOD Land
USFWS Land
CA State Land
BLM Land
BOR Land
Split Estate - All Mineral Rights Owned
Split Estate - Geothermal Rights Owned
Split Estate - Oil and Gas Rights Owned
Designated Utility Corridor
Contigent Utility Corridor
County Boundary
Major Road
City
Miles
0 1 2 3

Figure 3.12-1

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Other land uses within and surrounding the West Chocolate Mountains REEA include Camp Billy Machen and Sea, Air, and Land (SEAL) Weapons and Tactics (SWAT) Area 4. The camp is a desert warfare training facility for Naval Special Warfare (NSW) training and operational units and is located within SWAT 4 on the southwestern edge of CMAGR R-2507N, approximately 0.5 mile east of the REEA. This training area extends along much of the southwest border of the CMAGR, outside of restricted airspace, and is adjacent to the Coachella Canal. It shares a border with the West Chocolate Mountains REEA for approximately 8.4 miles and includes numerous land warfare live fire and maneuver training ranges. Slab City is a former military base and is located within the REEA, approximately 2.7 miles southeast of Camp Billy Machen.

The Geothermal PEIS provides land use authorizations and agreements to use BLM-administered lands such as solar and wind ROW grants and geothermal leasing for long-term uses. The PEIS also provides a definition for land withdrawals to implement resource management planning and stipulates that a land withdrawal creates a title encumbrance on the land which restricts an agency's ability to manage its lands under multiple use management principles. The BLM has the authority to issue geothermal leases on federal mineral estate lands. Leasing geothermal resources by the BLM vests with the lessee a non-exclusive right to future exploration and an exclusive right to produce and use the geothermal resources within the lease area subject to existing laws, regulations, formal orders, and the terms, conditions, and stipulations in or attached to the lease form or included as conditions of approval in permits. Ground-disturbing activities to explore or develop geothermal leases ares not allowed without site-specific approval for the intended operation (BLM 2008a).

The DOE's and the BLM's Summary of Public Scoping Comments Received during the Scoping Period for the Solar PEIS discusses public comments suggesting stipulations for solar energy development. Land use comments included concern over development of land for a single use and requests to coordinate with transmission line development and other government agencies (DOE and BLM 2008).

In the Wind PEIS (BLM 2005), the BLM refers to its 2002 Interim Wind Energy Development Policy for guidance on processing ROW applications for wind energy (BLM 2005). The plan specifies that, depending on the location of a proposed wind energy project, special land use determinations may need to be made, particularly if the proposed plan is to be sited in or would impact environmentally sensitive or protected areas (BLM 2005). The document does not provide specific guidance on the opening or closing of lands for wind energy development.

The WECO Plan Amendment established or revised off-road vehicle designations of areas and trails (routes of travel) in accordance with part 43 CFR Subpart 8342. Trails (routes of travel) for inclusion in the State of California's Discovery Trail System and a segment of the Juan Bautista de Anza National Historic Trail are identified and authorized. The proposed designations pertain to public lands addressed by the CDCA Plan in the WECO portion of Imperial County that lie west of the ISDRA.

The BLM's ISDRA Management Plan and Draft EIS (BLM 2010) refers to the BLM and DOE 2003 report, Assessing the Potential for Renewable Energy on Public Lands, for renewable

energy development screening criteria. These criteria are more specific to wind development than other renewable energy types and include that the wind resource be wind power Class 4 and above for short-term; Class 3 and above for long-term, that federal, state, and local policies support wind energy; that transmission access is within 25 miles (69 to 345 kilovolt [kV]) and transmission capacity is available; that the site be compatible with wind energy development; scenic areas, view-sheds, and non-development regions must be eliminated; and that the site have access to roads within 50 miles (BLM 2010). The Plan also states that proximity to major electrical distribution systems is a specific requirement for financial feasibility and is dependent on the energy transmission corridor (BLM 2010).

The Imperial Valley Natural Community Conservation Plan and Habitat Conservation Plan is a collaborative effort between the IID, CDFG, and USFWS to manage natural biological diversity within the planning area, and does not address the land management of solar and wind ROW development or geothermal leasing areas (IID 2006).

The DRECP does not specifically address the development of solar and wind ROWs or geothermal leasing areas; however, the Plan encourages the coordination and consideration of desert land uses and activities during the planning process, and meeting complex and evolving conservation objectives over multiple land owners and land uses (CDFG 2009)

3.12.4 Land Status

Thirthy-three (33) existing BLM ROW grants have been issued within the West Chocolate Mountains REEA (see Table 3.12-1).

Table 3.12-1 Existing Rights-of-Way within the West Chocolate Mountains REEA

Case Number	Township/Range	ROW Type	Status	Expiration
CACA- 018904	T9S, R12E, portions of Section 6, 8, 10, 24, 28, 34	Power Lines	Authorized	12/31/17
CACA- 018904	T9S, R13E, portions of Section 28, 34	Power Lines	Authorized	12/31/17
CACA- 019166	T9S, R12E, portions of Section 6, 8, 10, 14, 24	Power Lines	Authorized	12/31/17
CACA- 019166	T9S, R13E, portions of Section 28, 34	Power Lines	Authorized	12/31/17
CACA- 019166	T10S, R14E, portions of Section 6, 8, 22, 26	Power Lines	Authorized	12/31/17
CACA- 019166	T11S, R15E, portions of Section 6, 8, 20, 28	Power Lines	Authorized	12/31/17
CALA- 0159997	T10S, R14E, portion of Section 22 (E2E2)	Power Lines	Authorized	12/31/17
CARI- 000141	T9S, 12E, Section 12 (NE)	Power Lines	Authorized	12/2/21
CARI- 000141	T9S, 13E, portion of Sections 20, 22, 26	Power Lines	Authorized	12/2/21
CARI- 000141	T10S, R14E, portion of Sections 6, 8, 22	Power Lines	Authorized	12/2/21
CALA- 0170375	T9S, 12E, Section 24 (SW, S2SE)	Telephone/ Telecommunication Lines	Authorized	12/31/11
CALA- 0170375	T9S, 13E, portion of Section 30, 32	Telephone/ Telecommunication Lines	Authorized	12/31/11
CACA-040610	T9S, R12E, Section 18 (NENENE)	Fiber Optic Facilities	Authorized	12/31/30

Table 3.12-1 Existing Rights-of-Way within the West Chocolate Mountains REEA

Case Number	Township/Range	ROW Type	Status	Expiration
CACA- 025164	T11S, R15E, Section 18 (SWSENE, NWNE, SE)	Road ROW	Authorized	12/22/19
CACA- 033442	T9S, R13E, portion of Section 20	Road ROW	Authorized	12/31/22
CACA- 033443	T9S, R13E, portion of Section 22, 28	Road ROW	Authorized	6/21/23
CACA- 045042	T9S, R13E, Section 26 (E2SESE)	Road ROW	Authorized	12/31/32
CACA-047981	T9S, R13E, portion of Section 20, 28	Road ROW	Authorized	3/9/37
CACA- 030646	T10S, R14E, Section 22 (SE)	Pipeline	Authorized	2/3/24
CACA- 040468	T9S, R13E, portion of Section 20	Pipeline	Authorized	12/31/18
CALA-0138603	T9S, R12E, portion of Section 18, 24	Oil and Gas Pipeline	Authorized	Indefinite
CALA-0138603	T9S, R13E, portion of Section 30, 32	Oil and Gas Pipeline	Authorized	Indefinite
CARI- 000373	T11S, R15E, Section 20 (NE)	Oil and Gas Pipeline	Authorized	Indefinite
CARI- 0007181	T10S, R14E, Section 22 (E2E2)	Oil and Gas Pipeline	Authorized	Indefinite
CACA- 00295346	T9S, R12E, Section 18 (NWSE)	Federal- Non Energy Facility	Authorized	Indefinite
CALA- 0039762	T9S, R12E, Section 14	Federal- Non Energy Facility	Authorized	Indefinite
CALA- 0039762	T9S, R13E, Section 32	Federal- Non Energy Facility	Authorized	Indefinite
CALA- 0039762	T10S, R13E, Section 4, 6	Federal- Non Energy Facility	Authorized	Indefinite
CALA- 0039762	T10S, R14E, Section 28	Federal- Non Energy Facility	Authorized	Indefinite
CALA- 0039762	T11S, R14E, Section 12	Federal- Non Energy Facility	Authorized	Indefinite
CALA- 0039762	T11S, R15E, Section 6, 8, 14, 18, 20, 22, 26, 28, 34	Federal- Non Energy Facility	Authorized	Indefinite
CALA- 0039762	T11S, R16E, Section 30	Federal- Non Energy Facility	Authorized	Indefinite

Source: BLM Geocommunicator 2009b

There are no tribal lands within or immediately adjacent to the REEA; however, it is within the traditional use areas of several tribes. The closest reservation land is the Quecha Reservation in Yuma and the Torrez Martinez on the northwest side of the Salton Sea; however, it is within the traditional use areas of several tribes.

3.12.5 Existing Facilities, Utility Corridors, and Rights-of-Way

Under Section 368 of the Energy Policy Act of 2005, several federal agencies prepared the West-Wide Energy Corridor PEIS to identify energy ROWs throughout the 11 contiguous states in the Western U.S. The PEIS did not, however, designate any Section 368 corridors; the closest is approximately 18 miles north of the West Chocolate Mountains REEA (BLM 2008b).

The CDCA Plan designated 16 utility corridors in the Energy Production and Utility Corridors Element of the plan (BLM 1980b), two of which (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 has been amended. There are existing utility ROWs within Corridor M, and a major ROW includes IID's 230-kV 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 (BLM 1980b). Corridor T splits off of Corridor M and proceeds along the east side of the ISDRA.

The majority of BLM ROW grants are authorized by Title V of FLPMA (43 U.S.C. 1761-1771), and the Mineral Leasing Act (Section 28 of the Mineral Leasing Act of 1920, as amended, 43 U.S.C. 185). A BLM ROW grant authorizes rights for a specific use of a project on public lands for a specific period of time. Typical ROW uses include wind and solar energy projects, roads, pipelines, transmission lines, and communication sites. BLM ROWs are usually granted for a term appropriate for the life of the project (BLM 2009a). Table 3.12-1 includes the existing BLM ROW grants that have been issued within the West Chocolate Mountains REEA.

3.13 Human Health and Safety/Hazardous Materials

This section contains a description of the environmental and regulatory settings with respect to hazards, health, and safety that may be present in the West Chocolate Mountains REEA. Hazards associated with seismic conditions are addressed in Section 3.3, Topography, Geology, and Geologic Hazards, potential flooding and water quality hazards are addressed in Section 3.5, Water Resources, The issues considered in this analysis include exposures to chemical contaminants and potential exposure to hazardous wastes. This section also discusses the potential for encountering hazardous contaminants on the surface or subsurface during project construction and operation activities.

During the scoping period, meetings were conducted with the public and government agencies to identify their concerns. Written comments were also received. Navy Special Warfare provided comments about compatibility of renewable energy projects with operations on and around the CMAGR including: (1) potential displacement of protected natural resources onto military lands due to development of nearby public lands; (2) growth caused by public lands development leading to an increase in noise and traffic load onto nearby communities; (3) range transients crossing military property and related security and safety concerns; (4) encroachment onto military lands by recreationalists due to adjacent public development; (5) fire safety issues; (6) ground and airborne radar interference from moving wind turbine blades causing flight safety concerns; (7) lighting impacts to pilots using night vision goggles; and (8) heights of renewable energy structures and the transmission lines that connect these sources to the grid posing potential aviation obstacles to Marine Corps low-level aircraft entering and exiting the range airspace and those transiting the area via military training routes and special use airspace.

Several commentors recommended that the EIS identify/evaluate health and safety issues such as: (1) measures to ensure that OHV and other users are not injured due to hazards associated with exposed collectors, piping, and transmission lines; (2) potential hazards and impacts to humans and wildlife, especially birds; (3) potential direct, indirect, and cumulative impacts of hazardous waste from construction and operation of the proposed plan; (4) projected hazardous waste types and volumes, and expected storage, disposal, and management plans; (5) hazards from inactive Formerly Used Defense Sites (FUDS) located on the federal lands earmarked for geothermal, solar, or wind development; (6) fire and prevention of Homeland Security issues; (7) adequate law enforcement personnel; and (8) access to emergency services and hospitals. A comment also requested that agencies responsible for spill prevention, planning,

and cleanup be identified. These comments are addressed in Section 3.13.3, Existing Conditions, and in Chapter 4, Environmental Consequences, Section 4.13.

3.13.1 Definition of the Resource

The resource to potentially be affected is the baseline level of risk to human health and safety posed by hazardous materials, environmental conditions, or other factors. Changes to this level of risk to human health and safety brought about by the proposed plan would represent effects. The following provides summary definitions of hazardous materials and hazardous waste:

- **Hazards and Hazardous Material:** Hazards and hazardous materials are generally characterized by chemical and physical properties that cause a substance to be considered hazardous including toxicity, ignitability, corrosivity, and reactivity. A hazardous material poses a significant present or potential hazard to human health and safety or the environment, if released, because of its quantity, concentration, or physical or chemical characteristics (26 CCR 25501). Hazardous materials can be in the form of explosives, flammable and combustible substances, poisons, radioactive materials, pesticides, and petroleum products. Within typical construction sites, substances that can be considered hazardous include fuels, motor oil, grease and other lubricants, solvents, soldering and welding equipment and glues. These substances are most often released as a result of motor vehicle or equipment accidents or because of chemical accidents during industrial use. These substances have the potential to leach into soils, surface water, and groundwater due to spills if not properly contained (EPA 2010).
- **Hazardous Waste:** A waste may be considered hazardous if it exhibits certain hazardous properties (characteristics) or if it is included on a specific list of wastes that EPA has determined are hazardous (listing a waste as hazardous). EPA's regulations in 40 CFR define four hazardous waste characteristic properties: ignitability, corrosivity, reactivity, and toxicity (40 CFR 261.21-.24) (EPA 2010).

Exposure to hazardous materials or wastes can occur during normal use, handling, storage, transportation, and disposal. Exposure may also occur due to hazardous compounds existing in the environment such as fuels in underground storage tanks, pipelines, or areas where chemicals have leaked into the soil or groundwater. The primary reason to define potentially hazardous sites is to protect health and safety and to minimize public exposure to hazardous materials during construction and waste handling. If encountered, contaminated soil may qualify as hazardous waste, thus requiring handling and disposal according to local, state, and federal regulations.

3.13.2 Applicable Plans, Policies, and Regulations

Hazardous materials handling and hazardous waste management are subject to numerous laws and regulations at all levels of government; laws and regulations related to health and safety are regulated by federal and state agencies. Additionally, there are also laws and regulations applicable to solar panel construction, design, and operation. The laws that may apply to the proposed plan are summarized below.

3.13.2.1 Federal

Federal Toxic Substances Control Act

The Federal Toxic Substances Control Act (1976) and the Resource Conservation and Recovery Act (RCRA) of 1976 established a program administered by the EPA for the regulation of the generation, transportation, treatment, storage, and disposal of hazardous waste. The RCRA was amended in 1984 by the Hazardous and Solid Waste Act (HSWA) which affirmed and extended the "cradle to grave" system of regulating hazardous wastes. The use of certain techniques for the disposal of some hazardous wastes was specifically prohibited by HSWA.

Comprehensive Environmental Response, Compensation, and Liability Act

Under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), or the Superfund Act of 1980, as amended, and pursuant to the National Oil and Hazardous Substances Pollution Contingency Plan, the BLM has been delegated the responsibility for undertaking response actions with respect to the release or threat of release of oil, petroleum products, hazardous substances, or pollutants and contaminants, that pose an actual or potential threat to human health or welfare, or to the environment.

CERCLA provides a federal Superfund to clean up uncontrolled or abandoned hazardous-waste sites, as well as accidents, spills, and other emergency releases of pollutants and contaminants into the environment. CERCLA establishes requirements concerning closed and abandoned hazardous waste sites, provides for liability of persons responsible for releases of hazardous waste at these sites, and establishes a trust fund to provide for cleanup when no responsible party can be identified. Under this authority, the BLM may take an action to protect public land resources and users from hazardous substances that pose a threat or potential threat to human health and the environment. As the lead federal agency for actions taken on BLM public land, the BLM is responsible for the identification of all environmental laws that pertain to any CERCLA cleanup actions.

CERCLA also enabled the revision of the National Contingency Plan (NCP). The NCP provided the guidelines and procedures needed to respond to releases and threatened releases of hazardous substances, pollutants, and/or contaminants. The NCP also established the National Priorities List (NPL).

Superfund Amendments and Reauthorization Act

The Superfund Amendments and Reauthorization Act (SARA) amended CERCLA and established a nationwide emergency planning and response program, and imposed reporting requirements for businesses that store, handle, or produce significant quantities of extremely hazardous materials. The Act requires states to implement a comprehensive system to inform local agencies and the public when a significant quantity of such materials is stored or handled at a facility. Additionally, SARA identifies requirements for planning, reporting, and notification concerning hazardous materials. SARA Title III contains the Emergency Planning and Community Right to Know Act.

Hazard Management and Resource Restoration Program

The Hazard Management and Resource Restoration (HMRR) Program is administered by the BLM. Its mission is to protect lives, resources, and property, and to improve the health of landscapes and watersheds by:

- Minimizing environmental contamination on public lands;
- Reducing and eliminating risk associated with physical and environmental hazards;
- Restoring resources impacted by oil discharges and hazardous release; and
- Administering CERCLA assessments.

Federal Resource Conservation and Recovery Act

The RCRA regulates solar PV product end-of-life disposal, and is based on the California Hazardous Waste Control Law (HWCL). If solar panels are determined to be hazardous waste by the regulatory authority, the requirements of RCRA (and HWCL) would regulate their handling, recycling, reuse, storage, treatment, and disposal. Decommissioned or defective solar panels are currently considered hazardous waste if they do not meet the EPA Toxicity Characteristic Leaching Procedure (TCLP) standards (this determination varies depending on the technology used). Silicon-based panels typically last 20 to 25 years and a proactive recycling option can eliminate health and environmental risks of water contamination for municipalities.

Occupational Safety and Health Administration

The Occupational Safety and Health Administration (OSHA) administers Occupational Safety and Health Standards (29 CFR 1910 and 1926), which: (1) provide regulations for safety in the workplace; (2) regulate construction safety, and; (3) require a Hazard Communication Plan to include identification and inventorying of all hazardous materials for which Material Safety Data Sheets will be maintained, and employee training in safe handling of said materials.

Occupational Safety and Health Administration, Electrical Safety Standards

Title 29 CFR, Part 1910.302, Sub-Part S: Design Safety Standards for Electrical Systems, and 1910.331, Electrical Safety-Related Work Practices Standard (1990), provides a description of concepts and principles associated with electrical hazards and basic electrical safety for individuals. OSHA's electrical standards for construction recommend following general industry electrical standards whenever possible for hazards that are not addressed by industry-specific standards. The standards address concerns that relate to electrical hazards and exposures to dangers such as electrical shock, electrocution, burns, fires, and explosions. OSHA's electrical standards help minimize these potential hazards by specifying safety aspects in the design and use of electrical equipment and systems.

National Fire Protection Association 780, National Electrical Code

The National Electrical Code (NEC) addresses electrical hazards through guidance related to installation of any electrical power system, including PV systems. The NEC covers the installation of electrical conductors, equipment, and raceways; signaling and communications

conductors; and equipment and optical fiber cables for public and private premises. Article 690 of the NEC specifically covers installation and operational requirements for solar PV systems.

Clean Water Act

The CWA was enacted with the intent of restoring and maintaining the chemical, physical, and biological integrity of the waters of the United States. It requires a written Spill Prevention, Control, and Countermeasures (SPCC) Plan to be prepared for facilities that store oil that could leak into navigable waters. Since its enactment, the CWA has formed the foundation for regulations detailing specific requirements for pollution prevention and response measures. The EPA implements provisions of the CWA through a variety of regulations, including the NCP and the Oil Pollution and Prevention Regulations. Implementation of the CWA is the responsibility of each state.

Facilities that could reasonably be expected to discharge oil into navigable waters in quantities that may be harmful are required to develop and implement SPCC plans per the SPCC Rule. EPA amended the SPCC Rule in 2006 to extend the SPCC compliance dates in §112.3(a), (b), and (c) for all facilities until October 31, 2007. SPCC plans must be prepared, certified (by a professional engineer), and implemented by facilities, which store, process, transfer, distribute, use, drill, produce, or refine oil or oil production.

Clean Air Act

The CAA establishes a nationwide emergency planning and response program, and imposes reporting requirements for businesses that store, handle, or produce significant quantities of extremely hazardous materials. The CAA Section on Risk Management Plans (42 U.S.C. §112(r)) requires states to implement a comprehensive system to inform local agencies and the public when a significant quantity of such materials is stored or handled at a facility.

Hazardous Materials Communications, Emergency Response Information, Training Requirements, and Security Plans, 49 CFR 172.800

This Regulation requires that the suppliers of hazardous materials prepare and implement security plans in accordance with U.S. Department of Transportation (USDOT) regulations.

Pollution Prevention Act

The Pollution Prevention Act established, as national policy, that, wherever feasible, source reduction must be used as the primary method of preventing pollution. Source reduction is defined as the practice of reducing the amount of any hazardous substance, pollutant, or contaminant released into the environment, and it can involve substituting materials and changing processes to avoid the use of hazardous substances, altogether. Other requirements of the Act include recycling pollutants that cannot be disposed of in an environmentally safe manner, treating pollution that cannot be prevented or recycled in an environmentally safe manner, and disposing of pollutants or releasing them into the environment only as a last resort.

Emergency Planning and Community Right to Know Act

The Emergency Planning and Community Right to Know Act (EPCRA) is also known as Title III of the SARA and is augmented by EO 12856 (Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements). The EPCRA has four major sections, each providing different requirements for facilities, communities, and states, and each covering a different group of chemicals. These sections include Emergency Planning (Sections 301-303), Emergency Notification (Section 304), Community Right-to-Know (Sections 311-312), and Toxic Release Inventory Reporting (Section 313). The EPCRA establishes programs to provide the public with information on the hazardous and toxic chemicals in their communities and requires emergency planning and notification programs to protect the public in the event of a release of extremely hazardous substances. It further requires specified facilities to prepare an annual report listing the amount of certain chemicals treated or recycled on site, transferred off site, or released into the environment.

The Toxic Chemical Reduction Goals section of the EPCRA states that each federal agency must develop voluntary goals for its Section 313 Toxic Release Inventory sites to reduce by 50 percent total releases of toxic chemicals to the environment and off-site transfers of such toxic chemicals for treatment and disposal by 31 December 1999. The baseline for this reduction is the calendar year 1994. The Act also states that, to the maximum extent practicable, these reductions must be achieved by source reduction practices.

The federal agency approach toward implementing the EPCRA is for each agency to develop a written pollution prevention strategy. The strategy should include, but is not limited to, a pollution prevention policy statement and a commitment to prevent pollution through source reduction methods. The policy statement is required to: (1) designate the principal responsibilities for development, implementation, and evaluation of the strategy; (2) reflect the agency's commitment to source reduction; and (3) identify the person responsible for coordinating the pollution reduction efforts. The commitment to adopt source reduction practices, on the other hand, is simply that a pledge to use source reduction, where practicable, as the primary means of achieving and maintaining compliance with all applicable regulations.

Executive Order 12873

EO 12873 requires that federal agencies implement programs to promote cost effective waste prevention (also known as source reduction) and recycling of reusable materials in all of its facilities. Agencies shall also emphasize the procurement of recycled and environmentally preferable products and services.

3.13.2.2 State

California Occupational Safety and Health Administration

Title 8 of the CCR, Chapters 3, 4, and 7 (Occupational and Industrial Safety), establishes requirements for safe working conditions and safety-related reporting in the state. A hazard communication plan would need to include identification and inventorying of all hazardous materials, for which material safety data sheets are required, and employee training in safe handling of said materials.

California Emergency Management Agency

The California Emergency Management Agency (Cal/EMA) was formed January 1, 2009, as the result of a merger between the Governor's Office of Emergency Services (OES) and the Office of Homeland Security. The Hazardous Materials (HAZMAT) Unit of the Cal/EMA is responsible for HAZMAT emergency planning and response, spill release and notification, and HAZMAT enforcement of the Unified Program. OES provides emergency response services in support of local jurisdictions.

Emergency Services Act

Under the Emergency Services Act, the state developed an emergency response plan to coordinate emergency services provided by federal, state, and local agencies. Rapid response to incidents involving hazardous material or hazardous waste is an important segment of the plan administered by Cal/EMA. Cal/EMA coordinates the response of agencies which include the CalEPA, Caltrans, California Highway Patrol, regional water quality control boards, air quality management districts, and county disaster response offices.

California Environmental Protection Agency

CalEPA enforces the Hazardous Waste Control Act (Title 26 CCR), which defines requirements for proper management of hazardous materials. The CalEPA Department of Toxic Substances Control (DTSC) regulates the generation, transportation, treatment, storage, and disposal of hazardous waste under RCRA and the California HWCL. Both laws impose "cradle to grave" regulatory systems for handling hazardous waste in a manner that protects human health and the environment.

California Department of Forestry and Fire Protection Office of the State Fire Marshall

In 2008, the Office of the State Fire Marshall published a draft copy of the Solar Photovoltaic Installation Guide (in partnership with interested local fire officials, building officials, and industry representatives). This guide was developed to increase public safety for all structures equipped with solar PV systems. This guidance was developed for PV systems associated with residential and commercial buildings, but some of the information about marking, access, pathways, smoke ventilation, location of direct current conductors, and ground mounting could be applicable (NEC 2008).

Department of Toxic Substance Control

The DTSC is a department of CalEPA and is the primary agency in California that regulates hazardous waste, administers clean-ups of existing contamination, and looks for ways to reduce the hazardous waste produced in California. The DTSC regulates hazardous waste in California primarily under the authority of RCRA and the California Health and Safety Code. Other laws that affect hazardous waste are specific to handling, storage, transportation, disposal, treatment, reduction, cleanup, and emergency planning. DTSC manages, maintains, and monitors the Cortese List of hazardous waste sites.

California Code of Regulations, Title 22, Chapter 11

CCR Title 22, Division 4.5, Chapter 11 contains regulations for the identification and classification of hazardous wastes. The Code defines a waste as hazardous if it has any of the following characteristics: ignitability, corrosivity, reactivity, and toxicity. Article 3 provides detailed definitions of each characteristic. Articles 4 and 5 provide lists of RCRA hazardous wastes, non-RCRA hazardous wastes, hazardous wastes from specific sources, extremely hazardous wastes, hazardous wastes of concern, and special wastes.

Hazardous Waste Control Act

The Hazardous Waste Control Act created the state hazardous waste management program, which is similar to, but more stringent than, the RCRA program requirements. The Act is implemented by regulations contained in CCR Title 26, which describes the requirements pertaining to the following aspects of proper management of hazardous waste:

- Identification and classification;
- Generation and transportation;
- Design and permitting of recycling, treatment, storage and disposal facilities;
- Treatment standards;
- Operation of facilities and staff training; and
- Closure of facilities and liability requirements.

These regulations list more than 800 materials that may be hazardous and establish criteria for the identification, packaging, and disposal of such waste. Under the Hazardous Waste Control Act and CCR Title 26, the generator of hazardous waste must complete a manifest which accompanies the waste from the generator to the transporter to the ultimate disposal location. Copies of the manifest must be filed with DTSC. DTSC operates programs to protect California from exposures to hazardous wastes.

Photovoltaic Product Disposal and End-of-Life Regulation

Regulation of solar PV products' end-of-life disposal is based on the federal RCRA and on the California HWCL. If solar panels are determined to be hazardous waste, RCRA and HWCL should be used to regulate their handling, recycling, reuse, storage, treatment and disposal. Decommissioned or defective solar panels are currently considered hazardous waste by regulators if they do not meet the EPA TCLP standards (and this determination varies depending on the technology used). Silicon-based panels typically last 20 to 25 years, and a proactive recycling option can eliminate health and environmental risks of water contamination for municipalities.

3.13.2.3 Local

Imperial County General Plan, Seismic and Public Safety Element

The Seismic and Public Safety Element of the Imperial County General Plan is directly concerned with reducing the loss of life, injury, and property damage that might result from a

disaster or accident. This Element identifies goals and policies that will minimize the risks associated with natural and human-made hazards. In addition, the Element specifies land use planning procedures that should be implemented to avoid hazardous situations (County of Imperial 1993a).

Imperial County General Plan, Public Services and Safety Section

The Public Services/Safety Section of the Imperial County General Plan is provided as part of the General Plan to analyze effects of the General Plan on local public services such as police protection, fire protection, solid waste, natural gas, electric and telephone, water service and availability, sewage treatment, schools, parks and recreation, and seismic safety (County of Imperial 1993b).

Imperial County Operational Area Emergency Operations Plan

The Imperial County Operational Area (OA) Emergency Operations Plan provides a comprehensive, single source of guidance and procedures for the county to prepare for and respond to significant or catastrophic natural, environmental, or conflict-related risks that produce situations requiring coordinated response (County of Imperial Office of Emergency Services 2007).

3.13.3 Existing Conditions

3.13.3.1 Hazardous Waste and Substances Sites and Sites with Land Use Restrictions

For the purposes of this EIS, information concerning human health risks associated with the exposure to hazardous materials including the presence and current disposition of hazardous wastes was obtained from the California DTSC EnviroStor database. EnviroStor includes the following:

- **Federal:** National Priority List (NPL), Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS), CERCLIS No Further Remedial Action Planned (CERCLIS-NFRAP), Resource Conservation and Recovery Act Information System (RCRIS: RCRA Corrective Action Sites [CORRACTS] and Non-CORRACTS Transportation, Storage, and Disposal [TSD] facilities, RCRA Generator List and RCRA-NonGen), Facility Index System (FINDS), U.S. Brownfields, Emergency Response Notification System (ERNS), and others.
- **State of California:** HIST Cal-Sites, Bond Expenditure Plan, Cortese List, California Solid Waste Recycling (SWRCY) facilities list, California Solid Waste Facilities/Landfills (SWF/LF), California Leaking Underground Storage Tank (LUST) (leaks of hazardous substances from underground storage tanks), Facility Inventory Database (CA FID UST), Spills, Leaks, Investigations and Cleanups (SLIC), Underground Storage Tank (UST) list and historical UST sites (HIST UST), Aboveground Storage Tank (AST) sites, Statewide Environmental Evaluation and Planning System (SWEEPS) UST list, Voluntary Cleanup Properties (VCP), RESPONSE (confirmed release sites), All Hazards Network (HAZNET) for

hazardous waste disposal sites, Emissions Inventory (EMI) data for toxics and criteria pollutant emissions, EnviroStor for known or suspected contamination sites, and others.

The list of Hazardous Waste and Substances Sites and Sites with Land Use Restrictions revealed one inactive cleanup site in the West Chocolate Mountains REEA. There are no sites with land use restrictions in the REEA.

Camp Dunlap

Camp Dunlap is classified as a formerly used defense site (EnviroStor ID 80000005). The DOD obtained 631,345 acres in fee for use as Camp Dunlap Military Reservation through condemnation proceedings in 1942. Camp Dunlap is an abandoned military training camp with concrete slabs, two concrete water storage tanks, remnants of a sewage treatment plant, and four USTs. Ownership of the property was re-entered to the State of California in October 1961 because the property was no longer needed for national defense. The property is currently owned by the CSLC, which has decided to dispose of the property to Imperial County and has given Imperial County jurisdiction to regulate certain activities on the property since January 1985.

Underground Storage Tanks, Other Cleanup Sites, and Monitoring Wells

A search using the California SWRCB Geotracker Application showed there are no leaking underground tank cleanup sites or permitted underground storage tank facilities within the West Chocolate Mountains REEA (SWRCB 2009).

Hot Spa Waste Management Facility (97-022; L10009821173; RB Case # 7A130301041) is a land disposal site with cleanup status of “open” as of January 1, 1965. This land disposal site is located on the corner of Hot Mineral Road and Spa Road (Latitude 33.40039, Longitude -115.683). There are actively-tested groundwater-monitoring wells at the site. Chemicals detected in samples include bromoform, and chloroform (SWRCB 2009).

Salvation Mountain

Salvation Mountain is located off of Beal Road in Niland, California. It is a modest tourist attraction consisting of a mud hill and hay bales with years of layered paint that may contain large amounts of lead. Although concerns have been raised about the site as a potential health hazard, the painted hill is not “listed” as a hazardous site, and it has remained as tourist attraction due to its popularity as a folk art site (Salvation Mountain 2004).

3.13.3.2 Emergency Evacuation Routes

The Imperial County Emergency Operations Plan does not designate specific evacuation routes (County of Imperial Office of Emergency Services 2007). The West Chocolate Mountains REEA does not bisect any major routes of travel, with the exception of SR 111. The segment of SR 111 that is overlapped by the REEA is undeveloped and unpopulated. In addition, this highway connects to Interstate 10 to the north and Interstate 8 to the south, providing alternative route options for exiting the area.

3.13.3.3 Sensitive Receptors

Sensitive receptors generally include young and elderly sectors of the population that may be susceptible to health and safety impacts resulting from construction and operation of renewable energy facilities. The closest areas of likely sensitive receptors would be residential populations within the small town of Bombay Beach, which abuts the Salton Sea and the town of Niland, located approximately 0.6 mile southwest of the West Chocolate Mountains REEA. There are no schools or hospitals within 1 mile of the REEA.

3.13.3.4 Aircraft and Military Operations

The nearest airport is the Calipatria Municipal Airport, which is approximately 7 miles west of the West Chocolate Mountains REEA.

Military bases were established in the Imperial Valley desert area during World War II and are still in use today. The CMAGR is located along the eastern boundary of the West Chocolate Mountains REEA. NSW conducts basic and unit training in CMAGR SWAT 4. The training includes: (1) small arms marksmanship; (2) automatic weapons firing; (3) reconnaissance; (4) sniper weapons; (5) static and projectile explosives; (6) small unit live fire and maneuver; (7) field training exercises (FTX), and, pending approval of restricted airspace; (8) Unmanned Aerial Systems (UAS).

Significant aviation training operations occur within the REEA. In 2007, there were 17,360 aerial sorties at the CMAGR, as shown in Table 3.13-1.

Naval Air Facility (NAF) El Centro is located 40 miles south of Niland. This facility provides support for the Joint Parachute Test Facility, Naval Aerospace Recovery Facility, National Parachute Test Range, and U.S. Air Force Space and Missile System Organization and it serves as the winter training base for the Navy's Blue Angels demonstration team. Camp Billy Machen, a Navy SEAL desert warfare training facility, is located approximately 0.5 mile east of the West Chocolate Mountains REEA in SWAT 4 on the southwest side of CMAGR R-2507N, near Slab City.

Table 3.13-1 Aerial Sorties at the Chocolate Mountains Aerial Gunnery Range

Area	Sortie (Operation) Counts
Abel East	191
Able South	12
Kane East	1,444
Kane South	0
R-2507 North/South (Umbrella)	5,284
R-2507 South	1,340
R-2510 East	3,430
R-2510 West	4,002

Table 3.13-1 Aerial Sorties at the Chocolate Mountains Aerial Gunnery Range

Area	Sortie (Operation) Counts
Re-2512 IB	1,657
R-2512 KB	0

Source: NASMOD 2008.

3.13.3.5 Industrial/Technological Hazards

Pipelines and Power Lines

The West Chocolate Mountains REEA includes of several fuel pipelines that deliver gasoline, diesel and jet fuel to Southern California and Arizona. There are also several existing transmission lines that cross the REEA and that are owned and operated by the IID. The Santa Fe Pacific Pipeline delivers liquid petroleum via pipelines located within the SPRR ROW. The ROW follows a northwest to southeast trend in Imperial Valley and passes near the east side of the Salton Sea. The pipeline serves a petroleum storage facility in Niland that has a capacity of 77,500 barrels. The Southern California Gas Company delivers natural gas via pipelines that run south through the County in Range 14 East. These pipelines serve Niland, Calipatria, Brawley, Imperial, El Centro, Heber, and Calexico, and branch lines serve Holtville, Westmorland, Seeley, Naval Air Field (NAF) El Centro, and Plaster City. The natural gas lines are vulnerable to disruption from seismic activity.

Portions of the underground pipelines and overhead power lines are located along the San Andreas Fault and disruption of this type of infrastructure could result in power failure, fire and/or explosions. Table 3.12-1 in Section 3.12, Lands and Realty, provides information about the location and type of existing BLM ROW grants for transmission lines, renewable energy, roads, and pipelines that have been issued within the West Chocolate Mountains REEA.

Solar and Wind Energy Hazards

Solar and wind energy may introduce hazardous material during construction and operation. Petroleum products, coolants, antifreeze, diesel fuel, gasoline, and cleaning solvents, are generally used during construction and maintenance and are stored at the operation and maintenance facilities. During construction, ASTs of diesel fuel, gasoline, motor oil, hydraulic fluid, and coolant are kept on site in a location with secondary containment. The tanks are removed and petroleum products are not stored after construction is completed. An SPCC plan is prepared and implemented in accordance with all applicable regulations.

Geothermal Energy Hazards

The development of geothermal energy may introduce hazardous material during exploration and production drilling, storage, and use. Exploratory drilling and excavation may expose buried hazardous materials resulting from prior use of the site or adjacent property.

Binary geothermal power plants routinely use hydrocarbon working fluid and lubricating oils. In addition, acids may be injected into well bores to dissolve scale.

Contamination from Pesticides

Imperial County has large agriculture operations that use pesticides, which are a source of hazardous materials that may affect the health and safety of residents and visitors in the area. Pesticides can contaminate and/or impair the quality of air, water, and soil within the West Chocolate Mountains REEA and the region. The use of pesticides is regulated and monitored by the Imperial County Agricultural Commission, CalEPA, and the Department of Pesticide Regulation (County of Imperial 2007).

3.13.3.6 Natural Hazards

Wind Storms and Thunderstorms

The West Chocolate Mountains REEA is situated primarily in open desert that is characterized by minimal vegetation and vacant land with sparse development areas. The area is hot and dry and subject to significant temperature gradients throughout the day. In addition, the REEA is subject to floods, windstorms, and thunderstorms that could damage transmission lines and other renewable energy related structures and cause power outages.

Fire Hazards

Wildland fires result from either natural or man-made causes which occur in brush, grasslands, or fallow agricultural areas are capable of causing widespread damage to neighboring lands, in addition to threatening the lives and personal property of persons residing in wildfire-prone areas. According to the Imperial County Public Safety Element, the West Chocolate Mountains REEA is classified as a low risk fire zone (County of Imperial 1993b).

3.14 Energy and Minerals

This section discusses applicable federal, state, and local plans, policies, and regulations for energy and mineral resources and identifies any mineral resources and mining claims within the West Chocolate Mountains REEA. Mining operations are restricted to the relatively few locations where mineral deposits are suitable for extraction. During the scoping period, meetings were conducted with the public and government agencies to identify their concerns. Written comments were also received. One commenter inquired about the impacts to minerals within the West Chocolate Mountains REEA. This comment will be addressed in Section 3.14.3, Existing Conditions, and in Chapter 4, Environmental Consequences, Section 4.14.

3.14.1 Definition of the Resource

The BLM identifies three types of energy and mineral resources, defined by the type of mining claim: leasable, locatable, and salable. Leasable minerals include oil, gas, and geothermal resources that are extracted through a competitive leasing program. Locatable minerals include metallic minerals such as gold, silver, and copper that are extracted within a defined geographic area. Salable minerals include sand, gravel, and other aggregates that are extracted and sold at a fair market value under 43 CFR 3600 (BLM 2010a).

3.14.2 Existing Energy Conditions

Existing energy resources in Imperial County consist of many geothermal resources, and hydroelectric and gas turbine power plants operated by the IID. There is great potential for solar, wind, and biomass for thermal energy generation.

Imperial County contains one of the potentially largest liquid-dominated geothermal resources in the world. The county's geothermal resources have some of the hottest geothermal wells in the world, which are located at relatively shallow depths. The County of Imperial seeks to stimulate economic development activities through direct heat processes and encourages and facilitates the development of non-electrical uses of geothermal energy for economic development purposes. Geothermal resources can be utilized in virtually any process or activity which requires heat in addition to electrical generation. Geothermal fluids can be used directly from a well, or users could obtain "cascaded" heat from other projects. The liquid-dominated geothermal resource can provide a relatively clean source of power as compared to other energy sources (e.g., coal and petroleum reserves) (County of Imperial 2006). Agriculture, aquaculture, food processing, geothermally produced ethanol, and manufacturing are all potential uses of direct heat as identified by the DOE and County of Imperial (County of Imperial 2006).

The geothermal energy industry has become an important part of the county's industrial base. Imperial County supports and encourages the development of geothermal resources in a manner compatible with the protection of agricultural and environmental resources. The county implements this goal by providing leadership, staff liaison with other regulatory and permitting agencies, and an effective set of plans and standards to facilitate the development process (County of Imperial 2006).

The development of geothermal and other alternative energy resources has not progressed as rapidly as projected in previous county geothermal/alternative energy and transmission plans because of high operating costs, slow growth in utility company demand, deregulation and relatively low costs for oil. Imperial County has recently expanded the Geothermal/Alternate Energy and Transmission Element to provide guidance for public input into the planning process regarding the future siting of electrical transmission lines in Imperial County (County of Imperial 2006). This additional guidance information within the element intends to take into account the potential and probable growth of major transmission facilities anticipated to occur in Imperial County over the next decade (County of Imperial 2006). The new transmission lines would accommodate increased demand for power delivery due to expected demand growth and system delivery requirements in Southern California's service area (County of Imperial 2006).

The most productive geothermal field in the Imperial Valley is the Salton Sea Geothermal Field, which has measured temperatures as high as 630°F. About 280 MW of geothermal power is generated from the Salton Sea field, and additional capacity will be added in the future. There are three other operating geothermal fields in Imperial County: (1) Heber, where about 100 MW of geothermal power are generated; (2) East Mesa, which currently produces about 75 MW of geothermal power; and (3) Brawley, which hosts a 50-MW development. There is significant interest in additional geothermal development in the province, driven by utility demand for renewable, baseload power. Energy Source drilled to explore geothermal potential in Imperial Valley in 2008, but did not actually begin plant construction. Energy Source's proposed 49-MW Hudson Ranch 1 geothermal power plant is located west of

Niland, near the Salton Sea. The West Chocolate Mountains REEA is located about 5 miles east of the proposed Hudson Ranch 1 geothermal power plant.

The areas being considered for geothermal leasing within the West Chocolate Mountains REEA exhibit a range of prospective geothermal resource development. The northwestern portion of the proposed lease area includes a few square miles that lie within the boundaries of the Salton Sea Known Geothermal Resource Area (KGRA), a designation that is no longer used but represents the area in which significant interest was expressed in geothermal leasing. The southern part of this northwestern portion is likely to be the area attracting the most interest for geothermal development based on the amount of heat in place, reservoir characteristics, and economic factors. The central portion, while being limited in area, could also attract attention from electric and utility companies, as well as geothermal developers who have geothermal leasing agreements with the owners of the surrounding parcels. The southeastern portion lies outside the areas that were the focus of earlier exploration and development efforts, but remain prospective. A number of geothermal development companies including, but not limited to, Magma Energy, Vulcan Power, and Ormat have been actively leasing private land for geothermal development in the entire area, including around the lease areas being considered by BLM. Currently, geothermal, solar, and wind energy are the commercially viable energy resources in the West Chocolate Mountains REEA. As shown in Table 3.14-1, BLM currently has two geothermal lease authorizations and one noncompetitive geothermal lease application on file BLM 2010b.

Table 3.14-1 Current Geothermal Lease Authorizations and Applications within the West Chocolate Mountains Area

Serial Number	Lease Holder	Section/Township/Range/Quad	Acres	Status
CACA 047196	Western Geothermal Partners	T95, R12E, Section 10	640	Pending
CACA 046142	Western Geothermal Partners	T95, R12E, Section 2,12,14 (NW¼ and W½ of NE¼), 24	2,161.9	Approved
CACA 043965	Ormat Nevada, Inc.	T10S, R14E, Section 8 (all excluding DOD lands), Section 28 (NE¼ of SE¼)	1,160	Approved

There are no known fluid or solid mineral energy reserves in Imperial County, although exploratory drilling for oil and gas has taken place in the West Chocolate Mountains REEA (Steward 2010). The IID imports these fuels for use at the El Centro Steam Plant, the Brawley Diesel Plant, the Rockwood Plant, and Coachella Station. In 1988, approximately 62 percent of electricity generated by IID was with the use of imported fossil fuels.

In 1936, IID entered into the electrical power business as a public utility. After construction of the All-American Canal, low-cost hydroelectric energy became a byproduct of the irrigation system available to the Imperial Valley. As electrical needs have increased, IID has imported additional sources of energy to supplement the hydro-generated power.

IID operates nine hydroelectric generation plants, a 180-MW steam plant, eight gas turbines, and an eight-unit diesel plant. The Coachella Valley Substation, placed in service in June 1986, is the key link between IID and Southern California Edison. A 230-kV transmission line constructed in 1988 allows Imperial Valley access to the rest of the southwestern power grid and establishes a path to export geothermal and other alternative energy (such as biomass purchased by Southern California Edison) from Imperial Valley.

Power generated by the hydraulic force of water (hydroelectric generation) is a relatively low-cost means of generating electrical power with minimal adverse impacts on the environment when the resource is available. In normal rainfall years, nearly 16 percent of California's electrical generating capacity comes from hydropower.

The first hydroelectric plants on the All-American Canal were completed at Drops 3 and 4 in 1941. The hydroelectric facility at Drop 2 was installed in 1953. The Pilot Knob Plant was built on a bypass channel between the All-American Canal and the Colorado River, near Yuma, Arizona, and went into operation in 1957. The Drop 5 installation was completed in 1982; the Drop 1 and East Highline Turmant Hydro Plants were opened in 1984. Hydroelectric power from the All-American Canal produces approximately 85 MW (CEC 2002). Pilot Knob has 55 feet of hydraulic head and can produce up to 33 MW (BOR 2005). Capacity for the other small plants was not readily available.

An extensive source of energy is available in Imperial County in the form of sunlight (solar generation). Imperial County receives about 360 days of annual sunshine and, because there are large amounts of private and public lands available for development and the topography is virtually completely flat, the solar energy development potential is excellent. It has been estimated that solar power could eventually produce 10 percent of the United States' energy supply. According to the Geothermal/Alternative Energy and Transmission Element of the Imperial County General Plan, the benefits of increased transmission line development in Imperial County includes increased opportunity for the development of solar energy generation facilities with local construction and permanent job creation (County of Imperial 2006). PV cells power a variety of items from calculators to remote telecommunications stations and water pumps.

3.14.3 Minerals

A wide variety of minerals are found throughout Imperial County. Gold, gypsum, sand, gravel, lime, clay, and stone have the highest economic value and are presently extracted for profit in the county. Industrial materials are also readily available, including kyanite, mineral fillers (clay, limestone, sericite, mica, and tuff), salt, potash, calcium chloride, manganese, and sand. The managed use of the valuable mineral deposits is important for regional economic stability. Mining operations are restricted to the locations where mineral deposits are suitable for extraction. A great deal of sand and gravel (aggregate material) is being commercially produced on public (BLM) and private land within the West Chocolate Mountains REEA, especially within the northern area near Frink Spring (Steward 2010).

Table 3.14-2 identifies the BLM mining claims within the West Chocolate Mountains REEA. All of these mining claims have been closed.

Mining Claims

Mineral mining in Imperial County is present on BLM land; however, there are no active mining claims managed under the 1872 Mining Act that are located within the West Chocolate Mountains REEA.

There were never mining claims within the geothermal lease areas for CACA 047196 and CACA 043965; however, there were previously some mining claims on portions of the geothermal lease area for CACA 046142, and the solar lease area for CACA 050113, but the mining claims are currently closed. The last set of mining claims was closed on August 31, 1994 (Erukanure 2009). There are 20 closed oil and gas leases within BLM lands (BLM 2009).

Table 3.14.2 Mining Claims within the West Chocolate Mountains REEA

Serial Number	Section/Township/Range/Quad	Claimant	Status
CAMC262258	T9S, R13E, Section 20, Quad NE, SE	Frank Sand & Gravel	Closed
CAMC262429	T9S, R13E, Section 20, Quad NE	Frank Sand & Gravel	Closed
CAMC262430	T9S, R13E, Section 20, Quad NE	Frank Sand & Gravel	Closed
CAMC262431	T9S, R13E, Section 20, Quad SE	Frank Sand & Gravel	Closed
CAMC262432	T9S, R13E, Section 20, Quad SE	Frank Sand & Gravel	Closed
CAMC262433	T9S, R13E, Section 20, Quad SE	Frank Sand & Gravel	Closed
CAMC262434	T9S, R13E, Section 20, Quad SE	Frank Sand & Gravel	Closed
CAMC262435	T9S, R13E, Section 20, Quad SE	Frank Sand & Gravel	Closed
CAMC262436	T9S, R13E, Section 20, Quad SE	Frank Sand & Gravel	Closed
CAMC32192	T9S, R13E, Section 20, Quad NE, SE	Frank Sand & Gravel	Closed
CAMC60850	T9S, R13E, Section 20, Quad NW	County of Imperial	Closed
CAMC149939	T9S, R12E, Section 2, Quad NW	Crowthiers Clean Air	Closed
CAMC149939	T9S, R12E, Section 2, Quad NW	Diamond Ram Expl. Co.	Closed
CAMC149939	T9S, R12E, Section 2, Quad NW	Glen Smith Foundation	Closed
CAMC149939	T9S, R12E, Section 2, Quad NW	Huntington Development Corp.	Closed
CAMC149939	T9S, R12E, Section 2,Quad NW	Huntington Pet. Corp.	Closed
CAMC149939	T9S, R12E, Section 2, Quad NW	Leffler Dan	Closed
CAMC149939	T9S, R12E, Section 2, Quad NW	Nailan Maria	Closed
CAMC149939	T9S, R12E, Section 2, Quad NW	Smith Glen	Closed
CAMC149940	T9S, R12E, Section 2, Quad NW	Crowthiers Clean Air	Closed
CAMC149940	T9S, R12E, Section 2, Quad SW	Diamond Ram Expl. Co.	Closed
CAMC149940	T9S, R12E, Section 2, Quad SW	Glen Smith Foundation	Closed
CAMC149940	T9S, R12E, Section 2, Quad SW	Huntington Development Corp.	Closed
CAMC149940	T9S, R12E, Section 2, Quad SW	Huntington Pet. Corp.	Closed

Table 3.14.2 Mining Claims within the West Chocolate Mountains REEA

Serial Number	Section/Township/Range/Quad	Claimant	Status
CAMC149940	T9S, R12E, Section 2, Quad SW	Leffler Dan	Closed
CAMC149940	T9S, R12E, Section 2, Quad SW	Nailan Maria	Closed
CAMC149940	T9S, R12E, Section 2, Quad SW	Smith Glen	Closed
CAMC149941	T9S, R12E, Section 2, Quad SE	Crowthiers Clean Air	Closed
CAMC149941	T9S, R12E, Section 2, Quad SE	Diamond Ram Expl. Co.	Closed
CAMC149941	T9S, R12E, Section 2, Quad SE	Glen Smith Foundation	Closed
CAMC149941	T9S, R12E, Section 2, Quad SE	Huntington Development Corp.	Closed
CAMC149941	T9S, R12E, Section 2, Quad SE	Huntington Pet. Corp.	Closed
CAMC149941	T9S, R12E, Section 2, Quad SE	Leffler Dan	Closed
CAMC149941	T9S, R12E, Section 2, Quad SE	Nailan Maria	Closed
CAMC149941	T9S, R12E, Section 2, Quad SE	Smith Glen	Closed
CAMC149942	T9S, R12E, Section 2, Quad NE	Crowthiers Clean Air	Closed
CAMC149942	T9S, R12E, Section 2, Quad NE	Diamond Ram Expl. Co.	Closed
CAMC149942	T9S, R12E, Section 2, Quad NE	Glen Smith Foundation	Closed
CAMC149942	T9S, R12E, Section 2, Quad NE	Huntington Development Corp.	Closed
CAMC149942	T9S, R12E, Section 2, Quad NE	Huntington Pet. Corp.	Closed
CAMC149942	T9S, R12E, Section 2, Quad NE	Leffler Dan	Closed
CAMC149942	T9S, R12E, Section 2, Quad NE	Nailan Maria	Closed
CAMC149942	T9S, R12E, Section 2, Quad NE	Smith Glen	Closed
CAMC232782	T9S, R12E, Section 2, Quad SE	Fischer Watt Gold Company	Closed
CAMC232783	T9S, R12E, Section 2, Quad SE	Fischer Watt Gold Company	Closed
CAMC232784	T9S, R12E, Section 2, Quad SE	Fischer Watt Gold Company	Closed
CAMC232785	T9S, R12E, Section 2, Quad SE	Fischer Watt Gold Company	Closed
CAMC232786	T9S, R12E, Section 2, Quad SW, SE	Fischer Watt Gold Company	Closed
CAMC232787	T9S, R12E, Section 2, Quad SW	Fischer Watt Gold Company	Closed
CAMC232788	T9S, R12E, Section 2, Quad SE	Fischer Watt Gold Company	Closed
CAMC242974	T9S, R12E, Section 2, Quad NW	Comm. Church by Bay	Closed
CAMC242974	T9S, R12E, Section 2, Quad NW	Crowthiers Clean Air	Closed
CAMC242974	T9S, R12E, Section 2, Quad NW	Diamond Ram Expl. Co.	Closed
CAMC242974	T9S, R12E, Section 2, Quad NW	Glen Smith Foundation	Closed
CAMC242974	T9S, R12E, Section 2, Quad NW	Huntington Development Corp.	Closed
CAMC242974	T9S, R12E, Section 2, Quad NW	Huntington Pet. Corp.	Closed
CAMC242974	T9S, R12E, Section 2, Quad NW	Nailen Maria	Closed

Table 3.14.2 Mining Claims within the West Chocolate Mountains REEA

Serial Number	Section/Township/Range/Quad	Claimant	Status
CAMC242974	T9S, R12E, Section 2, Quad NW	Smith Glen	Closed
CAMC242975	T9S, R12E, Section 2, Quad SW	Comm. Church by Bay	Closed
CAMC242975	T9S, R12E, Section 2, Quad SW	Crowthiers Clean Air	Closed
CAMC242975	T9S, R12E, Section 2, Quad SW	Diamond Ram Expl. Co.	Closed
CAMC242975	T9S, R12E, Section 2, Quad SW	Glen Smith Foundation	Closed
CAMC242975	T9S, R12E, Section 2, Quad SW	Huntington Development Corp.	Closed
CAMC242975	T9S, R12E, Section 2, Quad SW	Huntington Pet. Corp.	Closed
CAMC242975	T9S, R12E, Section 2, Quad SW	Nailen Maria	Closed
CAMC242975	T9S, R12E, Section 2, Quad SW	Smith Glen	Closed
CAMC242976	T9S, R12E, Section 2, Quad SE	Comm. Church by Bay	Closed
CAMC242976	T9S, R12E, Section 2, Quad SE	Crowthiers Clean Air	Closed
CAMC242976	T9S, R12E, Section 2, Quad SE	Diamond Ram Expl. Co.	Closed
CAMC242976	T9S, R12E, Section 2, Quad SE	Glen Smith Foundation	Closed
CAMC242976	T9S, R12E, Section 2, Quad SE	Huntington Development Corp.	Closed
CAMC242976	T9S, R12E, Section 2, Quad SE	Huntington Pet. Corp.	Closed
CAMC242976	T9S, R12E, Section 2, Quad SE	Nailen Maria	Closed
CAMC242976	T9S, R12E, Section 2, Quad SE	Smith Glen	Closed
CAMC242977	T9S, R12E, Section 2, Quad NE	Comm. Church by Bay	Closed
CAMC242977	T9S, R12E, Section 2, Quad NE	Crowthiers Clean Air	Closed
CAMC242977	T9S, R12E, Section 2, Quad SW	Diamond Ram Expl. Co.	Closed
CAMC242977	T9S, R12E, Section 2, Quad SW	Glen Smith Foundation	Closed
CAMC242977	T9S, R12E, Section 2, Quad SW	Huntington Development Corp.	Closed
CAMC242977	T9S, R12E, Section 2, Quad SW	Huntington Pet. Corp.	Closed
CAMC242977	T9S, R12E, Section 2, Quad SW	Nailen Maria	Closed
CAMC242977	T9S, R12E, Section 2, Quad SW	Smith Glen	Closed
CAMC232789	T9S, R12E, Section 12 Quad NW	Fischer Watt Gold Company	Closed
CAMC232790	T9S, R12E, Section 12 Quad NW	Fischer Watt Gold Company	Closed
CAMC232791	T9S, R12E, Section 12 Quad NW	Fischer Watt Gold Company	Closed
CAMC232792	T9S, R12E, Section 12 Quad NW	Fischer Watt Gold Company	Closed
CAMC232793	T9S, R12E, Section 12 Quad NW	Fischer Watt Gold Company	Closed
CAMC232794	T9S, R12E, Section 12 Quad NW	Fischer Watt Gold Company	Closed
CAMC232795	T9S, R12E, Section 12 Quad NW	Fischer Watt Gold Company	Closed
CAMC232796	T9S, R12E, Section 12 Quad NW	Fischer Watt Gold Company	Closed

Table 3.14.2 Mining Claims within the West Chocolate Mountains REEA

Serial Number	Section/Township/Range/Quad	Claimant	Status
CAMC232797	T9S, R12E, Section 12 Quad NW	Fischer Watt Gold Company	Closed
CAMC232798	T9S, R12E, Section 12 Quad NW	Fischer Watt Gold Company	Closed
CAMC232799	T9S, R12E, Section 12 Quad NE	Fischer Watt Gold Company	Closed
CAMC232800	T9S, R12E, Section 12 Quad NE	Fischer Watt Gold Company	Closed
CAMC232801	T9S, R12E, Section 12 Quad NE	Fischer Watt Gold Company	Closed
CAMC232802	T9S, R12E, Section 12 Quad NE	Fischer Watt Gold Company	Closed
CAMC232803	T9S, R12E, Section 12 Quad NE	Fischer Watt Gold Company	Closed
CAMC232804	T9S, R12E, Section 12 Quad NE	Fischer Watt Gold Company	Closed
CAMC232805	T9S, R12E, Section 12 Quad SW	Fischer Watt Gold Company	Closed
CAMC232806	T9S, R12E, Section 12 Quad SW	Fischer Watt Gold Company	Closed
CAMC232807	T9S, R12E, Section 12 Quad SW	Fischer Watt Gold Company	Closed
CAMC232808	T9S, R12E, Section 12 Quad SW	Fischer Watt Gold Company	Closed
CAMC232809	T9S, R12E, Section 12 Quad SW	Fischer Watt Gold Company	Closed
CAMC232810	T9S, R12E, Section 12 Quad SW	Fischer Watt Gold Company	Closed
CAMC232811	T9S, R12E, Section 12 Quad SW	Fischer Watt Gold Company	Closed
CAMC232812	T9S, R12E, Section 12 Quad SE	Fischer Watt Gold Company	Closed
CAMC232813	T9S, R12E, Section 12 Quad SW	Fischer Watt Gold Company	Closed
CAMC232814	T9S, R12E, Section 12 Quad SW	Fischer Watt Gold Company	Closed
CAMC232815	T9S, R12E, Section 12 Quad SE	Fischer Watt Gold Company	Closed
CAMC232816	T9S, R12E, Section 12 Quad SE	Fischer Watt Gold Company	Closed
CAMC232817	T9S, R12E, Section 12 Quad SE	Fischer Watt Gold Company	Closed
CAMC232818	T9S, R12E, Section 12 Quad SE	Fischer Watt Gold Company	Closed
CAMC232819	T9S, R12E, Section 12 Quad SE	Fischer Watt Gold Company	Closed
CAMC232820	T9S, R12E, Section 12 Quad SE	Fischer Watt Gold Company	Closed
CAMC232821	T9S, R12E, Section 12 Quad SE	Fischer Watt Gold Company	Closed
CAMC232822	T9S, R12E, Section 12 Quad SE	Fischer Watt Gold Company	Closed
CAMC232823	T9S, R12E, Section 12 Quad SE	Fischer Watt Gold Company	Closed
CAMC232824	T9S, R12E, Section 12 Quad SE	Fischer Watt Gold Company	Closed

3.15 Recreation

This section discusses applicable plans, policies, and regulations for recreational resources and identifies the types of recreational activities and resources in the West Chocolate Mountains REEA. During the scoping period, meetings were conducted with the public and government agencies to identify their concerns. Written comments were also received. Several comments were received regarding recreation. Recommendations were that the EIS include a discussion or evaluation of: (1) management of OHV recreation; (2) emissions from OHVs, as well as any mitigation measures to minimize these emissions; (3) disclosure of the impacts to recreational users on the lands identified for renewable energy development; (4) discussion of loss of access to public lands from proposed developments and impacts to recreation, hiking, camping, birding, hunting, rock-hounding, and so forth. These comments will be addressed in Section 3.15.3, Existing Conditions, and in Chapter 4, Environmental Consequences, Section 4.15.

3.15.1 Definition of the Resource

Recreation activities include hobby prospecting, sightseeing, photography, hunting, painting, bird watching, biking, camping, picnicking, hiking, OHV use, and wildlife viewing.

3.15.2 Applicable Plans, Policies, and Regulations

3.15.2.1 Federal

Federal Land Policy and Management Act

As provided in the FLPMA §101, the BLM's legal mandate is to manage BLM lands in accordance with the principles of multiple use and sustained yield. The Act also directs the BLM to protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values; that, where appropriate, will preserve and protect certain public lands in their natural condition; that will provide food and habitat for fish and wildlife and domestic animals; and that will provide for outdoor recreation and human occupancy and use (Pub. L. 90-2743; 43 U.S.C. 1601, et seq.).

Specific, authorized uses are determined in the land use planning process, as prescribed in §202 of the FLPMA. The proposed plan would be in conformance with the BLM's mandate to manage BLM land for multiple use as outlined in §101 and 202 of the FLPMA.

Executive Order 11644

EO 11644 of 1971 established uniform polices regarding OHV use on public lands, requiring agencies to monitor OHV use to assess and minimize impacts on important resources on public lands.

3.15.2.2 BLM

The BLM is entrusted with the multiple use management of natural resources on public land, in accordance with the FLPMA. As part of multiple use management under the FLPMA, public land must be managed for outdoor recreation and natural, scenic, scientific, and historical values (Policy set by Section 102(a)(13) of the FLPMA also recognizes the nation's need for

domestic sources of minerals, timber, food, and fiber from the public lands). BLM land has a variety of uses, including recreation. General recreation activities on BLM-administered land in the CDCA include hobby prospecting, sightseeing, photography, hunting, painting, bird watching, biking, camping, picnicking, hiking, OHV use, and wildlife viewing (BLM 1980). The California Desert attracts several million visitors annually, participating in a wide range of recreational activities as noted above. The sheer landscape diversity provides a variety of settings in which to enjoy the desert's natural beauty and solitude away from the urban settings of Southern California.

The West Chocolate Mountains REEA is not designated a Special Resource Management Area (SRMA); however, the ISDRA is located at the southern end of the REEA and is managed as part of the ISDRA Management Plan. In addition, recreational uses are allowed by BLM and occur within the REEA. The primary recreational uses in the REEA include offroading (OHV use), birdwatching, hiking, primitive camping, hunting, rockhounding, horseback riding, hunting/target shooting, and sightseeing. In addition to OHV uses, the REEA has several unmanaged hiking trails within the area, and several primitive campgrounds with no facilities that can be accessed only by foot or OHV. The BLM has no developed campgrounds or facilities within the REEA.

The CDCA Plan (described below) has an important legal policy consideration which states that the collection and removal of plant parts by recreational users is permitted with stipulations pursuant to 43 CFR 5400 and 5500 (BLM 1980). For the collection of dead and down plants parts, the CDCA Plan stipulates that the BLM requires recreational users to bring their own fire wood when recreation-use permits are issued for large groups (BLM 1980).

If the West Chocolate Mountains REEA was completely built out for the testing and development of solar and wind energy facilities, as well as for the leasing of geothermal energy exploration and development, the nearest sensitive recreation viewers include OHV users at the ISDRA which is located at the southeast portion of the proposed plan, and the CDFG's Imperial Wildlife Area (Wister Area).

Since the CDCA's designation, the BLM lands have been managed according to mandates set forth in FLPMA §601. A CDCA policy within FLPMA §601 recommends that California Desert resources "should be provided for in a multiple use and sustained yield management plan to conserve these resources for future generations, and to provide present and future use and enjoyment, particularly outdoor recreation uses, including the use, where appropriate, of off-road recreational vehicle. . ." (90 Stat. 2743, Sec. 601 (a)(4)).

Section 601(d) also directed the BLM to develop a land use plan, prepared under FLPMA §202, which was originally completed in 1980 and amended many times since to guide the management of the CDCA under the principles of multiple use and sustained yield, including resource use and mineral development. The plan divided all public land within the CDCA, including the parcels in the West Chocolate Mountains REEA, into multiple use classes that stipulate, among other things, whether different areas can be used for motorized recreation and motorized access and the intensity of that use. Because these classes are legally binding, unless amended through the public process, the BLM must manage the parcels in the West Chocolate Mountains REEA according to the class prescriptions. The REEA is currently unclassified.

California Desert Conservation Area Plan

The BLM's CDCA Plan describes land use management goals and policies within the approximately 10 million-acre CDCA Planning Area and provides guidelines and requirements for recreational activities. Goals in the CDCA Plan's Recreation Element (BLM 1980) are as follows:

- Provide for a wide range of quality recreational opportunities and experiences, emphasizing dispersed undeveloped use;
- Provide a minimum of recreation facilities. Facilities should emphasize resource protection and visitor safety;
- Manage recreational use to minimize user conflicts, provide a safe recreation environment, and protect desert resources;
- Emphasize the use of public information and education techniques to increase public awareness, enjoyment, and sensitivity to desert resources;
- Adjust management approach to accommodate changing visitor use patterns and preferences;
- Encourage the use and enjoyment of desert recreational opportunities by special populations and provide facilities to meet the needs of those groups;
- Locate areas and trails in officially designated wilderness areas or primitive areas; and
- Locate areas and trails in natural areas only if the authorized officer determines that vehicle use in such locations would not adversely affect their natural, esthetic, scenic, or other values for which such areas are established.

Western Colorado Desert Routes of Travel Designations Plan Amendment

In 2003, BLM completed the Western Colorado Route of Travel Designations Plan Amendment, which updated the route designations for the western portions of the CDCA, including lands within the West Chocolate Mountains REEA.

The goals in the CDCA Plan's Recreation Element (1985 Plan Amendment Six, approved January 15, 1987; and 1987 Plan Amendment Nine, approved August 23, 1988) are incorporated as the purpose for the WECO designated routes of travel as identified below:

- Provide for a wide range of recreation opportunities and experiences, emphasizing dispersed undeveloped use;
- Provide a minimum of recreation facilities. Those facilities should emphasize resource protection and visitor safety;
- Manage recreation use to minimize user conflicts, provide a safe recreation environment, and protect desert resources;
- Emphasize the use of public education and education techniques to increase public awareness, enjoyment, and sensitivity to desert resources;

- Adjust the management approach to accommodate changing visitor use patterns and preferences;
- Encourage the use and enjoyment of desert recreation opportunities by special populations, and provide facilities to meet the needs of those groups (BLM 2002);
- Recreation Goals and Objectives (2.3.12.2.1):
    1. Improve access to appropriate recreation opportunities on DOI-managed or DOI-partnered lands;
    2. Ensure a quality experience and enjoyment of natural and cultural resources on DOI-managed or DOI-partnered lands;
    3. Provide for and receive fair value in recreation;
- ACEC Goals and Objectives (2.3.12.2.1): ACECs would provide protection for relevant and important special status species, wildlife, scenic, and significant cultural resources values.

Northern and Eastern Colorado Coordinated Management Plan

The Northern and Eastern Colorado (NECO) has the following desert tortoise and bighorn sheep objectives:

Desert Tortoise Conservation Goals and Objectives:

- Establish desert wildlife management areas (DWMAs) where viable desert tortoise populations can be maintained.
- Implement management actions within DWMAs to address conflicts with the goal.
- Acquire sufficient habitat within the DWMAs to ensure that management actions are effective in the DWMAs as a unit.
- Reduce tortoise direct mortality resulting from interspecific (e.g., raven predation) and intraspecific (e.g., disease) conflicts that likely result from human-induced changes in ecosystem processes.
- Mitigate effects on tortoise populations and habitat outside DWMAs to provide connectivity between DWMAs.

Desert Bighorn Sheep Conservation Goals and Objectives:

The overall goal of the desert bighorn sheep conservation strategy in the planning area is to ensure the long-term viability of the Sonoran Desert Bighorn Sheep Metapopulation and the Southern Mojave Desert Bighorn Sheep Metapopulation. To achieve this goal, the following sub-goals have been identified:

- Maintain genetic variation in each metapopulation by conserving and enhancing individual bighorn sheep demes (subpopulations).

- Maintain genetic variation in and viability of individual demes by improving or increasing usable habitat and by augmenting populations.
- Maintain habitat connectivity within and between demes.

The objectives are to:

- Identify and protect essential habitat for bighorn sheep (i.e., that habitat providing forage, water, cover, and space, including movement corridors, necessary for maintenance of a viable metapopulation).
- Maintain, improve, and restore habitat quality within essential habitat.
- Reestablish lost demes or augment demes with less than 50 individuals by transplanting bighorn sheep as required.

Desert Bighorn Sheep Strategy:

The bighorn sheep populations within the Northern and Eastern Colorado Desert planning area would be managed as two metapopulations--the "Sonoran Desert Bighorn Sheep Metapopulation" and the "Southern Mojave Desert Bighorn Sheep Metapopulation"--through decisions made in this plan and more specific plans for these two meta-populations that the CDFG is developing. The CDFG plans would contain considerably more detail and site-specific proposals.

All objectives and actions that follow apply to both metapopulations unless specified otherwise. Most of the actions were taken from a draft management plan prepared by CDFG for the Sonoran Desert Bighorn Sheep Metapopulation. Work on the Southern Mojave plan has not yet begun. At least one alternative in each action set implements BLM's Fish and Wildlife 2000 Plan entitled Mountain Sheep Ecosystem Management Strategy in the 11 Western States and Alaska.

The NECO also has the following designated routes of travel objectives for routes west and south of the project area:

Routes of Travel Goals and Objectives:

- The goals stated in the CDCA Plan's Motorized-Vehicle Access Element (1985 Plan Amendment Six, approved January 15, 1987) are herein reiterated as goals of the NECO Plan for motorized-vehicle access and routes of travel designations.
- Provide for constrained motorized vehicle access in a manner that balances the needs of all desert users, private landowners, and other public agencies.
- When designating or amending areas or routes for motorized vehicle access, to the degree possible, avoid adverse impacts to desert resources.
- Use maps, signs, and published information to communicate the motorized vehicle access situation to desert users. Be sure all information materials are understandable and easy to follow.

The goals in the CDCA Plan's Recreation Element (1985 Plan Amendment Six, approved January 15, 1987; and 1987 Plan Amendment Nine, approved August 23, 1988) are herein reiterated as goals of the NECO Plan for recreation:

- Provide for a wide range of quality recreation opportunities and experiences, emphasizing dispersed undeveloped use.
- Provide a minimum of recreation facilities. Those facilities should emphasize resource protection and visitor safety.
- Manage recreation use to minimize user conflicts, provide a safe recreation environment, and protect desert resources.
- Emphasize the use of public information and education techniques to increase public awareness, enjoyment, and sensitivity to desert resources.
- Adjust management approach to accommodate changing visitor use patterns and preferences.
- Encourage the use and enjoyment of desert recreation opportunities by special populations, and provide facilities to meet the needs of those groups.

The objectives for motorized-vehicle access / routes of travel designations / recreation are to:

- Designate routes of travel consistent with the criteria at 43 CFR 8342.1.
- Provide for competitive off-highway vehicle events in a manner that protects desert resources.
- Establish stopping, parking, and vehicle camping limitations consistently.

3.15.3 Existing Conditions

This section discusses recreation resources within one mile of the West Chocolate Mountains REEA. A one-mile buffer has been chosen because it includes direct, on-site impacts to recreation, as well as reasonably foreseeable off-site impacts to recreational areas and dispersed recreational activities. The proposed plan would be located entirely on lands administered by the BLM El Centro Field Office, Imperial County, and CSLC. The proposed plan would be located within one mile of recreational facilities as shown in Table 3.15-1.

Table 3.15-1 Recreation Areas in the Vicinity of the West Chocolate Mountains REEA

Name	Distance	Use
ISDRA (BLM)	Directly adjacent to the south	Largest mass of sand dunes in state of California. OHV use, hiking.
CDFG's Imperial Wildlife Area (Wister Area)	Within 1 mile of REEA	6,000 acre human made marsh with nearly different 400 species, essential habitat for migratory birds, hiking, birdwatching, hunting, fishing.

3.15.3.1 Off-Highway Vehicles

Recreational activities, including OHV uses, within the West Chocolate Mountains REEA are limited due to the lack of legal routes; however, the ISDRA is a heavily used OHV area. Some of the OHV users have ridden on private property within the REEA and, thus, have created OHV trails which BLM has no jurisdiction over. The BLM has no visitor use data within the REEA, and no racing has been permitted in the REEA. There are existing open OHV routes of travel within the REEA, some of which parallel the Coachella Canal and East Highline Canal (refer to Figure 3.15-1). There are also open OHV interconnect routes between these two canals in the southern portion of the REEA, and many other open OHV routes in the northern portion.

3.15.3.2 Imperial County

The Niland Marina Park is a recreational area located within the northwest portion of the West Chocolate Mountains REEA, and is a county-owned park on the shores of the Salton Sea, approximately 3.5 miles east of Bombay Beach. This park serves as a boat launch area, and the park is closed as some of the facilities are inundated by water. The park served primarily as a boat launch area and included restrooms, shade structures, a pump house and an office (County of Imperial 2008). Other recreational areas include the Bashford's Hot Mineral Spa and Fountain Youth Spa which are located less than one mile from the northeastern boundary of the REEA.

3.15.3.3 Federal Recreation Areas

The ISDRA is located adjacent to the southern edge of the West Chocolate Mountains REEA and has federal oversight from the BLM. The Recreation Area, with sand dunes that rise up to 300 feet, is used primarily as an off-highway area for dune buggies, dirt bikes, quads, and other OHVs. ISDRA also includes wilderness areas that are closed to mechanized/motorized vehicles to preserve wildlife habitats (County of Imperial 2008). These sand dunes are the largest in California (the dune system extends more than 40 miles by 5 miles wide) and were formed by windblown sands of ancient Lake Cahuilla. The ISDRA is a favorite location for OHV users, hikers, and a home to rare plants and animals (BLM 2010).

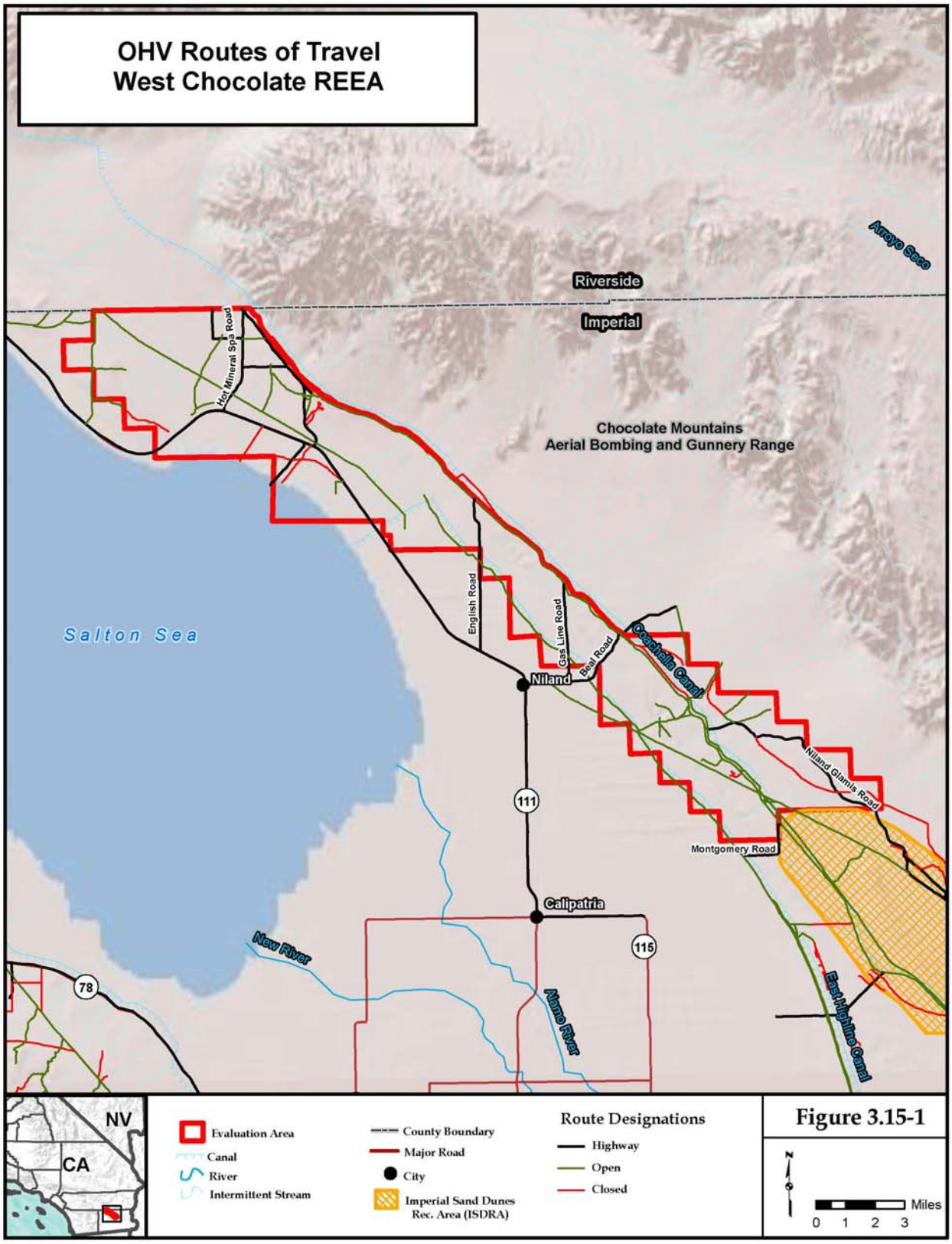
OHV Routes of Travel
West Chocolate REEA
Riverside
Imperial
Arroyo Seco
Chocolate Mountains
Aerial Bombing and Gunnery Range
Salton Sea
Hot Mineral Spa Road
English Road
Gas Line Road
Beal Road
Dogwood Canal
Niland
Niland Glamis Road
Montgomery Road
111
Calipatria
115
78
New River
Alamo River
East Highline Canal
NV
CA
Evaluation Area
Canal
River
Intermittent Stream
County Boundary
Major Road
City
Imperial Sand Dunes Rec. Area (ISDRA)
Route Designations
Highway
Open
Closed
Miles
0 1 2 3

Figure 3.15-1

3.15 Recreation Resources

This section discusses applicable plans, policies, and regulations for recreational resources and identifies the types of recreational activities and resources in the West Chocolate Mountains REEA. During the scoping period, meetings were conducted with the public and government agencies to identify their concerns. Written comments were also received. Several comments were received regarding recreation. Recommendations were that the EIS include a discussion or evaluation of: (1) management of OHV recreation; (2) emissions from OHVs, as well as any mitigation measures to minimize these emissions; (3) disclosure of the impacts to recreational users on the lands identified for renewable energy development; (4) discussion of loss of access to public lands from proposed developments and impacts to recreation, hiking, camping, birding, hunting, rock-hounding, and so forth. These comments will be addressed in Section 3.15.3, Existing Conditions, and in Chapter 4, Environmental Consequences, Section 4.15.

3.15.1 Definition of the Resource

Recreation activities include hobby prospecting, sightseeing, photography, hunting, painting, bird watching, biking, camping, picnicking, hiking, OHV use, and wildlife viewing.

3.15.2 Applicable Plans, Policies, and Regulations

3.15.2.1 Federal

Federal Land Policy and Management Act

As provided in the FLPMA §101, the BLM's legal mandate is to manage BLM lands in accordance with the principles of multiple use and sustained yield. The Act also directs the BLM to protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values; that, where appropriate, will preserve and protect certain public lands in their natural condition; that will provide food and habitat for fish and wildlife and domestic animals; and that will provide for outdoor recreation and human occupancy and use (Pub. L. 90-2743; 43 U.S.C. 1601, et seq.).

Specific, authorized uses are determined in the land use planning process, as prescribed in §202 of the FLPMA. The proposed plan would be in conformance with the BLM's mandate to manage BLM land for multiple use as outlined in §101 and 202 of the FLPMA.

Executive Order 11644

EO 11644 of 1971 established uniform polices regarding OHV use on public lands, requiring agencies to monitor OHV use to assess and minimize impacts on important resources on public lands.

3.15.2.2 BLM

The BLM is entrusted with the multiple use management of natural resources on public land, in accordance with the FLPMA. As part of multiple use management under the FLPMA, public land must be managed for outdoor recreation and natural, scenic, scientific, and historical values (Policy set by Section 102(a)(13) of the FLPMA also recognizes the nation's need for

3.16 Special Management Areas

This section discusses applicable plans, policies, and regulations for special management areas (SMAs) and identifies the types of SMAs within or near the West Chocolate Mountains REEA. During the scoping period, meetings were conducted with the public and government agencies to identify their concerns. Written comments were also received; however, no specific scoping comments were received for SMAs.

3.16.1 Definition of the Resource

The BLM manages lands that possess unique and important historical, anthropological, ecological, biological, geological, and paleontological features. These features include undisturbed wilderness tracts, critical habitat, natural environments, open spaces, scenic landscapes, historic locations, cultural landmarks, and paleontologically rich regions. SMAs are administered with the intent to preserve, protect, and evaluate these significant components of our national heritage. Most SMAs are designated either by an Act of Congress or by Presidential Proclamation, or are created under BLM administrative procedures.

3.16.2 Applicable Plans, Policies, and Regulations

3.16.2.1 Federal

California Desert Conservation Area Plan

The goals of the Area of Critical Concern (ACEC) program within the CDCA Plan are to: (1) identify and protect the significant natural and cultural resources requiring special management attention found on the BLM-administered lands in the CDCA; (2) provide for other uses in the designated areas, compatible with the protection and enhancement of the significant natural and cultural resources; and (3) systematically monitor the preservation of the significant natural and cultural resources on BLM-administered lands, and the compatibility of other allowed uses with these resources (BLM 1980).

In addition to ACECs, areas that possess rare, unique, or unusual qualities of scientific, educational, cultural, or recreational significance may have SMA designations applied to them. These various designations are important BLM management tools which complement the broad regional management of the multiple-use classes and the resource and activity-specific perspective of the CDCA Plan elements (BLM 1980).

Western Colorado Desert Routes of Travel Designations Plan Amendment

As discussed in Section 3.2.2.1, the WECO Plan Amendment designated preferred routes of travel across public lands managed by the BLM in the WECO Planning Area. Eight ACECs, which are designated by the CDCA Plan, as amended, are located within the WECO Planning Area (BLM 2002). Management actions for all SMAs within the Plan area conform to those set forth by the CDCA Plan and other BLM planning regulations.

Imperial Sand Dunes Recreation Area Management Plan

The ISDRA has the following management goals for ACECs:

- ACEC Goals and Objectives (2.3.12.2.1): ACECs would provide protection for relevant and important special status species, wildlife, scenic, and significant cultural resources values.

3.16.2.2 BLM

The National Landscape Conservation System (NLCS), originally created by the BLM in June 2000 and Congressionally established in March 2009 as part of the Omnibus Public Land Management Act of 2009 (Pub. L. 111-11), is the primary management framework for specially designated lands within the BLM's multiple-use mission. The NLCS includes National Monuments, National Conservation Areas and similar designations, Designated Wilderness Areas, Wilderness Study Areas, Wild and Scenic Rivers, National Scenic and Historic Trails, and the Conservation Lands of the California Desert (BLM 2009).

Other special areas managed by the BLM outside of the NLCS framework include ACECs, Research Natural Areas, National Natural Landmarks, National Recreation Trails, and a variety of other area designations.

3.16.3 Existing Conditions

The West Chocolate Mountains REEA is directly adjacent to the ISDRA to the south, and there is one designated Wilderness Area and two ACECs within 10 miles. There are currently no other areas designated under the NLCS or other special areas managed by the BLM within 10 miles of the REEA.

3.16.3.1 Wilderness Areas and Lands with Wilderness Characteristics

Wilderness Areas, designated by Congress, are defined by the Wilderness Act of 1964 as places "where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain." Designation is aimed at ensuring that these lands are preserved and protected in their natural condition. Wilderness Areas, which are generally 5,000 acres or more, offer outstanding opportunities for solitude or a primitive and unconfined type of recreation; such areas may also contain ecological, geological, or other features that have scientific, scenic, or historical value.

The North Algodones Dunes Wilderness Area, designated by Congress in 1994, is located approximately 7 miles southeast of the West Chocolate Mountains REEA (Figure 3.16-1) and encompasses nearly 26,000 acres of large sand dunes that provide a habitat for such sensitive species as the flat-tailed horned lizard, desert tortoise, Colorado desert fringe-toed lizard, and Andrew's dune scarab beetle (*Pseudocotalpa andrewsi*) (BLM, n.d.).

Lands with wilderness characteristics are within the spectrum of public land resource values and uses that the BLM manages under the FLPMA. Under Section 201 of the FLPMA, the BLM is required to maintain inventories of public land resources, including wilderness characteristics, to help make informed decisions regarding their management. If wilderness

characteristics exist, they must be considered along with other multiple use values and uses in land use planning and project level decisions. Public lands with wilderness characteristics:

- Have at least 5,000 acres of land or of sufficient size as to make practicable an area's preservation and use in unimpaired condition;
- Have been primarily affected by the forces of nature, with the imprint of humans substantially unnoticeable;
- Have outstanding opportunities for solitude or a primitive and unconfined type of recreation; and
- Potentially contain ecological, geological, or other features of scientific, educational, scenic, or historical value.

All public lands within the California Desert District, including the West Chocolate Mountains REEA, were originally inventoried and summarized in a comprehensive 1979 Wilderness Inventory conducted under Section 603 of the FLPMA. At that time, lands that had wilderness characteristics were designated as Wilderness Study Areas. The REEA (which did not have wilderness characteristics in 1979) was reviewed to determine if conditions had changed sufficiently in the 32 years since the original inventory to warrant a formal update to the wilderness characteristics inventory. This preliminary review determined that wilderness characteristics are still clearly lacking in the West Chocolate Mountains REEA. Given the fragmented land ownership pattern in the REEA, only the southeastern corner of the planning area contains a 5,000-acre (or more) block of contiguous BLM land. However, the Niland-Glamis Road bisects this part of the REEA. Thus, no roadless areas approaching 5,000 acres exist within the REEA. Because this size criterion is not met, wilderness characteristics clearly do not exist on the lands affected by the project, so they will not be further inventoried for or analyzed in this document.

3.16.3.2 Areas of Critical Environmental Concern

The BLM uses the ACEC designation to highlight public land areas where special management attention is necessary to protect and prevent irreparable damage to important historical, cultural, and scenic values; fish or wildlife resources; or other natural systems or processes. The ACEC designation may also be used to protect human life and safety from natural hazards. The BLM identifies, evaluates, and designates ACECs through its resource management planning process. Allowable management practices and uses, mitigation, and use limitations, if any, are described in a management plan prepared specifically for each ACEC.

Approximately 1 mile north of the West Chocolate Mountains REEA is the Dos Palmas Preserve ACEC (Figure 3.16-1). Within its 15,000 acres are hundreds of fan palms surrounding artesian springs and many unique biological and cultural resources. The ACEC contains habitat for special-status species, including the desert pupfish, Yuma clapper rail, California black rail, flat-tailed horned lizard, yellow bat, and the Palm Springs pocket mouse. Cultural resources include Native American archaeological sites focused around the shorelines of ancient Lake Cahuilla, historic grave sites, the Bradshaw Trail, and the associated Dos Palmas stage stop (State of California 2009).

Less than 10 miles north-northeast of the West Chocolate Mountains REEA is the Chuckwalla Desert Wildlife Management Area (DWMA) ACEC (Figure 3.16-1). The BLM established the Chuckwalla DWMA ACEC to protect the federally listed desert tortoise and 38 special status plant and animal species. This region historically contained some of the highest known densities of desert tortoises in California, prompting the USFWS to designate the area as critical habitat for the desert tortoise. In addition to its importance to the desert tortoise, the ACEC contains some of the best developed and most diversified Sonoran Desert flora in California (BLM 2008).

3.16.3.3 Special Recreation Management Areas

An SRMA is an area of land that is under BLM management that is typically 1,000 acres or more, and has been identified as having the potential for high public use and/or cultural/natural resources management. The SRMA designation is outside of the NLCS is used for internal BLM administrative and budgetary considerations.

Special recreation permits are required for specific recreational uses of BLM managed public lands and waters, and are issued to protect natural and cultural resources, and accommodate commercial recreational uses. Recreational uses requiring a special recreation permit are authorized by the Land and Water Conservation Fund Act.

The northern extent of the ISDRA is adjacent the southern portion of the West Chocolate Mountains REEA and contains open areas for OHV use just south of the REEA (Figure 3.16-1). The ISDRA may be used by people for recreational purposes such as off road vehicle use, hiking, and camping. There are no other SRMAs near the REEA.

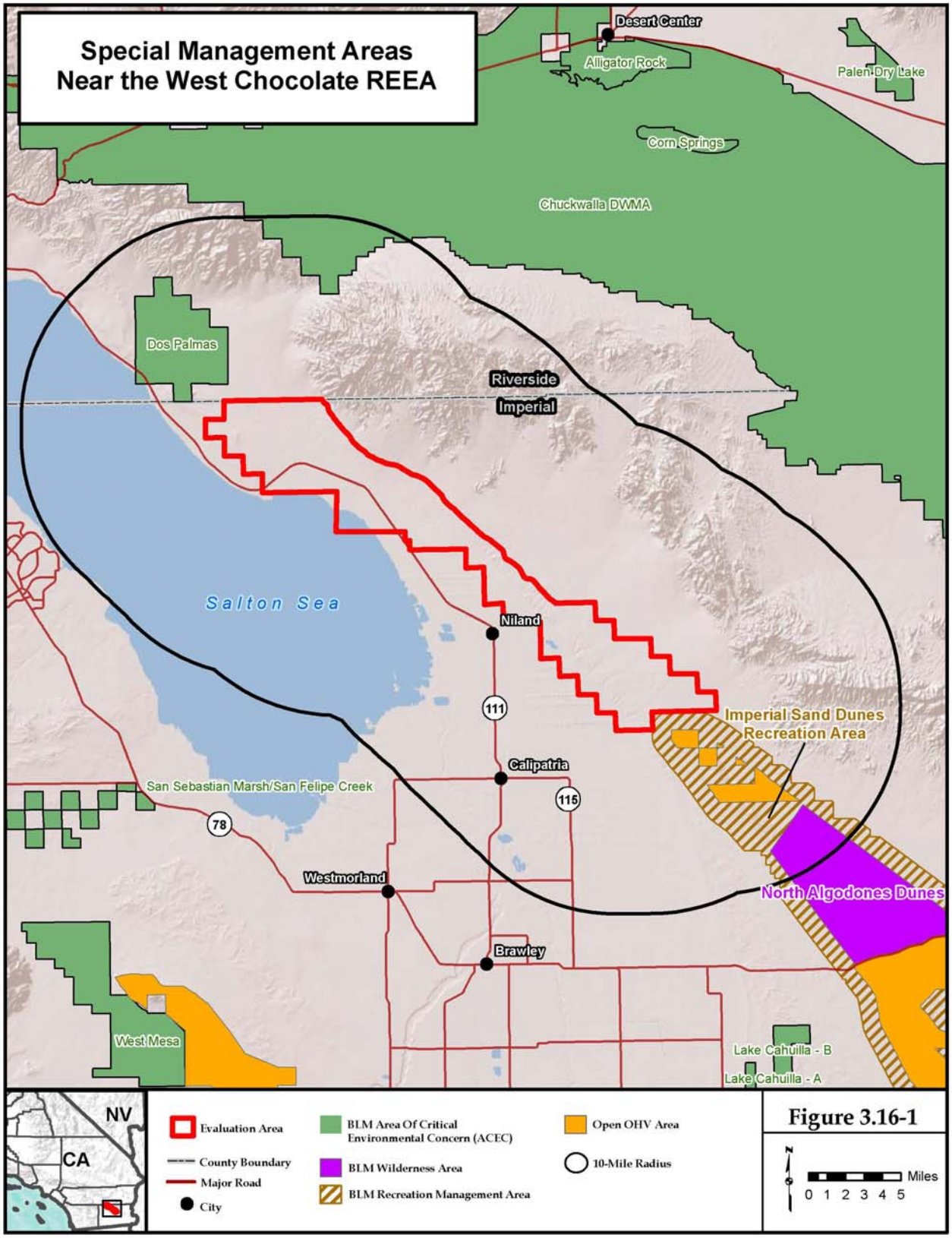
Special Management Areas
Near the West Chocolate REEA
Desert Center
Alligator Rock
Palen Dry Lake
Corn Springs
Chuckwalla DWMA
Dos Palmas
Riverside
Imperial
Salton Sea
Niland
111
Imperial Sand Dunes
Recreation Area
Calipatria
115
San Sebastian Marsh/San Felipe Creek
78
Westmorland
North Algodones Dunes
Brawley
West Mesa
Lake Cahuilla - B
Lake Cahuilla - A
NV
CA
Evaluation Area
County Boundary
Major Road
City
BLM Area Of Critical Environmental Concern (ACEC)
BLM Wilderness Area
BLM Recreation Management Area
Open OHV Area
10-Mile Radius
Miles
0 1 2 3 4 5

Figure 3.16-1

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3.17 Social and Economic Conditions

This section discusses potentially affected social and economic resources in the West Chocolate Mountains REEA. During the scoping period, meetings were conducted with the public and government agencies to identify their concerns. The following issues related to social and economic conditions were raised during scoping: how renewable energy would increase the commerce or economic development in the region, the costs and benefits, costs to cover mitigation and/or operation, and maintenance, and how the proposed plan would be funded. These comments are addressed in Section 3.17.3, Existing Conditions, and in Chapter 4, Effects Analysis, Section 4.17.

3.17.1 Definition of the Resource

The West Chocolate Mountains REEA is located east of the Salton Sea, along the western border of the CMAGR, comprising approximately 37,000 acres of primarily flat, desert terrain. Public lands in this area include those managed by the BLM, the USFWS, and the CSLC, although much of the area is privately held.

For the purposes of this analysis, the social and economic West Chocolate Mountains REEA is considered to include those counties and communities within a one-hour drive from the proposed management area on mapped roads. This area is considered to be an acceptable commuting distance for workers associated with the proposed plan, as well as the communities reasonably assumed to be socially and economically tied to the proposed management area. The social and economic REEA ranges from the Coachella Valley in eastern Riverside County in the north, to much of the agricultural area of the Imperial Valley, located in eastern Imperial County to the south. The communities included in the analysis presented here include Coachella, Indio, La Quinta, and Mecca in Riverside County; and Niland, Calipatria, Westmorland, Brawley, Imperial, El Centro, Heber, Holtville, and Calexico in Imperial County.

3.17.2 Applicable Plans, Policies, and Regulations

There are no applicable plans, policies, or regulations for social or economic resources; however, an analysis under EO 12898, Environmental Justice (59 FR 7629), is required and discussed in Section 3.17.3.4.

3.17.3 Existing Conditions

As noted elsewhere (BLM 2007), the Coachella and Imperial valleys share a history linked to the creation of large-scale irrigation canals that brought water from the Colorado River for the purposes of establishing the agricultural sector in areas otherwise geographically and meteorologically primed for year-long activity due to a number of factors, including their mild winters. While agriculture is still present in both areas, the Coachella and Imperial valleys have changed over the decades into two culturally distinct regions with separate economic drivers.

Agriculture is still a primary economic driver in the Imperial Valley, with the vast majority of land devoted to agricultural production. Crop and livestock figures from 2008 note that the total gross agricultural production value was nearly $1.7 billion, with the primary commodities being cattle, alfalfa, and wheat (County of Imperial 2009). The local economy of the Imperial Valley is also linked strongly with federal, state, and local government, with the

presence of the NAF El Centro, Calipatria State Prison, and Centinela State Prison in the area, along with numerous local and county government positions located in the valley. Recently, retail trade has increased in the area with the establishment of the Imperial Valley Mall in El Centro, which attracts business from throughout Imperial County, as well as nearby areas of western Arizona and northern Mexico. The population has grown substantially over the past few decades due to the relative affordability of homes and increased employment opportunities in government, health care, and retail trade. More recently, however, the latest economic downturn has deeply affected the county, and Imperial County had the highest unemployment rate in the state at 29.2 percent in November 2009 (California Employment Development Department [EDD] 2009).

Agriculture forms the economic foundation for the Coachella Valley, and the area remains the primary date-growing region in the United States. Starting in the early 1900s, the Coachella Valley became a hub of agricultural activity due to the success of date farming, but it has since expanded to include a range of commodities including citrus, vegetable, and apiary crops. In 2008, the value of crops in the Coachella Valley was estimated at just over $500 million, which was approximately 53.8 percent of Riverside County's total crop valuation (Riverside County 2009a). Government employment is also an important source of jobs in Riverside County, but the Coachella Valley is arguably more known as a tourist and recreation destination due to the presence of Palm Springs, and many golf courses, spas, casinos, and annual cultural events that draw nonresidents as well as locals. While the population of Imperial Valley is predominately Hispanic and generally composed of young families, the Coachella Valley attracts a more diverse population, including retirees and others looking for a more recreation-oriented or leisurely lifestyle.

Alternative energy efforts in the Coachella and Imperial valleys have been dominated by wind and geothermal energy generation, respectively. Narrow valleys and high winds in the Coachella Valley have created a number of small areas with high wind energy potential. One of the largest wind farms in the State of California, the San Gorgonio Wind Farm, is located on the western edge of the Coachella Valley. In contrast, high wind speeds in the Imperial Valley are not common; however, the Imperial Valley is located in the Salton Trough, which is an area of geologic activity with underground water at sufficient temperature for geothermal application occurring relatively near the ground surface. As of early 2010, 16 separate geothermal plants were operating in Imperial County and nearly 350,000 acres had been identified as "known geothermal resource areas" (Summit Blue Consulting 2008). Due to approximately 350 days of sunshine in both valleys, the potential for efficient solar power generation is also present in the West Chocolate Mountains REEA and is a rapidly growing sector. Economically, these alternative energy efforts bring long-term, well-paying jobs to the area. However, the number of full-time employees is relatively small compared to other local sectors or as a ratio of jobs per developed acre considering the physical size of many alternative energy sites. Regardless, the alternative energy sector is growing in both the Imperial and Coachella valleys as land unsuitable for agriculture and/or recreation is transformed into sites for alternative energy generation.

3.17.3.1 Social Environment

In the Imperial and Coachella valleys, there are various communities of place and interest that interact in a variety of complex ways, among one another, with the BLM, and with private

industry. Such sociocultural entities can be tightly circumscribed geographically, in the case of small towns in the Imperial Valley, or widely distributed over the landscape as in the OHV enthusiast or environmentalist communities. Some of these groups obtain a sense of community from their physical proximity and frequent interactions; others get it from a shared world view, common interests, or experiences. This section describes both communities of place – the local towns within the social and economic West Chocolate Mountains REEA – as well as communities of interest: the OHV community, environmental protectionists, "snowbirds" in Slab City, military institutions, and economic development agencies.

Communities of Place

As discussed in Section 3.9, Cultural Resources, archaeological evidence suggests that a large Native American population once lived in the area surrounding the West Chocolate Mountains REEA. Lake Cahuilla, a large, prehistoric lake that was formed after the last ice age, was present in an area that encompasses the present-day Salton Sea and formed the centerpiece of life for the Kamia, Kumeyaay, and other Yuman-speaking people in the area. Those who lived in the area used the water resources from Lake Cahuilla for fishing. Lake Cahuilla desiccated around 1650 A.D. and much of the Native American population shifted either to the east and west, with a large proportion of former residents settling along the Colorado River. The 1650 desiccation of Lake Cahuilla was the final desiccation. There had been several before. The Native American population continued to use Imperial Valley extensively, though evidence for habitation sites in the area is lacking, it doesn't mean that the area wasn't used. Lithic scatters, hearth features and cleared circles are all found throughout the valley, under what was the maximum shoreline of Lake Cahuilla. Although Spanish exploration occurred throughout the region in the 16th and 17th centuries, exploration of the area surrounding West Chocolate Mountains REEA was generally intermittent as it was considered remote and difficult to access. The land that would eventually become Imperial County was ceded by Mexico to the United States in 1848. A year later, with the discovery of gold in California in 1849, American settlers began steadily migrating into or through the area. Between 1849 and 1860 an estimated 8,000 emigrants crossed the Colorado River on their way to California (Laflin 1998). Mining, farming, and commerce stayed relatively small scale in the Imperial Valley due to inefficient transportation in the area. By the end of the 1870s, however, railroads had been established throughout southern California, including an extension of the Southern Pacific Railroad near the southern end of the present-day Salton Sea. By 1904, the rail line had reached Calexico. As the rail line grew, small towns were established along the route to provide services and manage resources, including water needed for the steam engines. By the 1920s, routes that started out as planks laid out on moving sand were transformed into asphalt roads and a reliable road system across Imperial County and the Coachella Valley was established. Despite the presence of some effective transportation networks in the region, settlement was slow to take hold until a reliable water source could be found. In the 1890s, a group of investors and engineers began construction on a series of canals that would bring water from the Colorado River. Water was first delivered through the Imperial Canal in 1901.

Because of the creation of the canals, Imperial Valley quickly developed farming settlements and the population increased. In 1900, the Imperial Land Company was formed with the purpose of developing town sites in Imperial Valley (Henderson 1968). Imperial was the first town that was platted (1901), and other towns such as Silsbee, Holtville, and Brawley followed

in the next few years (Norris and Carrico 1978). In 1904, W.F. Holt and C.A. Baker purchased land south of Imperial and grew it into the town now known as El Centro (Dowd 1956). Niland was established in 1914. This network of settlements led to the establishment of Imperial County. The area had previously been part of San Diego County, but the inhabitants soon complained of having to travel long distances to reach the county seat (Henderson 1968). In 1907, El Centro was designated as the seat of the new county.

The Boulder Canyon Project Act of 1928 provided for the construction of a more direct route for water from the Colorado River. The project eventually resulted in the construction of Boulder Dam, Imperial Dam, All-American Canal, and Coachella Canal. By 1940, the new irrigation system was providing desilted water and hydroelectric power throughout the Coachella and Imperial valleys, providing the foundation for the agriculture-focused economy seen in the West Chocolate Mountains REEA today.

World War II brought General George S. Patton to the area in 1942 for maneuvers in terrain that simulated conditions in the North African deserts. After establishing Camp Young at Chiriaco Summit, Gen. Patton expanded the training area into the California-Arizona Maneuvering Area. During the war, bases were established throughout the area, including Camp Dunlap (near Niland) and an air station that would eventually become Naval Air Facility El Centro. The influx of the military had a profound effect on the region, with uniformed personnel, civilian support, and construction staff entering the area. It is estimated that one million troops had trained in the area by the time World War II had ended. The end of World War II meant the closure of some specialized training areas, but many military facilities remained operational throughout the Cold War and remain so today. As previously mentioned, the CMAGR continues to be used to test munitions and aerial bombing, while El Centro continues to provide support for the Joint Parachute Test Facility, Naval Aerospace Recovery Facility, National Parachute Test Range, and U.S. Air Force Space and Missile System Organization. It also serves as the winter training base for the Navy's Blue Angels demonstration team.

As noted above, the present-day communities within the Coachella and Imperial valleys are dissimilar in some ways, in that the two areas have attracted different types of residents in the last few decades. While both areas have seen a rise in population, the Imperial Valley has seen a sharp increase in the number of Hispanic residents and the area is strongly tied economically to the nearby Mexican retail hub of Mexicali. The Coachella Valley, on the other hand, has become a major tourist destination, attracting a multicultural mix of affluent retirees and families looking for relatively affordable housing with nearby luxury amenities within commuting distance of Los Angeles. Recreational activities and cultural events also vary by location, with sporting events (i.e., golf, minor league baseball, auto racing) and music events (i.e., Coachella Valley Music and Arts Festival) occurring in Coachella Valley, and recreational OHV use, Cattle Call Parades, rodeos (including the major Cattle Call Rodeo in Brawley), hunting, fishing, and birdwatching occurring in the Imperial Valley. Both areas attract visitors from nearby urban areas, including Los Angeles, San Diego, Yuma, and Mexicali (BLM 2007).

Population

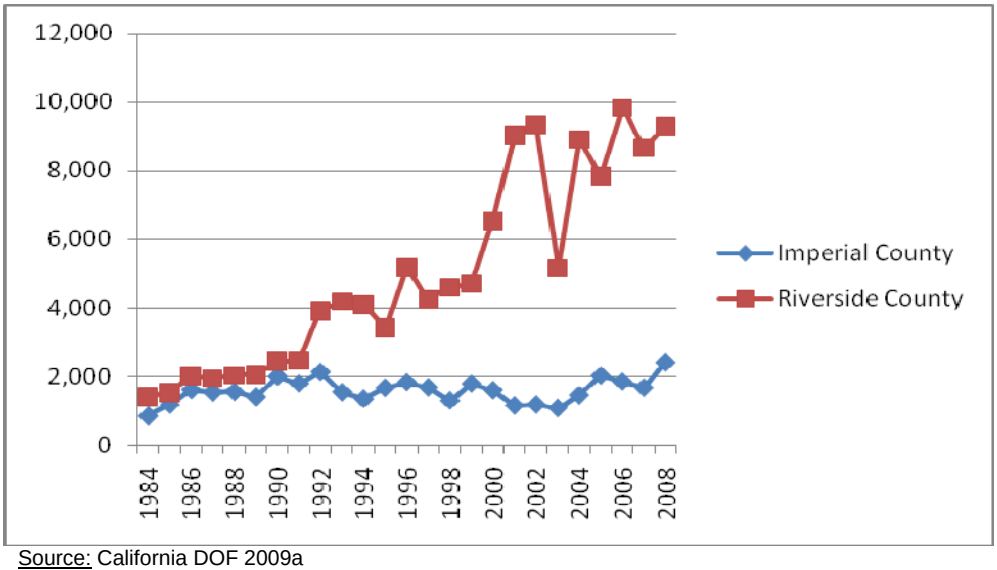
Population estimates and future population projections for the local and regional areas are summarized in Table 3.17-1 and 3.17-2. Information presented in Table 3.17-2, demographic data for individual communities can be largely interpreted as representative for the entire

Imperial Valley, as over 80 percent of the county population resides in the valley. For the Coachella Valley, demographic data were disaggregated from Riverside County data. The Coachella Valley makes up only a small part of Riverside County's population. Riverside County, Imperial County, and California data are included in the table for reference.

Both Imperial County and the Coachella Valley have seen rapid population growth in the last several decades. Since 1990, Imperial County has grown at a rate greater than California as a whole. The Coachella Valley has outpaced the State's growth rate and that of Imperial County. For the last quarter century, the population of the socioeconomic impact area has grown at a rate about three times faster than the State average.

Riverside County is the fourth most populous county in California. The population of Riverside County grew from 1,545,387 in 2000 to 2,107,653 in 2009, a 4.0 percent average annual increase, according to the California Department of Finance (DOF), a much faster rate than California as a whole. For Riverside County, the population increase was due, at least in part, to people relocating from Los Angeles and Orange counties in an effort to "escape the congestion and costs of the city" (Pritchard 2004). By 2005, 244 new people were moving to Riverside County per day. The growth continued into late 2010, when statistics from the California DOF showed that growth in Riverside County was almost equal between natural increase (i.e., births minus deaths) and net migration. Between 2000 and 2009, average annual growth was somewhat slower in Imperial County at 2.9 percent. The reasons for this growth in population during the 2000s can be attributed to a large amount of population growth in the Central Valley and Inland Southern California as a whole. For Riverside County, the population increase was due, at least in part, to people relocating from Los Angeles and Orange counties in an effort to "escape the congestion and costs of the city" (Pritchard 2004). By 2005, 244 new people were moving to Riverside County per day. The growth in Riverside and Imperial counties led to new residential housing developments and a sharp increase in home prices that typified the late 2000s in California (Veiga 2005). In 2008, a spokesman for the Riverside County Economic Development Agency described the reasoning for the population increase in areas outside of the primary urban centers of southern California: "Potential residents look for communities that are safe and offer a range of public and private schools, colleges and universities … Our geographic location and close proximity to lakes, beaches, mountains, deserts and affordable housing continue to make [Riverside County] a choice for new residents" (Begley 2008). It is assumed that the same drivers have led to increased population in Imperial County, as well.

It should be noted that immigration to Riverside and Imperial counties has also resulted in increases in population for these areas. Figure 3.17-1 presents a visual representation of legal immigration to Riverside and Imperial counties. Between 1984 and 2008, an average of 4,986 immigrants came into Riverside County, while 1,579 immigrants came into Imperial County. Total immigration numbers for Riverside and Imperial counties between 1984 and 2008 are 124,651 and 39,487 individuals, respectively. Unauthorized immigration statistics are typically not measured at the county level, but the rate of unauthorized immigration statewide has increased 3 percent from 2000 to 2009, with an estimated 10,000 unauthorized immigrants coming into California annually. While unauthorized immigrants come from a wide range of countries, including those in Central America, South America, and Asia, the vast majority (61.9 percent) of all unauthorized immigrants are from Mexico. The increase in unauthorized immigration from Mexico has increased 42 percent between 2000 and 2009 (Hoefer et al. 2010).



Source: California DOF 2009a

Figure 3.17-1 Legal Immigration, Riverside and Imperial Counties, 1984-2008

Population growth in Riverside County is expected to slow over the next few decades. The growth rate is projected to be 3.0 percent per year between 2010 and 2020, and then to fall to 2.1 percent per year between 2020 and 2030. Projected growth in Imperial County is anticipated to be somewhat slower than Riverside County, although generally higher than the State of California as a whole. Growth in both counties in the West Chocolate Mountains REEA is projected to slow by the year 2030.[2]

Table 3.17-2 shows the populations of the affected cities and communities in 2000 and 2009 for those with populations 1,000 residents or more, along with growth rates. The cities in Riverside County that experienced especially pronounced population growth between 2000 and 2009 are La Quinta (9.4 percent annually), Coachella (8.9 percent annually), and Mecca (8.6 percent annually). All of the Riverside communities together experienced an 8.3 percent growth rate. A majority of the Imperial County communities in the West Chocolate Mountains REEA grew less than 3 percent between 2000 and 2009; however, two communities grew at much faster rates than the county average. Calexico (5.0 percent) and Imperial (8.0 percent) outpaced all other communities in the REEA with Calexico adding the greatest number of people (12,228) during the time period.

[2] The population projections discussed above were made prior to the economic recession that began in 2008. It is possible these projections may be modified as a result of the economic recession or related events.

Table 3.17-1 Population Estimates, Projections, and Average Annual Growth Rates

	Jurisdiction		
	Riverside County	**Imperial County**	**California**
2000	1,545,387	142,361	34,105,437
2009	2,107,653	179,254	38,292,687
Avg Annual Growth Rate 2000–2009	4.0%	2.9%	1.4%
2010 Projection	2,239,053	189,675	39,135,676
Avg. Annual Growth Rate 2009–2010	6.2%	5.8%	2.2%
2020 Projection	2,904,848	239,149	44,135,923
Avg. Annual Growth Rate 2010–2020	3.0%	2.6%	1.3%
2030 Projection	3,507,498	283,693	49,240,891
Avg. Annual Growth Rate 2020–2030	2.1%	1.9%	1.2%

Sources: California DOF 2007; California DOF 2009a.

Table 3.17-2 West Chocolate Mountains REEA Communities Population Growth

Jurisdiction	2000	2009	Average Annual Change (2000–2009)
Coachella Valley, Riverside County			
Coachella	22,724	41,000	8.9%
Indio	49,116	82,230	7.5%
La Quinta	23,694	43,778	9.4%
Mecca	5,402	9,591[1]	8.6%
Coachella Valley Communities	100,936	176,599	8.3%
Imperial Valley, Imperial County			
Niland	1,143	1,431[1]	2.8%
Calipatria	7,289	8,108	1.2%
Westmorland	2,131	2,427	1.5%
Brawley	22,052	26,948	2.5%
Imperial	7,560	12,970	8.0%
El Centro	38,025	44,259	1.8%
Holtville	5,612	6,515	1.8%

Table 3.17-2 West Chocolate Mountains REEA Communities Population Growth

Jurisdiction	2000	2009	Average Annual Change (2000–2009)
Calexico	27,109	39,337	5.0%
Heber	2,988	3,741[1]	2.8%
Imperial Communities	113,909	145,736	3.1%

Source: California DOF 2009a; U.S. Census Bureau 2000a.

Note:
[1] Denotes communities where 2009 population was estimated by applying the average community growth for all tabulated communities in that county. County totals include these estimates.

Table 3.17-3 shows the proportion of males and females for all West Chocolate Mountains REEA communities, as well as the distribution of age groups and median age for the population. In general, the proportions of males and females, distributions of ages, and median ages across all REEA communities are relatively equal, except for Calipatria, which is dominated by males aged 18-49 due to the presence of Calipatria State Prison. The communities of Calexico and Heber have a slightly higher proportion of female residents compared to other REEA communities, but the distributions of ages among residents in these communities are relatively similar to other communities in Imperial County. The community of Holtville has the highest proportion of residents over 85 years old, while the communities of Niland and La Quinta have the highest proportion of residents over 65 (15.6 and 13.4, respectively). These two communities also have the highest median age of all communities in the REEA.

Table 3.17-3 West Chocolate Mountains REEA Communities Sex Distribution, Age Distribution, and Median Age (2000)

Jurisdiction	Sex		Age						Median Age
	Male	Female	Under 18	18-34	35-49	50-64	65-80	Over 80	
Coachella Valley, Riverside County									
Coachella	11,365	11,359	9,270	6,249	4,244	1,833	949	179	22.8
	50.0%	50.0%	40.8%	27.5%	18.7%	8.1%	4.2%	0.8%	
Indio	24,710	24,406	17,318	13,155	9,146	5,047	3,518	932	27.3
	50.3%	49.7%	35.3%	26.8%	18.6%	10.3%	7.2%	1.9%	
La Quinta	11,619	12,075	6,905	4,406	5,358	3,852	2,702	471	36.4
	49.0%	51.0%	29.1%	18.6%	22.6%	16.3%	11.4%	2.0%	
Mecca	3,042	2,360	2,152	1,634	954	463	161	38	22.6
	56.3%	43.7%	39.8%	30.2%	17.7%	8.6%	3.0%	0.7%	

Table 3.17-3 West Chocolate Mountains REEA Communities Sex Distribution, Age Distribution, and Median Age (2000)

Jurisdiction	Sex		Age						Median Age
	Male	Female	Under 18	18-34	35-49	50-64	65-80	Over 80	
Coachella Valley Communities	50,736	50,200	35,645	25,444	19,702	11,195	7,330	1,620	NA
	50.3%	49.7%	35.3%	25.2%	19.5%	11.1%	7.3%	1.6%	
Imperial Valley, Imperial County									
Niland	572	571	343	209	226	187	146	32	36.2
	50.0%	50.0%	30.0%	18.3%	19.8%	16.4%	12.8%	2.8%	
Calipatria	5,716	1,573	1,189	2,943	2,263	620	228	46	32.6
	78.4%	21.6%	16.3%	40.4%	31.0%	8.5%	3.1%	0.6%	
Westmorland	1,035	1,096	762	496	414	255	174	30	28.9
	48.6%	51.4%	35.8%	23.3%	19.4%	12.0%	8.2%	1.4%	
Brawley	10,855	11,197	7,598	5,122	4,606	2,606	1,629	491	29.7
	49.2%	50.8%	34.5%	23.2%	20.9%	11.8%	7.4%	2.2%	
Imperial	3,718	3,842	2,670	1,806	1,815	795	382	92	29.9
	49.2%	50.8%	35.3%	23.9%	24.0%	10.5%	5.1%	1.2%	
El Centro	18,594	19,241	12,716	8,887	8,204	4,499	2,757	772	30
	49.1%	50.9%	33.6%	23.5%	21.7%	11.9%	7.3%	2.0%	
Holtville	2,720	2,892	1,973	1,184	1,189	643	443	180	30
	48.5%	51.5%	35.2%	21.1%	21.2%	11.5%	7.9%	3.2%	
Calexico	12,629	14,480	9,464	6,068	5,679	3,083	2,342	473	29.2
	46.6%	53.4%	34.9%	22.4%	20.9%	11.4%	8.6%	1.7%	
Heber	1,426	1,562	1,041	716	606	358	232	35	29.3
	47.7%	52.3%	34.8%	24.0%	20.3%	12.0%	7.8%	1.2%	
Imperial Communities	57,265	56,454	37,756	27,431	25,002	13,046	8,333	2,151	NA
	50.4%	49.6%	33.2%	24.1%	22.0%	11.5%	7.3%	1.9%	

Housing

Permanent Housing

Table 3.17-4 presents the housing resources in Riverside and Imperial counties. In 2008, the West Chocolate Mountains REEA communities in Riverside County had 58,123 total housing units, with a vacancy rate of approximately 19.8 percent. The REEA communities in Imperial County had a vacancy rate of 5.6 percent, lower than Imperial County as a whole (11.0 percent) and the Riverside County communities. Among the cities in Riverside County relevant

to the REEA, La Quinta had the highest vacancy rate (28.5 percent) and the highest number of vacant units at 6,085. Among the cities in Imperial County relevant to REEA, El Centro had the highest vacancy rate in 2008 (6.7 percent), as well as the highest number of vacant units (961).

The California EDD data from 2008 were collected and tabulated before the nationwide recession that emerged in 2008 and carried through 2009. As such, the data presented in Table 3.17-4 show information that changed dramatically after its publication. While no new data exists from the California DOF that shows the impact the recession had on housing, vacancy rates, or total housing units, there is some evidence that suggests that vacancies increased as foreclosures increased in both Riverside and Imperial counties. Press reports from the region suggest that the Inland Empire region was one of the first areas to experience an increase in home foreclosures, so information from 2008 does capture some of the impact of the recession (Berkman 2008a, b). However, the rate of foreclosures increased throughout 2009 to the point that one in every 27 homeowners in Riverside County had defaulted on their mortgages by the first quarter (Day 2009). The AP Economic Stress Index, which computes a value based on the unemployment rate, bankruptcy, and foreclosure rates, rated Imperial County as the most stressed county in the nation in December 2010, with 28.3 percent unemployment, 4.1 percent of homes in foreclosure, and 1.69 percent of residents in bankruptcy (AP.org 2011).

Table 3.17-4 West Chocolate Mountains REEA Housing Characteristics, 2008

Jurisdiction	Total Housing Units (Occupied and Vacant)	Single-Family	Multi-Family	Mobile Homes/Other	Vacancy Rate of All Housing Units
Riverside County	780,112	564,836	128,592	86,684	13.1%
Coachella	8,873	6,642	1,774	457	4.4%
Indio	27,899	19,291	5,380	3,228	18.0%
La Quinta	21,351	19,169	1,925	257	28.5%
Mecca[1]	1,058	526	428	104	0.0%
Riverside Communities Total[2]	58,123	45,102	9,079	3,942	19.8%
Imperial County	56,237	36,574	11,786	7,877	11.0%
Niland[1]	528	221	0	307	18.6%
Calipatria	1,158	790	305	63	6.6%
Westmorland	757	460	257	40	6.1%
Brawley	8,654	5,968	2,231	455	5.8%
Imperial	4,121	3,637	450	34	3.4%
El Centro	14,343	8,363	4,662	1,318	6.7%
Holtville	1,891	1,255	441	195	3.3%
Calexico	10,181	7,529	2,447	205	2.4%
Heber[1]	754	519	84	151	2.9%
Imperial Communities[3]	42,391	28,002	10,793	2,310	5.6%
California	13,530,719	8,720,779	4,213,013	596,927	5.9%

Sources: California DOF 2009b; U.S. Census Bureau 2000b.

Notes:

1 Denotes communities for which 2000 data were used.
2 Does not include housing counts for Mecca.
3 Does not include housing counts for Niland and Heber.

Temporary Housing

Temporary housing would likely be used by the project's temporary construction workers and a small proportion of operational workers. Temporary housing in the form of hotel/motel rooms is present throughout the two counties of the West Chocolate Mountains REEA, typically concentrated in major urban areas or near major transportation nodes. For the purposes of this analysis, only those hotels in the closest population center were tabulated under the assumption that construction and operations workers would congregate to this area for commuting ease. There are approximately 2,700 guest rooms among 50 hotels and motels in the social and economic REEA, with substantial additional temporary housing available in the communities within two hours of the REEA. Additional temporary housing opportunities are available in the form of recreational vehicle facilities, mobile home sites, and campgrounds. Also, permanent housing includes rentals as well as owner-occupied units. As shown in Table 3.17-4 above, vacancy rates are high in the Riverside County portion of the REEA.

Communities of Interest

OHV Community

Interest in OHV recreation surged following World War II as surplus military jeeps became available for private purchase (BLM 2010). While little formal information is available regarding the history of OHV use in the vicinity of the West Chocolate Mountains REEA, it is clear that OHV use grew rapidly throughout the United States during the second half of the 20th century. Specifically, the number of OHV recreationists in the nation increased from just over 5 million in 1979 to 28 million by the late 1990s (Bowker et al. 1999). Moreover, between 1990 and 2006, California's population increased 14 percent, whereas registered OHVs increased 60 percent and highway-registered four-wheel-drive vehicles increased 1,342 percent (ICF International 2006). As of 2007, there were 1,135,000 off-highway registered OHVs and 4,134,000 highway registered four-wheel-drive vehicles in California (California Department of Parks and Recreation 2009).

Formal and informal riding opportunities in the vicinity of the West Chocolate Mountains REEA draw riders from throughout southern California. Formal recreation areas in the vicinity of the REEA include ISDRA, Ocotillo Wells State Vehicular Recreation Area, and Heber Dunes State Vehicular Recreation Area. Informal riding areas are parcels of land that have historically been used for riding but have no formal designation as an OHV riding area. During fall and winter holiday weekends, riding areas are known to receive hundreds of thousands of visitors (Steffen 2009; Jones 2009). These large groups of family and friends tend to trailer camp for a few days and throughout their visit spend time riding, socializing, and barbequing or picnicking. OHV riding in the vicinity of the REEA typically drops off significantly during the spring and summer due to soaring daytime temperatures. OHVs that are used in the vicinity of the REEA include all-terrain vehicles (ATVs), off-highway motorcycles (dirt bikes), dune buggies, sand rails, side-by-sides, and four-wheel drive vehicles (such as sport utility vehicles and trucks).

The local business community has a keen interest in OHV recreation in the vicinity of the West Chocolate Mountains REEA due to the revenue generated by OHV recreationists for restaurants, motels and campgrounds, service stations, and OHV-related businesses. The importance of the economic contribution of OHV recreation in the vicinity of the REEA is substantial enough that organizations have been created to promote local businesses to OHV

riders (Imperial Valley Off-Road Vehicle Association, United Desert Gateway). These organizations have a stake in maintaining OHV recreation opportunities in the vicinity of the REEA.

Environmental Groups and Non-Governmental Organizations (NGOs)

While the origin of the environmentalist movement can arguably be traced back to medieval times, during which various rulers proscribed responsible natural resource use and/or protection due to public health concerns, the movement's modern origins can most closely be traced back to the middle of the 19th Century. Starting roughly with the publication of Henry David Thoreau's *Excursions* and *Walden, or Life in the Woods in the 1850s*, conserving and protecting earth's natural resources has become increasingly important to a growing number of people over the last 150 years. By 1892, John Muir helped start the Sierra Club in California, which quickly lobbied to create Yosemite National Park and then the National Park Service by 1916. Throughout the 20th Century, environmentalists were integral in efforts to help save threatened wildlife (with mixed results), including the American bison and the passenger pigeon. In the decades immediately following World War II, the environmentalist movement began to combine the conservationist ideals typified by Thoreau, Muir, and other early environmentally minded thinkers with activism that involved wide-scale lobbying, advertising, book and leaflet publishing, and letter-writing campaigns. By the end of the 1970s, the Sierra Club was just one in a host of other activist organizations raising awareness regarding air pollution, water pollution, natural resource use, and animal protection, including Greenpeace (est. 1971) and the World Wildlife Fund (est. 1961).

As concerns for the natural environment and how pollution may affect human health became more prevalent in society, the federal government took a number of steps to understand, manage, and even mitigate human impacts to the environment, including the passage of NEPA in 1969, the establishment of the EPA in 1970, the signing of the ESA in 1973, and the formation of the Convention of International Trade in Endangered Species of Wild Fauna and Flora in 1975. In the 1980s, a "hole" in the ozone layer was discovered, attracting the attention of environmentalists and national governments worldwide, eventually resulting in the ratification of the Montreal Protocol in 1987, which phased out and/or limited the use of nearly 100 ozone-depleting chemicals. More recently, the environmentalist movement has been associated with raising awareness regarding global warming/global climate change, arguing for more sustainable natural resource use and a lowering of anthropogenic carbon emissions by reducing dependency on fossil fuels.

"Snowbirds" and Slab City

Slab City is a small settlement approximately three miles east of Niland, primarily composed of recreational vehicles (RVs) and trailers, tents, and a few semi-permanent mobile homes. The community is located directly in the West Chocolate Mountains REEA and is the only true population concentration within the REEA boundary. Slab City is specifically a destination for "snowbirds," or retirees who regularly travel from colder latitudes to more temperate areas during the winter months, typically from October to April. The permanent population of Slab City is approximately 100 to 150 people, although the population can swell to approximately 4,000 during the winter months. These population figures are only rough estimates, however, since the very nature of the community is based upon a transitory lifestyle.

While technically a Community of Place due to the community's circumscribed geography, the residents of Slab City are considered in this analysis as a Community of Interest due to the seasonal nature of many residents, and a lifestyle suggesting a shared cultural value system based on freedom, independence, mutual respect, and liberty (in its most literal sense). As described in 1988, "Almost everything about Slab City runs contrary to the normal patterns of modern, civilized communities. There are no property taxes, no land ownership, no rent, no sales tax, no building codes, no sewer or water system, no electricity, no paved streets, no mail delivery, no telephones, no elected officials, no jails, and no work. There *are* organized horseshoe games" (Hartwigsen and Null 1991:134-135; quoting Sorensen 1988).

The land on which Slab City is located is officially owned by the State of California and is considered Section 36 land, the revenue of which is used to help fund the state teachers retirement fund. During World War II, the land transformed into the previously mentioned Camp Dunlap and was used to train artillery specialists. The base had an estimated 30 buildings and over 8 miles of paved road, but was ultimately dismantled in 1956. The buildings and supporting infrastructure were removed, leaving behind only concrete slabs and the paved road network. The slabs, paved roads, warm weather, and proximity to basic supplies like water and food in nearby Niland attracted individuals in their RVs who appreciated the presence of basic amenities without having to pay fees. The area grew in popularity over the decades with the Snowbird community and others looking for freedom from their daily lives, privacy, and independence. Literature on Slab City suggests that there are four primary types of residents present in Slab City: (1) "bush bunnies," who are permanent residents that live south of the concrete slabs in an area predominantly wooded with creosote and palo verde trees and are generally in extreme poverty; (2) families who have established more permanent residences on the slabs and have a steady stream of income; (3) migrant farm laborers who live in Slab City seasonally when they are harvesting nearby crops; and (4) snowbirds, who are typically financially secure retirees from northern states or Canada (DuBry 2001). The New York Times noted that the residents of Slab City, particularly the seasonal snowbirds, "are mostly single, divorced or widowed – a whole generation on the road, independent, alone. In this place, to be 55 years old is to be young" (LeDuff 2004).

Slab City residents interviewed for previous projects have noted that, despite the different types of residents, shared values regarding privacy and independence, and the transitory nature of the community itself, Slab City has a highly developed sense of community. An anonymous resident stated, "There's a sense of community that America is sadly missing, in most instances, that happens right here. Most people would give their eyeteeth for that sense of community" (Journeyman Pictures 2002). There is a bulletin board advertising events and items for sale, as well as a free library stocked with books abandoned and/or donated by seasonal residents before making their way back north. An informal golf course, whimsically named the Gopher Flats Country Club, has also been created in the sandy dirt surrounding Slab City. In addition to socializing, activities in Slab City include fishing in the nearby canals, visiting a nearby hot spring, semi-regular musical events, an almost perpetual swap meet, and the Slab City Talent Show and potluck, held annually on the last Saturday in January (Desertdutch.org 2010). These activities are generally enjoyed more during the winter months by visiting snowbirds. Food, water, and other various necessities are typically purchased in Niland, Brawley, or El Centro, depending on availability, with many people receiving their mail at post office boxes in Niland.

Any description of Slab City would be incomplete without a short description of Salvation Mountain, which is a large, adobe mound at the entrance of Slab Mountain decorated with Christian imagery and evangelistic messages. Salvation Mountain is the creation of Leonard Knight, a former Vermont farmer who claims that he was compelled in the 1980s to, "proclaim himself a sinner and to ask Jesus into his heart." After some failed attempts, construction on the current Salvation Mountain was begun in 1990 and the monument has been continually added to ever since, as Leonard Knight accepts monetary and food donations (much of which he donates elsewhere), as well as paint, from visitors who are emotionally moved by his landmark. As described in a recent magazine article, "The centerpieces of the mountain are the giant red and pink words, 'God is Love,' and, underneath them, a huge red heart with, 'Jesus I'm a Sinner. Please Come Upon My Body, and Into My Heart.' Painted flowers, trees and waterfalls are interspersed on the artwork with biblical verses and messages" (Olson 2008).

Military Institutions

As mentioned above, NAF El Centro is located near the West Chocolate Mountains REEA in the Imperial Valley. Originally the site of the Imperial County airport, the Navy leased the facility for use as a Marine Corps Air Station in 1942. For the first 35 years, the El Centro facility was devoted to aeronautical escape system testing, evaluation, and design. In 1947, the first of a series of parachute divisions joined the air base. Starting with the Parachute Experimental Division, the program was expanded in 1951 to include not only the Naval Parachute Unit, but the Air Force's unit as well. In 1973, the U.S. Naval Aerospace Recovery Facility was combined with El Centro to form the National Parachute Test Range. In 1979, the parachute test mission was transferred to China Lake, but NAF El Centro continued to provide a range of services.

Services provided include flight operations, logistics, billeting, messing, hangars, ramps, aircraft parking space, administration and supply transport. Every month, 7 to 12 squadrons and up to 1,600 personnel train in El Centro. The warm weather, proximity to the CMAGR and a relative scarcity of commercial flight traffic has resulted in NAF El Centro becoming a key training facility. The facility has two operating runways, as well as areas that simulate carrier deck landings used for training. The facility is used as a divert base by ships near San Diego, as well as other units in the southwestern United States. Finally, NAF El Centro is the winter training base for the Navy's Flight Demonstration Squadron, the "Blue Angels." The number of flight operations (landings and take-offs) exceeded 167,000 in 1999. Flight operations on a typical day reach over 450 (GlobalSecurity 2010).

NAF El Centro is a major economic driver in the immediate region, as many of the 1,600 annual personnel that come through the facility are dependent on lodging, car rental, food, and entertainment provided by local businesses. The resulting economic impact has significant benefits to the surrounding communities. In 2006, NAF El Centro operations generated over 1,300 jobs and $22.9 million in employee compensation within Imperial County. In 2006, NAF El Centro purchased approximately $31.5 million in goods and services from Imperial Valley businesses in support of annual base operations and maintenance. In addition to these economic benefits, NAF El Centro also provides a range of community services, including donations to area charities, chaplain services for state and federal facilities, Color Guard services for ceremonies and burials, training for local law enforcement entities, firefighting assistance, and open classes available to community members at Vincennes University (NAFEC 2007).

As previously mentioned, NSW Camp Billy Machen is located in CMAGR SWAT 4 adjacent to the West Chocolate Mountains REEA. This training facility and the associated ranges are the busiest NSW training facilities in the western United States and are key and essential to NSW's overall training continuum. NSW first established a training presence at this location in 1966 and constructed the first training support facility in 1970. The current Desert Operations Facility opened in 1995. Additional training support facilities are programmed for construction in 2014. NSW forces train on a variety of live-fire ranges throughout SWAT 4 (29 currently, planned to increase to at least 32 during the next few years). There is active training approximately 350 days of each year. Average loading is approximately 100 personnel, with peaks up to 250. As previously noted, NSW training includes: (1) small arms marksmanship; (2) automatic weapons firing; (3) reconnaissance; (4) sniper weapons; (5) static and projectile explosives; and (6) small unit live fire and maneuver.

It should be noted that Marines from the Marine Corps Installations West also use areas near the West Chocolate Mountains REEA for military training exercises, although the physical locations of the Marine Corps installations that comprise the West region are not within the REEA and include: Marine Corps Base (MCB) Camp Pendleton, Marine Corps Air Station (MCAS) Miramar, Marine Corps Air Ground Combat Center (MCAGCC) 29 Palms, Marine Corps Logistics Base (MCLB) Barstow, MCAS Camp Pendleton, MCAS Yuma, and Marine Corps Mountain Warfare Training Center Bridgeport.

Economic Development Agencies

A wide range of entities within the West Chocolate Mountains REEA are interested in the economic development of the Coachella and Imperial Valley regions. These include the Imperial Valley Economic Development Corporation (IVEDC), local chambers of commerce throughout the region, the Imperial Valley Vegetable Growers Association (IVVGA), and the IID, which is a consumer-owned utility that provides water and electrical power throughout the REEA and is involved in many aspects of economic development.

As described by the IVEDC, the corporation "is a partnership of private enterprise and local government that is united by the common vision of expanding and diversifying our economy." Those businesses and individuals with an investment in the corporation include a wide range of entities that benefit from growth in Imperial County. A primary activity of the IVEDC is marketing the Imperial Valley to outside businesses in an effort to attract investment and additional economic growth. The organization also provides its investors with access to economic forecasting and market analyses, financial guidance, and assistance in workforce development, among other services. The top eight growth industries identified by the IVEDC include: renewable energy, construction materials, logistics, call centers, manufacturing, tourism, biotechnology, and agribusiness (IVEDC 2007).

Some of the communities within the West Chocolate Mountains REEA have local chambers of commerce that, in general, provide a range of services to their members. These organizations promote the businesses of the local community, provide networking opportunities for local business owners, and represent the interests of business with the local, county, state, and federal governments. These organizations also tend to sponsor community events, promote area businesses through marketing, and seek to expand the economic growth of their community by attracting additional businesses to the area. In the months after the Easter Earthquake on April 4,

2010, local chambers of commerce in communities affected by the quake provided information about business openings and closures within their communities. Those chambers of commerce within the REEA include:

- Coachella Chamber of Commerce;
- Indio Chamber of Commerce;
- La Quinta Chamber of Commerce;
- Niland Chamber of Commerce;
- Calipatria Chamber of Commerce;
- Brawley Chamber of Commerce;
- Calexico Chamber of Commerce;
- Imperial Chamber of Commerce;
- El Centro Chamber of Commerce; and
- Holtville Chamber of Commerce.

As described below, the agricultural industry is one of the primary economic drivers in the Riverside and Imperial County economies. While agricultural organizations in the area may belong to some of the above-mentioned chambers of commerce, the IVVGA is meant to represent, maintain, and improve the produce industry. Like chambers of commerce, the IVVGA also represents the interests of its membership with the government on issues that affect growers. The IVVGA was originally founded in 1968 to battle labor strikes in the lettuce and melon fields of the Imperial Valley but has since evolved into an association that is actively involved in issues such as labor, water transfers, environmental protection, and public education (IVVGA 2010).

Finally, the IID is a consumer-owned irrigation district and energy utility that provides water and power to approximately 145,000 residential, commercial, and industrial customers in the Coachella and Imperial valleys. The IID provides water to over 450,000 acres of farmland in the region. The IID has approximately 1,400 employees throughout Riverside and Imperial counties and has become the sixth-largest consumer-owned utility in California. While the IID is not technically considered a development agency, the IID does actively structure its business operations with regards, "for the sustained benefit of the regional economy…" The IID states that, "IID has played a leadership role in helping to develop both the Imperial and Coachella Valleys. With low electric and water rates, an abundance of natural resources, a capable workforce and a close proximity to the boarder [sic], this region has turned into a destination for business and industry of all kinds." Originally established in 1911 to acquire properties of the California Development Company (and its Mexican subsidiary), by 1922 the IID had acquired 13 mutual water companies. Agreements between the Coachella Valley and the IID eventually led to the construction of the All-American Canal to provide water to parts of Riverside County. Hydroelectric power generation capabilities were incorporated into the construction of the All-American Canal. Combined with other projects, such as the construction of Imperial Dam, the IID became an electric utility as well as the primary water utility for the region in the mid-20th century. Beyond delivering water and power, the IID is involved with the community in a variety of ways, including: providing monetary grants to community and nonprofit organizations;

sponsorship of community, cultural, and business development events; and advertising community events in district publications (IID 2006).

Social Attitudes and Values

Communities of Place

Table 3.17-5 presents a summary of the values, goals, and attitudes shared by communities, counties, and governmental institutions within the West Chocolate Mountains REEA. In many cases, the language provided in the table is directly from planning documents or official statements provided by the municipality regarding community values. In general, the values for the communities (and surrounding counties) are concerned with sustainable development, smart growth, retention of agricultural lands, protection of natural and cultural resources, and maintaining a safe, "small town" character. While no communities officially provided formal comments during the public scoping process, it is assumed that alternative energy development would be encouraged by most, if not all, of the communities within the REEA due to the economic activity and population growth that can accompany new facilities. Of course, if the construction and operation of multiple facilities at the same time results in growth exceeding forecasted estimates, and public services are stressed beyond their capacity, impacts to public safety, transportation, and community services (e.g., schools) may result. Impacts may be exacerbated if alternative energy developers are provided with tax breaks that ultimately result in a decreased amount of money provided to municipalities to improve public services and manage growth.

Table 3.17-5 Community Attitudes and Values

Jurisdiction	Attitudes and Values
Riverside County	• As noted in the Riverside General Plan, the first value listed is, "Community: Riverside County is a community within which a family of local communities exists. "Family" means that we treat each other with the compassion and respect that one rightfully expects of family members. The richness of our natural setting is a shared resource of inestimable value. Despite differences in priorities and approaches, we are engaged in community building for ourselves and our heirs based on the common ground we have forged." • Other values include: inter-relatedness, governmental and human rights, responsibilities, risk, diversity, valued contributions, varied communities, balance, participation, volunteerism, decision making, creativity and innovation, distinctiveness, housing, natural environment, man-made environment, employment, safety, communication, quality management, sustainability, costs, governmental cooperation, and youth in the community (Riverside County 2003).
Coachella	• Coachella characterizes itself as having a, "small town atmosphere, [and] big city advantages." • Recent fiscal challenges for the Coachella government have created an increased value for fiscal responsibility and have led to a recent measure to increase utility taxes to cover the cost of some public safety and other city services (City of Coachella 2010). • Recent planning efforts for the city have stressed "smart planning," and an increase of neighborhood schools (City of Coachella 2008).

Table 3.17-5 Community Attitudes and Values

Jurisdiction	Attitudes and Values
Indio	• "The City of Indio, with the involvement of its citizens, promotes its cultural and ethnic diversity, cares for its children and their future, seeks investment and economic development to create local jobs and a vibrant economy, and provides quality services" (City of Indio 2010).
La Quinta	• The City of La Quinta presents itself as a major leisure destination in the Coachella Valley featuring over 20 golf courses, as well as the historic La Quinta Resort and Club and other hotels and resorts. "The city embraces art and culture, offering the La Quinta Arts Festival, live theatre by the La Quinta Playhouse, and a variety of beautiful public art pieces," notes the official city website (City of La Quinta 2010).
Mecca	• Mecca is an unincorporated community that has experienced a large amount of growth in recent years and is a major agricultural area in Riverside County. Since the economy of the community is tied strongly to agriculture, attitudes and values regarding development and growth are influenced strongly by how individual projects and cumulative impacts may affect agricultural land uses and water.
Imperial County	• Imperial County values a balance of land uses, which seek to maintain the "quality of life" in the region (County of Imperial 1993). • The County of Imperial supports and encourages, "the full, orderly, and efficient development of geothermal/alternative energy resources while at the same time preserving and enhancing where possible agricultural, biological, human, and recreational resources;" "Geothermal/alternative energy operations will be required to efficiently utilize water;" "The County will actively minimize the potential for land subsidence to occur as a result of geothermal/alternative energy operations;" "Every effort will be made to maximize economic, fiscal, and social benefits and minimize negative impacts of geothermal resource development" (County of Imperial 2006).
Niland	• Niland is an unincorporated community strongly tied to the agriculture industry in Imperial County. Since the economy of the community is tied strongly to agriculture, attitudes and values regarding development and growth are likely influenced strongly by how individual projects and cumulative impacts may affect agricultural land uses and water. It is also likely that the scenic vistas of the surrounding mountains present around Niland are valued highly by the local community, including seasonal residents.
Calipatria	• According to the city's official website, "Calipatria has a small town flavor; it is friendly and enjoys a multi-cultural ambience that is enjoyed by all. Located 50 miles north of the Mexico border, short drives from San Diego, Palm Springs, Los Angeles and the Colorado River, one can enjoy the relative serenity and low cost of small town living while maintaining the option to access urban areas." • The official flagpole of the city is dedicated to "good neighborliness," suggesting that the community values its relationships with other nearby towns, including those in Mexico (City of Calipatria 2010).

Table 3.17-5 Community Attitudes and Values

Jurisdiction	Attitudes and Values
Westmorland	• The official city website notes that, "current city leaders want to retain the small town feel, but bring growth to the city," suggesting that unplanned and substantial growth would be considered an adverse impact, but a small amount of additional economic activity and growth (within projections) would be viewed as beneficial (City of Westmorland 2010).
Brawley	• In a recent letter, the mayor of Brawley stressed a few of the key values and symbols for the community: "We have a fascinating history, brought to life in the canals, the rich productive soil, and the brave pioneering people. We have amazing views of colorful produce fields, sand dunes cresting in the distance, and crystal clear evening stars." These items suggest that the agricultural sector of the economy, aesthetic beauty of the surrounding area, and small town nature of the community are all valued. • The mayor also noted that joint planning between various local districts and entities within Brawley is an important step for the future (City of Brawley 2010).
Imperial	• The vision for the City of Imperial put forth by its City Hall is create, "a rebuilt and redeveloped City anchored by an attractive, well-maintained central business district, quality residential areas and subdivisions, excellent schools and an economically vibrant business community, all contributing to a socially diverse and culturally rich city with a strong sense of identity, pride, and environmental awareness, and governed by an active community … focused on the principle of stewardship." • The community is also interested in providing, "land use planning direction that preserves City heritage and quality of life while promoting community improvement and economic development" (City of Imperial 2010).
El Centro	• As described in the El Centro General Plan, the City of El Centro is interested in expanding its economic base, including those with nearby Mexicali. The city also wishes to manage growth while retaining its valued safe, family environment. • In describing its vision, the El Centro General Plan suggests that, "El Centro is a place where people feel safe living and working in the community. A diversified economy provides long-term economic stability and a range of employment opportunities. Businesses that are beneficial to the City locate and thrive in the community providing employment opportunities and additional revenue for City services.… New development and redevelopment is compatible with and sensitive to the existing community" (City of El Centro 2004).
Holtville	• In a recent address to the residents of Holtville, city leadership expressed a number of attitudes and values regarding the city, its residents, and economic development: "Our farming heritage is important to Holtville and just like those farmers who founded this amazing town, we will collectively continue to plant seeds for the future, we will invest here, grow here and raise our families here with the same pioneer spirit," and, "Holtville has a unique charm, is family friendly, and promotes healthy living" (City of Holtville 2010).

Table 3.17-5 Community Attitudes and Values

Jurisdiction	Attitudes and Values
Calexico	• As stated in the City of Calexico General Plan: "Calexico offers excellent quality of life and a livable community for its residents by maintaining an appropriate balance among its various interests," and, "While allowing for new growth in prescribed areas, agricultural lands are preserved. Agriculture and retail continue to be the primary economic bases for Calexico, although expansion of other industries is beginning to provide job opportunities that allow greater upward mobility in the community," and, "Surrounded by and instilled with the natural beauty of mountains and desert, the community of Calexico values both the natural and human-made resources that contribute to its character. To protect these resources and community character, management of future growth is important." • Calexico is tightly connected economically and socially with its Mexican sister-city of Mexicali. In some ways, Calexico acts as a suburb to Mexicali and many residents of Mexicali come to Calexico for goods and services. This relationship is highly valued for the economic opportunities ii provides Calexico residents; development on the Mexican side of the border directly affects many different industries in Calexico (City of Calexico 2007).
Heber	• Like Niland, Heber is an unincorporated community strongly tied to the agriculture industry in Imperial County. Since the economy of the community is tied strongly to agriculture, attitudes and values regarding development and growth are likely influenced strongly by how individual projects and cumulative impacts may affect agricultural land uses and water. Additionally, the proximity of Heber to both Calexico and El Centro suggests that many of the same values of these larger communities, including values associated with economic activity and the preservation of the surrounding natural resources, may also be held by the residents of Heber.
Southern California Association of Governments	• The Southern California Association of Governments (SCAG) is a regional planning organization meant to develop regional plans for transportation, growth, housing, air quality, and other issues for the counties of Imperial, Riverside, San Bernardino, Orange, Los Angeles, and Ventura. SCAG primarily values increasing sustainability throughout Southern California and helping member areas realize their regional plans and improve life for Southern California residents (SCAG 2010).
Coachella Valley Association of Governments and Imperial Valley Association of Governments	• Both the Coachella Valley Association of Governments (CVAG) and IVAG are members of SCAG. Like SCAG, these organizations value promoting sustainability throughout their regions and coordinating the development and implementation of regional plans to benefit their residents. Recently, the CVAG has been educating its membership regarding ways to reduce their carbon footprint, while IVAG has been concentrating on coordinating transportation issues throughout the Imperial Valley (CVAG 2010; IVAG 2010).

Communities of Type

OHV Community

For many OHV recreationists, OHV riding is considered an important tradition. Many riders were introduced to OHV recreation by their parents or grandparents and maintaining this tradition for their own children is important to OHV enthusiasts. OHV recreationists value the

freedom to ride in wide open areas and view OHV riding as a pastime that is particularly "American." As one rider put it, "there is nothing more American than four-wheeling" (Tempest 2002). Desert riding is viewed as an opportunity to get away and escape from weekday responsibilities.

As access to OHV recreation opportunities decreases due to land use conversions, trail closures, public health concerns,[3] and environmental protection, riders have become concerned about the loss of recreational opportunities. OHV enthusiasts worry that as riding areas diminish they must drive greater distances for OHV recreation and existing OHV riding areas are becoming strained by overcrowding.

OHV recreationists perceive a widespread view by the general public that all riders lack respect for the land and nature, laws and regulations, and the safety of themselves and other trail users. Many from the riding community feel that they are unfairly blamed for the transgressions of a small group of riders and nonriders (California State Parks 2012).

Tensions exist between OHV enthusiasts and ecological protection communities. Environmental stakeholders express concerns about the detrimental impacts of OHV riding on natural resources. Resource issues commonly raised include impacts to endangered plant and wildlife species, habitat destruction, erosion (particularly of sensitive soils), water quality and runoff concerns, air quality impacts from dust and engine emissions, GHG generation, and consumption of limited petroleum reserves. OHV enthusiasts worry that riding opportunities will continue to diminish because environmental stakeholders are pushing for greater regulation and management of OHV recreation (AECOM in progress).

Environmental Groups and Non-Governmental Organizations

In terms of alternative energy generation and use, environmentalists are generally supportive as alternative energy typically produces less carbon than traditional energy generation (i.e., coal) and is generally more sustainable than energy production that relies on a finite amount of fossil fuels. For example, the Sierra Club suggests that, "Continuing our dependence on coal chains us to dirty energy and prevents us from making the changes we need to bring about a clean, secure energy future" (Sierra Club 2010). Recent efforts to establish alternative energy sites have met with concern by many environmentalists, however. For example, proposed wind farms are regularly challenged on grounds that they harm the visual aesthetics in the region, harm wildlife (specifically birds), or would require the construction of transmission lines that would create their own environmental impacts (LaMonica 2009). In southern California, a proposed solar project in the Mojave Desert was challenged by environmental groups because it had the potential to adversely affect a species of the desert tortoise, suggesting that the solar plant could be moved elsewhere in the immediate area to avoid these impacts (Danelski 2010). There is generally a high level of interest by environmentalist groups regarding the construction and operation of alternative energy-generating sites in Imperial County. However, as quoted in the *Los Angeles Times*, the conservation director for the Center of Biological Diversity, Peter Gavin, stated, "There are significant environmental issues involved in the California gold rush-

[3] Public health concerns often associated with OHV recreation include air quality impacts resulting from dust generation and engine emissions, and water quality impacts resulting from sedimentation.

like scenario unfolding in the desert. We are not going to just roll over when critical wild lands and last habitats of endangered species are in the mix." Also quoted was Joan Taylor, chairwoman of the Sierra Club's California/Nevada desert energy committee, "We believe there is room for solar energy development in the California desert, but there is no reason to put it in the wrong place" (Sahagun 2009). It is likely that these environmentalist sentiments extend to all alternative energy development, including geothermal.

In a scoping report for the Solar PEIS, a number of comments were elicited from environmentalists and environmental groups regarding the best way to go about building and operating solar power sites. Meetings were held throughout the United States, including in Riverside and El Centro, and approximately 50 environmental groups submitted comments to the Department of Energy and the BLM. In general, the comments submitted by environmentalist groups urged careful planning in solar project siting so that ecological impacts would be minimized. As quoted in the scoping report, "Environmental groups and others pointed out the potential harm that these projects could inflict on the ecosystems and urged that the delicate balances in the desert environment not be disturbed or destroyed" (DOE and BLM 2008).

Public scoping comments received from members of this community regarding the proposed plan generally concur with these earlier statements, and demonstrate a concern for: the EIS having an adequate number of alternatives analyzed; visual impacts to natural viewsheds; air quality impacts from fugitive dust and particulates; impacts to golden eagles, desert tortoises, flat-tailed horned lizards, burrowing owls, and other native species; impacts to the movement of animal species across the landscape; impacts resulting from non-native species traveling and establishing themselves in project sites; noise impacts; impacts to riparian areas; global climate change being taken into account during the planning process; an increased chance for human-caused fire to occur as a part of projects; impacts to groundwater; protection of lands acquired for conservation purposes; recreational impacts; impacts to soils; and traffic-related impacts.

In general, environmental groups and NGOs showed some support during the initial public scoping process. Defenders of Wildlife noted, "Defenders believes that renewable energy projects can be accommodated in the California desert, but only if they are carefully designed and located in areas that avoid sacrificing what remains of our relatively intact desert landscape and its associated biological resources and values. Wildlands Conservancy also noted their general support for renewable energy development within the planning area.

"Snowbirds" and Slab City

A recent study of Slab City in the *Journal of the Southwest* summarized the commonly held attitudes and beliefs present in the community:

> Many of those with whom we spoke indicate that they can live more freely in Slab City than elsewhere. They talk about individualism, self-sufficiency, and self-government. They police themselves and follow implicit rules of behavior. In Slab City, people are free to do as they wish as long as it does not interfere with the liberty of others. These, of course, are basic themes of democracy with which most American would agree. However, the residents of Slab City suggest that their practice of democracy is reality, not just an ideal (DuBry 2001).

No public scoping comments were received from residents of Slab City, but it is assumed that any alternative that would result in displacement of Slab City would be met with some resistance. Other environmental impacts to the area around Slab City, including air quality, noise, hazardous materials, and aesthetic impacts, may also be considered adverse by those who spend time in the area. This is particularly true for impacts that may occur during the winter months when the population of the area swells to thousands of residents.

Military Institutions

The Marine Corps and the Department of the Navy both provided comments regarding the proposed plan. In general, military institutions are theoretically supportive of alternative energy efforts. However, if alternative energy facilities threaten standard training procedures, military institutions may consider such impacts adverse. Changes to procedure may be perceived by military institutions as decreasing potential readiness and threatening national security.

Through the public scoping process, the Marine Corps noted that the height of structures and power lines near the CMAGR may become an impact to low-level flight training. Siting of structures may also affect ground accessibility. Lighting was noted as having the potential to interfere with pilots using night-vision technology. Other interferences with military technology include the potential for wind turbine blades to scatter radar waves and the potential for alternative energy sites to produce radiofrequency energy, which may affect radar instruments and communications systems. There is also a concern that OHV users may unintentionally encroach into the CMAGR if OHV access is restricted near alternative energy sites.

The Department of the Navy had similar concerns regarding the proposed plan and its effect on training and military readiness. The Navy noted that some training activities occur on BLM-managed land and that these activities may affect siting of alternative energy facilities. The Navy also expressed concerns regarding the types of impacts alternative energy facilities may have on flight training, aircrew training, cruise missile test flights, and the research, development, testing, and evaluation of weapons systems. There is also a concern by the Navy that tall structures may encroach on airspace, that wind turbines may affect radar systems, and that sonic booms produced by military aircraft may negatively affect solar equipment. Like the Marine Corps, the Navy is concerned with encroachment by OHV users, as well as potential growth in the Imperial Valley leading to increased noise, traffic impacts, and encroachment on military lands.

Economic Development Agencies

With regards to alternative energy, the IVEDC believes that the Imperial Valley, “with its vast natural resources and key location, the region is uniquely positioned to develop those resources while also helping the state and entire southwest meet the demand for renewable energy.” The IVEDC notes that there is ample opportunity for geothermal development, with the ability of lands surrounding the Salton Sea to produce over 2,000 megawatts of energy. Additionally, the IVEDC stresses the possibility for solar energy development due to large areas of land open to development, low slopes, and 360 days of annual sunshine. Finally, the IVEDC suggests that the agricultural industry in the area could also support biofuel energy production with nearly 500,000 acres of farmland and the largest single water right on the Colorado River.

No area chamber of commerce has provided comments on the proposed plan, but it is assumed that each local chamber would encourage any sort of alternative energy development in the region. Alternative energy projects can provide a range of beneficial economic impacts, including creating employment within the construction industry, as well as more indirect and induced economic impacts as money circulates within regional economies. As for the IVVGA, it is likely that land use issues, conversion of agricultural lands, and water use by alternative energy companies may be a concern, as decisions related to siting and water use may affect agriculture in the region.

As part of the IID Integrated Resource Plan, IID has identified a number of goals related to regional development and the development of alternative energy within the region. The primary regional development goal of the Integrated Resource Plan is to, "encourage local economic development by developing new generation resources within the District's service territory whenever possible." The IID is exploring options to develop its own geothermal, solar, wind, biomass, and biodiesel power generating facilities, but admits that it may have to rely on PPAs to meet a portion of its energy needs, particularly in the summer months and for its retail clients (IID 2010b).

3.17.3.2 Economic Environment

The economic environment in the most immediate vicinity of the lands targeted for renewable energy development reflect the conditions and characteristics of the Imperial County communities of El Centro, Brawley and Calexico. As mentioned above, Imperial County depends on agriculture, government and trade/transport/utilities as the primary employing sectors. In 2007, Imperial County was ranked 10th in the state by the total value of agricultural production ($1.3 billion) (USDA 2011). Employment in the agricultural sector is seasonal and the pattern of employment levels over time reflects these swings. The border area is also noted for the movement of people, goods and services between the U.S. and Mexico. Imperial County is integrated economically and socially with Northern Mexico and three ports of entry link the Imperial Valley and Calexico/Mexicali area with Northern Baja California. Surveys have revealed that more than 80 percent of northbound personal trips originating in Mexico are local in purpose and have final destinations in Imperial County (HDR/HLB Decision Economics, Inc. 2007).

Income

Measures of income and wealth are important indicators necessary to assess the social and economic wellbeing of the host communities. Growth in income is necessary to achieve improvements in living standards and the quality of life. The communities within a commuting distance of the West Chocolate Mountains REEA are varied in their wealth characteristics. In general, Imperial County is relatively poorer than Riverside, although pockets of poverty exist in Riverside as well, juxtaposed against wealthier communities such as Palm Springs and La Quinta.

The poverty rates shown in Table 3.17-6 measures the proportion of families and individuals who subsist on incomes below the poverty line or minimum threshold level. The poverty threshold takes into account family size. High rates of poverty can handicap a region by also compromising the ability of future generations to gain the education, work experience and

social development essential for attaining rising living standards and a better quality of life. It is noted that (see Public Finance Section below) that within Imperial County a large share of county expenses are allocated for public assistance. One fifth of the families living in El Centro subsist on incomes that are below poverty level thresholds (Census 2006-2008).

In terms of total personal income for the State of California, the shares of income accounted for by Imperial and Riverside counties are relatively minor. Riverside's total personal income was $61 billion in 2007. Only 4 percent of California's $1.5 trillion in total personal income can be attributed to Imperial and Riverside counties. Imperial County's total personal income was $3.8 billion in 2007, accounting for 0.25 percent of the State total. Personal Income is the income that is received by all persons from all sources with most coming from wages and salaries. Personal income can be viewed as a wealth proxy for area Gross Domestic Product (GDP), since GDP is not measured at the County level. California's 2007 GDP was $1.8 trillion in 2007. 2007 personal income was 83 percent of this amount (U.S. Bureau of Economic Analysis [BEA] 2009).

3.17-6 Income and Poverty Measures

	Median Household Income	Per Capita Income	Families Below Poverty Level	Individuals Below Poverty Level	Median Household Income as a % of U.S.	Per Capita Income as a % of U.S.
Imperial County	$37,492	$16,043	19.7%	21.2%	71.9%	58.4%
El Centro, city	$36,959	$17,916	20.0%	20.6%	70.8%	65.2%
Brawley, city	$35,582	$16,908	23.9%	25.8%	68.2%	61.6%
Calexico, city	$32,388	$13,605	22.4%	23.3%	62.1%	49.5%
Riverside	$58,168	$24,836	9.3%	12.2%	111.5%	90.4%
Coachella, city	$40,463	$12,542	22.0%	23.6%	77.6%	45.7%
Indio, city	$53,824	$22,350	10.9%	15.6%	103.2%	81.4%
La Quinta, city	$78,898	$46,389	2.8%	8.2%	151.2%	168.9%
Palm Springs,	$45,114	$37,438	6.7%	10.2%	86.5%	136.3%
California	$61,154	$29,405	9.6%	12.9%	117.2%	107.1%
U.S.	$52,175	$27,466	9.6%	13.2%	100.0%	100.0%

Source: U.S. Census Bureau 2009.

Notes: American Community Survey estimates represent the average characteristics of population and housing between January 2006 and December 2008 and do not represent a single point in time.

Figure 3.17-2 shows the long-term growth in per capita personal income for Imperial County, Riverside County, and California since 1969. The figure does not reflect the impact of the most recent recession but does reveal long-term trends in income growth across regions. California's per capita income in 2007 grew to over nine times the 1969 level. However, per capita personal income growth in both Riverside and Imperial counties has lagged behind the

State average in recent years, and the gaps or regional disparities in income have widened since the late 1990s (BEA 2009).

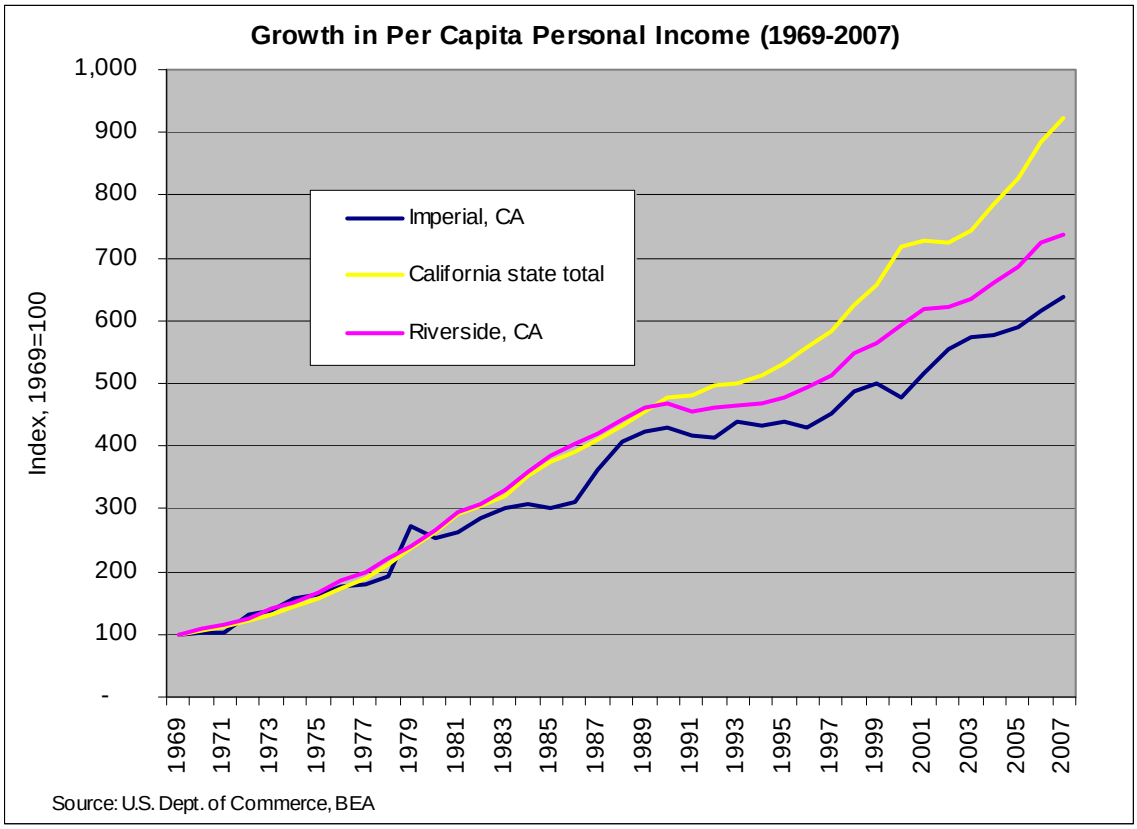


Figure 3.17-2 Growth in Per Capita Personal Income

Economy and Employment

West Chocolate Mountains REEA employment statistics by industry sector and county for 2008 are summarized in Table 3.17-7. The government is the largest employer in Riverside County, Imperial County, and California as a whole. This sector accounts for over 18.5 percent of the total jobs in Riverside County. Additional industries in the area include trade (wholesale and retail); services (e.g., professional, business, educational, health, other); natural resources, mining, and construction; manufacturing; financial activities; transportation, warehousing, and utilities; agriculture; and information. In Riverside County, government, other services, and retail trade services are the leading industry groups in terms of employment. The sector with the lowest number of persons employed is the information sector, with 7,700.

Imperial County's economy is dominated by two sectors: agriculture and government. As Table 3.17-7 shows nearly one in every three persons employed in Imperial County works for a federal, state, or local/tribal government agency. The relative importance of the government sector tends to be larger than average in rural counties, but Imperial County's 31.8 percent is nearly twice the California state average of 16.4 percent. Contributing to the size of the government sector are two state prisons (Centinela and Calipatria), a major military installation

(NAF El Centro), and employees of the IID, which numbered approximately 1,330 in 2006 (IID 2010a).

The economic structure of the Coachella Valley is quite different. Although the southeastern part of the valley, just north of the Salton Sea, has intensive agricultural production similar to the Imperial Valley, the scale is much reduced. Coachella Valley's 70,000 acres in production represent not quite 15 percent of the producing lands in Imperial Valley. Riverside County's agricultural sector, which is larger than that solely in the Coachella Valley, is estimated to represent 2.3 percent of employment, far less than in Imperial County (19.8 percent).

Table 3.17-7 Employment by Industry Group, Annual Average 2008

	Riverside County Employment		Imperial County Employment		California Employment	
Industry Group	**Total**	**% of Total**	**Total**	**% of Total**	**Total**	**% of Total**
Agriculture	13,800	2.3%	11,500	19.8%	390,900	2.5%
Natural Resources, Mining, and Construction	55,100	9.3%	1,600	2.8%	814,300	5.3%
Manufacturing	48,600	8.2%	2,600	4.5%	1,425,400	9.3%
Transportation, Warehousing, and Utilities	18,300	3.1%	1,800	3.1%	505,800	3.3%
Wholesale Trade	20,400	3.4%	1,900	3.3%	706,600	4.6%
Retail Trade	84,200	14.2%	7,500	12.9%	1,642,300	10.7%
Information	7,700	1.3%	400	0.7%	474,700	3.1%
Financial Activities	22,300	3.8%	1,300	2.2%	849,900	5.5%
Professional and Business Services	57,700	9.7%	3,100	5.3%	2,244,400	14.6%
Educational and Health Services	58,800	9.9%	3,400	5.9%	1,725,300	11.2%
All Other Services	94,300	15.9%	4,700	8.1%	2,086,000	13.6%
Government	110,200	18.5%	18,500	31.8%	2,519,300	16.4%
Total	**594,500**	**100%**	**58,100**	**100%**	**15,384,900**	**100%**

Source: California EDD 2010a.

Since data were compiled by the California EDD in early 2009 for the 2008 calendar year, the economy of the United States experienced a sharp recession that resulted in dramatic stock market declines, increased unemployment nationwide, decreased housing prices in almost all regions, and a rash of high-profile bank and corporate failures/bankruptcies. As such, the latest data published by the California EDD provide a snapshot of employment and economic activity before the 2008-2009 recession started to dramatically affect individual industry sectors and employment. While there was some regional variation in how economies reacted to the recession, in general, the downturn in the economy immediately affected the construction and manufacturing industries. As those sectors began to suffer, other industries closely related to construction and manufacturing, such as transportation and warehousing, started to experience a

downturn. Additionally, financial sectors began to experience a downturn as investments lost value. Tax bases began to shrink, stressing local and state governments, leading to job cuts in the government sector.

By the end of the 2008-2009 recession, there were few, if any, industry groups that did not experience a downturn when viewed nationally. While no official data exist yet from the California EDD that quantitatively describes employment impacts to individual sectors for Riverside County, new information dated to March 2009 indicates that the unemployment had increased to 13.6 percent from the 2008 baseline of 8.5 percent. Data for Imperial County, based on a March 2009 baseline, demonstrate the impact of the recession in a more detailed manner, as shown in Table 3.17-8 below. Particularly noteworthy in Imperial County is the decrease in jobs in the agricultural and construction sectors, with some slight growth in government employment and in the educational and health care service sector.

Table 3.17-8 Employment by Industry Group for Imperial County, Annual Average 2008 and 2009 (March 2009 Baseline)

Industry Group	2008		2009		Percent Change
	Total	Percent of Total	Total	Percent of Total	
Agriculture	11,400	19.7%	9,200	16.8%	-19.3%
Natural Resources, Mining, and Construction	1,700	2.9%	1,500	2.7%	-11.8%
Manufacturing	2,500	4.3%	2,300	4.2%	-8.0%
Transportation, Warehousing, and Utilities	1,800	3.1%	1,800	3.3%	0.0%
Wholesale Trade	1,800	3.1%	1,700	3.1%	-5.6%
Retail Trade	7,600	13.1%	7,000	12.8%	-7.9%
Information	400	0.7%	400	0.7%	0.0%
Financial Activities	1,300	2.2%	1,300	2.4%	0.0%
Professional and Business Services	3,000	5.2%	2,700	4.9%	-10.0%
Educational and Health Services	3,400	5.9%	3,800	6.9%	+11.8%
All Other Services	4,600	7.9%	4,300	7.8%	-6.5%
Government	18,500	31.9%	18,800	34.3%	+1.6%
Total	58,000	100.0%	54,800	100.0%	-5.5%

Source: California EDD 2010a.

Table 3.17-9 presents the projected new jobs by occupation for Imperial and Riverside counties. For the purposes of employment data tabulation, the California EDD groups Riverside and San Bernardino counties as one statistical area; hence, they are presented in Table 3.17-9 together. Riverside and San Bernardino counties follow a similar employment growth pattern as California as a whole, with the highest number of new jobs projected for retail salespersons, cashiers, and waiters and waitresses. In Imperial County, jobs in agriculture are anticipated to have the greatest number of openings. Job growth is also anticipated for personal care aides and retail sales.

Table 3.17-9 Industry Employment Projections for Riverside, San Bernardino, and Imperial Counties, and State of California, 2006–2016

Occupation	Number of New Jobs Projected
Riverside and San Bernardino Counties	
Retail Salespersons	24,360
Cashiers	20,170
Waiters and Waitresses	15,340
Laborers and Freight, Stock, and Material Movers	13,460
Combined Food Preparation and Serving Workers, including Fast Food	12,880
Elementary School Teachers, except Special Education	11,450
Office Clerks, General	11,190
Personal and Home Care Aides	9,710
Customer Service Representatives	8,890
Registered Nurses	8,380
Imperial County	
Farm workers and Laborers, Crop, Nursery, and Greenhouse	2,890
Personal and Home Care Aides	1,260
Retail Salespersons	1,090
Cashiers	970
Correctional Officers and Jailers	890
Detectives and Criminal Investigators	610
Elementary School Teachers, Except Special Education	600
Office Clerks, General	470
Meat, Poultry, and Fish Cutters and Trimmers	470
Combined Food Preparation and Serving Workers, including Fast Food	450
California	
Retail Salespersons	261,600
Cashiers	191,300
Waiters and Waitresses	180,100
Office Clerks, General	138,300
Personal and Home Care Aides	125,100
Laborers and Freight, Stock, and Material Movers	120,900
Customer Service Representatives	111,600
Registered Nurses	99,000

Table 3.17-9 Industry Employment Projections for Riverside, San Bernardino, and Imperial Counties, and State of California, 2006–2016

Occupation	Number of New Jobs Projected
Elementary School Teachers, except Special Education	93,200
Combined Food Preparation and Serving Workers, including Fast Food	93,200

Source: California EDD 2010b.

Project-Related Employment

Tables 3.17-10 and 3.17-11 present county employment figures for those skilled workers (by craft) required for construction and operation of the renewable energy facilities. Employment figures for 2006 are provided, as well as employment projections for the selected occupations for 2016. As noted above, the California EDD groups Riverside and San Bernardino counties into one statistical area for data presentation purposes. Thus, these two counties are presented together in Table 3.17-10, while Imperial County is presented separately in Table 3.17-11. As of 2006, there were relatively high numbers of skilled workers in Riverside and San Bernardino County, including construction workers (116,810), carpenters (28,850), and construction laborers (27,930). Imperial County had 2,210 construction workers in 2006.

Relevant specialized positions were generally fewer in number in the West Chocolate Mountains REEA, including paving, surfacing, and tamping equipment operators; power plant operators; and construction trade helpers. Employment figures for all occupations presented are anticipated to either remain constant or grow by 2016. The two occupations with the largest anticipated growth in Imperial County are plant and system operators (26.5 percent) and architects, surveyors, and cartographers (25.0 percent). The occupations with the largest growth by occupation in Riverside and San Bernardino counties are anticipated to be power plant operators (19.4 percent) and architects, surveyors, and cartographers (17.6 percent).

Table 3.17-10 Local Labor Pool by Craft for Riverside and San Bernardino Counties

	Annual Average and Projected Employment		Projected Employment Change		Average Annual Job Openings		
Occupational Title	**2006**	**2016**	**Number**	**Percent**	**New Jobs**	**Net Replace-ments**	**Total**
Construction Managers	4,380	5,110	730	16.7	135	160	295
Construction Workers	116,810	132,160	15,350	13.1	1,061	2,347	3,408
Carpenters	28,850	32,390	3,540	12.3	198	380	578
Cement Masons and Concrete Finishers	4,110	4,690	580	14.1	38	120	158
Construction Laborers	27,930	32,080	4,150	14.9	348	236	584
Paving, Surfacing, and Tamping Equipment Operators	630	720	90	14.3	8	16	24
Operating Engineers and Other Construction Equipment Operators	4,790	5,460	670	14.0	37	85	122
Drywall and Ceiling Tile Installers	7,570	8,310	740	9.8	25	118	143
Electricians	6,740	7,600	860	12.8	66	336	402
Painters, Construction and Maintenance	7,950	9,210	1,260	15.8	101	235	336
Plumbers, Pipefitters, and Steamfitters	4,630	5,330	700	15.1	81	249	330
Metal Workers and Plastic Workers	19,460	20,800	1,340	6.9	0	1,024	1,024
Helpers - Construction Trades	120	130	10	8.3	35	169	204
Maintenance and Repair Workers, General	11,920	13,690	1,770	14.8	241	75	316
Welders, Cutters, Solderers, and Brazers	3,960	4,640	680	17.2	48	178	226
Plant and System Operators	2,030	2,380	350	17.2	36	104	140
Power Plant Operators	310	370	60	19.4	4	11	15
Architects, Surveyors, and Cartographers	1,420	1,670	250	17.6	56	135	191
Engineering Managers	1,370	1,600	230	16.8	43	170	213
Supervisors, Construction and Extraction Workers	10,990	12,380	1,390	12.6	95	216	311
Machinists	2,630	2,960	330	12.5	0	161	161

Source: California EDD 2010c.

Table 3.17-11 Local Labor Pool by Craft for Imperial County

Occupational Title	Annual Average and Projected Employment		Employment Change		Average Annual Job Openings		
	2006	2016	Number	Percent	New Jobs	Net Replace-ments	Total
Construction Managers	80	90	10	12.5	1	1	2
Construction Workers	2,210	2,580	370	16.7	37	36	73
Carpenters	130	150	20	15.4	2	2	4
Cement Masons and Concrete Finishers	160	190	30	18.8	3	5	8
Construction Laborers	720	860	140	19.4	14	5	19
Paving, Surfacing, and Tamping Equipment Operators	50	60	10	20.0	1	1	2
Operating Engineers and Other Construction Equipment Operators	250	290	40	16.0	4	5	9
Drywall and Ceiling Tile Installers	80	90	10	12.5	1	1	2
Electricians	250	300	50	20.0	5	7	12
Painters, Construction and Maintenance	90	100	10	11.1	1	2	3
Plumbers, Pipefitters, and Steamfitters	130	150	20	15.4	2	3	5
Metal Workers and Plastic Workers	210	230	20	9.5	2	4	6
Helpers - Construction Trades	100	110	10	10.0	1	3	4
Maintenance and Repair Workers, General	660	800	140	21.2	14	2	16
Welders, Cutters, Solderers, and Brazers	160	190	30	18.8	3	4	7
Plant and System Operators	340	430	90	26.5	9	9	18
Power Plant Operators	140	170	30	21.4	3	5	8
Architects, Surveyors, and Cartographers	40	50	10	25.0	1	1	2
Engineering Managers	60	70	10	16.7	1	1	2
Supervisors, Construction and Extraction Workers	200	240	40	20.0	4	3	7
Machinists[1]	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Source: California EDD 2010c.
Note:
[1] Information for Machinists not available for Imperial County.

Existing Unemployment Rates

As of November 2009, Riverside County had a labor force of 915,200 workers, of which 781,400 were employed. Imperial County had labor force of 77,000 workers of which 54,500 were employed. The highest unemployment rate in all of California was Imperial County (29.2 percent), with the unemployment rate in Riverside (14.6 percent) ranked 35th out of 58 Californian counties. Of the communities in Riverside County, the community with the highest unemployment rate was Mecca (27.0 percent). In the Imperial County portion of the social and economic West Chocolate Mountains REEA, the community with the highest unemployment rate was Heber (43.2 percent), although data were unavailable for Niland. The labor force of the REEA counties and communities is presented in Table 3.17-12.

Table 3.17-12 Employment Data in the West Chocolate Mountains REEA, November 2009

Jurisdiction	Civilian Labor Force	Total Employment	Number Unemployed	Unemployment Rate	Median Household Income (2008)
Riverside County	**915,200**	**781,400**	**133,800**	**14.6%**	**$58,168**
Coachella	12,500	9,600	2,800	22.6%	$40,463
Indio	27,400	23,100	4,300	15.8%	$53,824
La Quinta	14,600	13,500	1,100	7.8%	$78,898
Mecca	3,600	2,600	1,000	27.0%	$29,689*
Riverside Communities	58,100	48,800	9,200	15.8%	n/a
Imperial County	**77,000**	**54,500**	**22,500**	**29.2%**	**$37,492**
Niland	n/a	n/a	n/a	n/a	$33,073*
Calipatria	1,700	1,200	500	30.0%	$40,013*
Westmorland	1,400	800	600	39.7%	$30,195*
Brawley	13,300	9,100	4,200	31.8%	$35,582
Imperial	4,700	3,700	1,000	20.6%	$63,907*
El Centro	22,300	16,100	6,200	27.7%	$36,959
Holtville	3,300	2,400	900	26.5%	$46,935*
Calexico	15,500	10,500	5,000	32.3%	$32,388
Heber	1,800	1,000	800	43.2%	$36,471*
Imperial Communities	64,000	44,800	19,200	30.0%	n/a
California	**18,314,700**	**16,084,000**	**2,230,400**	**12.2%**	**$61,154**

Sources: California EDD 2010d; U.S. Census Bureau 2009; U.S. Census Bureau 2000b.

Note:
[1] Denotes U.S. Census 2000 data inflated by CPI to represent 2008 amounts.

The recession has severely impacted the region's economy. Imperial County's unemployment rate climbed to over 32 percent before recently falling to a still historically high rate of 27.5 percent. Figure 3.17-3 shows the past ten year's trends in unemployment rates and includes the past recession of 2001. Compared to the current Great Recession, the past cyclical lows or troughs in the business cycle pale in comparison. For Riverside County and California, recent unemployment rates appear to have stabilized over the last several months but they still remain at unacceptably high levels.

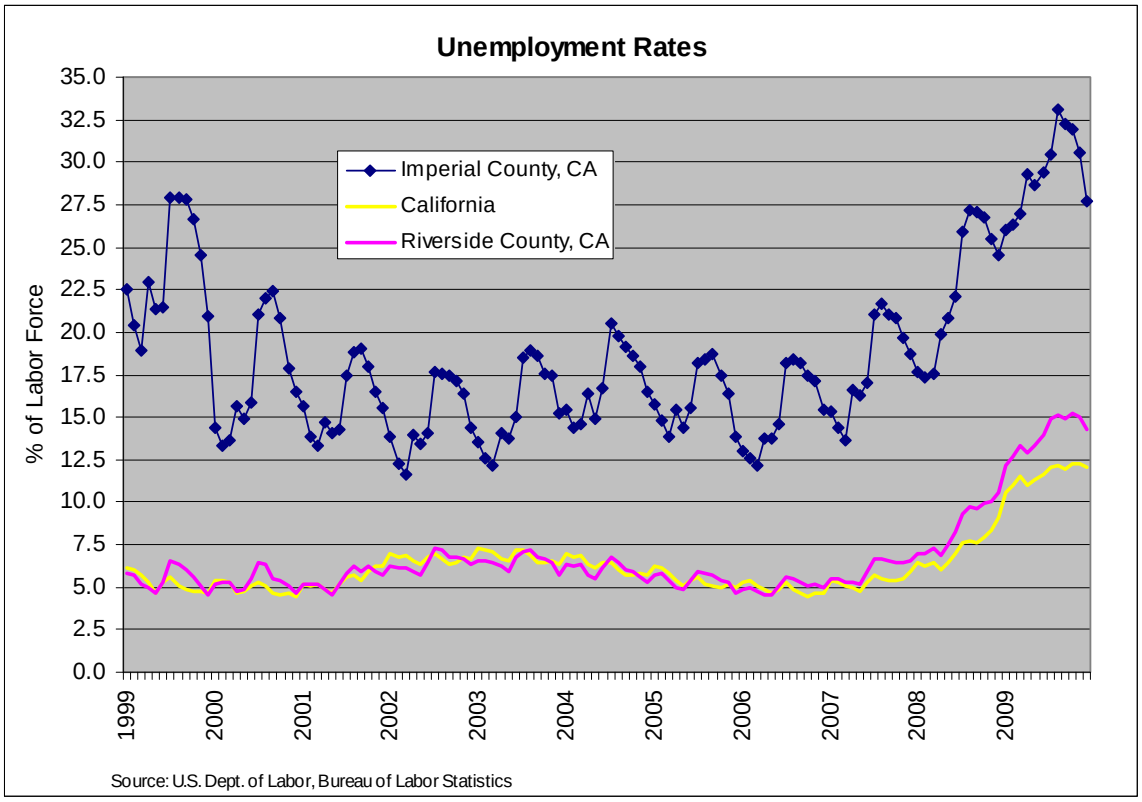


Figure 3.17-3 Unemployment Rates

The erosion of employee payroll, loss of income and consumption demand has resulted in a contraction in economic activity that is reflected in virtually all sectors of the regional economy. Table 13.17-3 shows quarterly earnings for Q2 2009. For Imperial County, Government employment accounts for approximately 32 percent of total employment while public payroll accounts for 47 percent of the total private and government combined quarterly earnings of $487 million. Riverside and California are much less dependent on government employment and earnings.

Table 3.17-13 Earnings-Q2 (April - June) 2009

	Riverside	Imperial	California
Quarterly Payroll (US$, Mils.)			
Private	$3,794	$263	$147,358
Government	$1,554	$224	$34,864
Total:	$5,348	$487	$182,222
Average Weekly Pay, (US$)			
Private	$654	$517	$925
Government	$1,060	$1,010	$1,133
Total:	$857	$763	$1,029

Sources: California EDD 2009.

Note: These data represent the count of employment and wages for workers covered by unemployment insurance programs in the time period indicated. They are the product of a Federal-State cooperative program known as the Quarterly Census of Employment and Wages (QCEW), or ES-202, program.

Projected Unemployment Rates

While no California State-generated figures exist for projected unemployment rates in Riverside and Imperial counties, a recent report prepared by UCLA Anderson Forecast does present near-term unemployment projections for the nation and California through 2011. At the time of publishing (December 9, 2009), UCLA Anderson Forecast estimated the nationwide unemployment rate would likely peak at 10.5 percent in the beginning of 2010, then settle at or above 10.0 percent for the remainder of the year.

For California, UCLA Anderson Forecast estimated the State unemployment rate would increase to 12.7 percent in the last quarter of 2009 and that no new jobs (net) would be generated in 2010. In 2011, employment is projected to begin to grow faster than the labor force and the unemployment rate should begin to fall as a result. According to projections, while the economy will be growing in 2011, it will not be generating enough jobs to drive the unemployment rate below double digits until 2012 (UCLA 2009).

Geothermal Development

Geothermal electrical production is part of the utilities sector, which has a relatively small share of Imperial County's total employment (see Table 3.17-4). The 16 geothermal power plants located in the county, together with subcontractors, may support around 600 jobs. However, the industry supplies utilities with an important regional source of electric power, generating over 500 MW of electricity. The industry is also an important revenue source to jurisdictions within Imperial County, representing about 10 percent of the county's property tax base. Although several geothermal greenhouse operations are located in the Coachella Valley, it has no geothermal power plants (BLM 2007).

The Geothermal PEIS analyzes the impact additional geothermal power development may have through 11 western states, including California. The proposed plan would identify those public lands with geothermal development potential, suggest BMPs for future geothermal leases, and amend applicable BLM Resource Management Plans to adopt resource allocations and BMPs, among other specific decisions regarding pending geothermal lease applications. The PEIS found that a large proportion of the acres within the El Centro BLM Field Office Planning Area would ultimately be closed to development (69.0 percent), but 382,834 total acres would still be available. Estimates provided in the document suggest that geothermal development could provide between 30 to 50 permanent, full-time, high-skilled jobs directly associated with the facility, becoming a stable, reliable economic driver in rural areas. In addition to employment, geothermal development can also increase property tax revenues for local governments, revenue payments on geothermal resources paid to the state, and voluntary donations and community support from geothermal developers eager to be considered "good neighbors" to the surrounding community (BLM 2008). As more geothermal projects are constructed in Imperial and Riverside counties, these economic benefits may accrue to neighboring communities, local governments, or the State of California.

Recreation

Imperial County has some significant recreational features, notably the Salton Sea and the ISDRA. Offering boating, fishing, birdwatching, and camping, the Salton Sea had visitor use that was said to rival that of Yosemite until the mid-1980s. However, fish and bird die-offs, an increase in unpleasant odors, and concerns about pollution and water quality have resulted in a decline in recreational use over the last 20 years. Efforts by the Salton Sea Authority, Salton Sea Ecosystem Restoration Program, other agencies, and stakeholders to stabilize the salinity of the Sea, restore wildlife habitat, protect water quality, decrease air quality impacts, and promote agricultural and other economic development in the area are still in motion and a recent report published in 2008 outlined recommendations for restoration based on a 2006 Programmatic Environmental Impact Report (PEIR). The ultimate preferred alternative would result in some shoreline access for the communities of Salton City and Bombay Beach, which would provide some opportunity for recreation and development (Hill 2008).

The ISDRA is considered one of the premier sand dune OHV recreation areas in the United States. Estimated visitation during the 1999–2000 fiscal year was almost 900,000 people. Peaking during holiday seasons, this use produces seasonal spikes in local retail sales of groceries and fuel and in restaurant and lodging use (BLM 2007).

Imperial County – Baja California, Mexico Border Habitat Linkages

There are three ports of entry along the Imperial County/Baja California border: Calexico West/Mexicali 1, Calexico East/Mexicali 2 and Andrade/Algodones. Data for 2005 show that total incoming passenger crossings reached 26.2 million persons with 62 percent or 16.3 million passing through Calexico West. Passenger crossings do not measure unique visitors, but total crossings within a year and include train, pedestrian, bus and private vehicle crossings. In 2006, the combined value of freight exports and imports by truck for these three ports was $11.3 billion (Exports: $4.7 B, Imports: $6.6 B). Top California exports to Mexico include machinery and transport equipment, chemicals and food, beverages and live animals, while top imports from

Mexico consist of machinery and transport equipment, miscellaneous manufactured articles and textiles (HDR/HLB Decision Economics, Inc. 2007).

Agricultural Production

The Imperial Valley is one of the bread baskets of California and was ranked 9th statewide in 2008 agricultural production ($1.7 B). Leading commodities were Cattle ($315 M), Alfalfa ($149 M), Wheat ($129 M), Lettuce (head plus leaf, $227 M), Broccoli ($73 M), Sudangrass hay ($67 M), Carrots ($67 M), and Cantaloupes ($42 M) (County of Imperial 2009).

Public Finance: Revenues and Expenditures

Public finances at the county level are necessary to understand how the potential renewable energy project assets may be integrated into the region, in terms of both potential impacts placed on public services, and as a source of public revenues used to defray any costs. Imperial County total public revenues were $316 million in fiscal year 2008. Revenues were mainly derived from operating grants and contributions (54 percent) and charges for services (27 percent). It is noted that property tax receipts, accounting for 5 percent of total revenues declined by $5.8 million between 2007 and 2008, reflecting the impact from the recession. Imperial's total expenditures in 2008 were $298 million. The largest expense categories were for public assistance (33 percent), public protection (24 percent), general government (21 percent) and health and sanitation (13 percent) (County of Imperial Comprehensive Annual Financial Report [CAFR] 2008). Riverside County total revenues in 2008 were $3.5 billion. The main funding sources were operating grants and contributions (37 percent) and charges for services (31 percent). Total 2008 expenditures for Riverside amounted to $3.5 billion and were dominated by public protection (35 percent), public assistance (24 percent) and the Regional Medical Center (11 percent; Riverside County CAFR 2009b).

3.17.3.3 Environmental Justice

The following analysis is required under EO 12898, Environmental Justice (59 FR 7629). Under EO 12898, demographic information is used to determine whether minority populations or low-income populations are present in the area potentially affected by the proposed plan. If so, a determination must be made whether implementation of the proposed plan may cause disproportionately high and adverse human health or environmental impacts on those populations. Information on minority and low-income populations is presented for each community within the social and economic West Chocolate Mountains REEA, as well as those U.S. Census block groups (a subset of census tracts) within 5 miles of the REEA. This 5-mile buffer is considered to be the maximum extent environmental impacts (e.g., aesthetic, air, noise, etc.) may carry into the surrounding area.

The CEQ defines the term "minority" as persons from any of the following U.S. Census categories for race: Black/African American; Asian; Native Hawaiian or Other Pacific Islander; and American Indian or Alaska Native. Additionally, for the purposes of this analysis, "minority" also includes all other nonwhite racial categories that were added in the most recent census, such as "some other race" and "two or more races." The CEQ also mandates that persons identified through the U.S. Census as ethnically Hispanic, regardless of race, should be included in minority counts. Persons living with income below poverty are identified as "low-income," utilizing the annual statistical poverty thresholds established by the U.S. Census (CEQ 1997).

According to the Census, the poverty threshold for a family of four in California was $17,029 in 2000. For this particular analysis, U.S. Census data from the 2000 census were used as they are the most comprehensive, most complete, and most customizable data set currently available for all communities in the area, as well as those census block groups immediately surrounding the West Chocolate Mountains REEA.

The Interagency Federal Working Group on Environmental Justice guidance states that a minority and/or low-income population may be present in an area if the proportion of the populations in the area of interest is "meaningfully greater" than that of the general population, or where the proportion exceeds 50 percent of the total population. For the purposes of this analysis, minority and low-income populations of each community and census block group were compared against the general population of the county as a whole. A meaningfully greater proportion was determined to be simply greater than the general population of the associated county (providing for a conservative measurement).

Table 3.17-14 illustrates the racial and ethnic composition of potentially affected communities and block groups within the West Chocolate Mountains REEA in Riverside and Imperial counties in 2000.

The proportions of total minority populations range from 19.7 percent to 95.0 percent in census block groups within the 5-mile buffer, and from 37.1 percent to 99.2 percent in nearby communities. The block groups with the highest proportion of minority residents were 456.04.1 and 456.04.2, which are located in Riverside County north of the Salton Sea. Block group 456.04.1 contains a large proportion of the north part of the Salton Sea, as well as the community of Mecca and portions of the Torres Martinez Indian Reservation. Block group 456.04.2 also contains parts of the Torres Martinez Indian Reservation, as well as the small communities of North Shore, Mortmar, Desert Beach, Desert Camp, and the outlying areas of Mecca.[4]

The community with the highest proportion of minority residents is nearby Mecca, which is almost entirely Hispanic (98.0 percent). Imperial County has a high proportion of Hispanic residents (79.8 percent) and every identified community in Imperial County has a percentage of Hispanic residents over 50.0 percent.

It should be noted that the presence of state prisons in block groups 101.00.4 and 458.00.3 results in figures that suggest a relatively diverse population, but many of these residents are likely confined to Calipatria State Prison and Chuckawalla Valley State Prison, respectively.

[4] It is possible that the U.S. Census tabulated the population of these areas during a harvesting season as the population is relatively large and other socioeconomic indicators (not presented here) show a disproportionately male population with a median age of approximately 23-24 years old. The argument becomes more convincing when combined with economic information, which presents block groups 456.04.1 and 456.04.2 as having low PCIs in the area and relatively high MHHs, which suggests multiple earners living under the same roof in these two areas.

Table 3.17-14 Race, Ethnicity, and Proportion of Total Minority

	Race														Ethnicity			
	White		Black/African American		American Indian or Alaskan Native		Asian		Native Hawaiian or Pacific Islander		Some Other Race		Two or More Races		Hispanic		Total Minority	
Geographic Area	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
5-Mile Buffer Area																		
Block Group 101.00.4	1,598	32.6%	1,435	29.3%	46	0.9%	24	0.5%	0	0.0%	1,764	36.0%	31	0.6%	1,957	40.0%	3,462	70.7%
Block Group 101.00.5	622	54.6%	36	3.2%	23	2.0%	52	4.6%	0	0.0%	321	28.2%	85	7.5%	630	55.3%	733	64.4%
Block Group 101.00.6	286	76.7%	11	2.9%	1	0.3%	17	4.6%	0	0.0%	41	11.0%	17	4.6%	189	50.7%	221	59.2%
Block Group 123.02.3	542	76.9%	6	0.9%	9	1.3%	4	0.6%	1	0.1%	104	14.8%	39	5.5%	222	31.5%	263	37.3%
Block Group 124.00.1	888	86.7%	75	7.3%	5	0.5%	3	0.3%	2	0.2%	21	2.1%	30	2.9%	95	9.3%	202	19.7%
Block Group 124.00.2	439	70.5%	11	1.8%	5	0.8%	3	0.5%	6	1.0%	132	21.2%	27	4.3%	172	27.6%	215	34.5%
Block Group 456.04.1	1,048	26.4%	4	0.1%	16	0.4%	44	1.1%	0	0.0%	2,691	67.8%	166	4.2%	3,822	96.3%	3,893	98.1%
Block Group 456.04.2	2,117	34.7%	14	0.2%	77	1.3%	30	0.5%	3	0.0%	3,633	59.6%	221	3.6%	5,727	94.0%	5,791	95.0%
Block Group 458.00.2	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA
Block Group 458.00.3	1,847	22.2%	2,136	25.7%	102	1.2%	132	1.6%	43	0.5%	3,893	46.9%	155	1.9%	4,079	49.1%	6,628	79.8%
Total	9,387	34.6%	3,728	13.7%	284	1.0%	309	1.1%	55	0.2%	12,600	46.4%	771	2.8%	16,893	62.3%	21,408	78.9%
Communities																		
Brawley	11,638	52.8%	540	2.4%	244	1.1%	288	1.3%	41	0.2%	8,349	37.9%	952	4.3%	16,280	73.8%	17,272	78.3%
Calexico	12,621	46.6%	134	0.5%	181	0.7%	492	1.8%	6	0.0%	12,739	47.0%	936	3.5%	25,832	95.3%	26,467	97.6%
Calipatria	2,361	32.4%	1,554	21.3%	53	0.7%	46	0.6%	2	0.0%	3,109	42.7%	164	2.2%	4,180	57.3%	5,839	80.1%
Coachella	8,810	38.8%	103	0.5%	191	0.8%	71	0.3%	7	0.0%	12,854	56.6%	688	3.0%	22,132	97.4%	22,361	98.4%
El Centro	17,728	46.9%	1,195	3.2%	369	1.0%	1,324	3.5%	37	0.1%	15,771	41.7%	1,411	3.7%	28,219	74.6%	30,998	81.9%
Heber	1,026	34.3%	19	0.6%	18	0.6%	8	0.3%	0	0.0%	1,848	61.8%	69	2.3%	2,914	97.5%	2,933	98.2%
Holtville	3,051	54.4%	35	0.6%	47	0.8%	47	0.8%	4	0.1%	2,197	39.1%	231	4.1%	4,144	73.8%	4,263	76.0%
Imperial	4,425	58.5%	201	2.7%	57	0.8%	205	2.7%	13	0.2%	2,336	30.9%	323	4.3%	4,619	61.1%	5,113	67.6%

Table 3.17-14 Race, Ethnicity, and Proportion of Total Minority

	Race														Ethnicity			
	White		Black/African American		American Indian or Alaskan Native		Asian		Native Hawaiian or Pacific Islander		Some Other Race		Two or More Races		Hispanic		Total Minority	
Geographic Area	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Indio	23,903	48.7%	1,361	2.8%	510	1.0%	742	1.5%	49	0.1%	20,638	42.0%	1,913	3.9%	37,028	75.4%	39,530	80.5%
La Quinta	18,602	78.5%	336	1.4%	171	0.7%	446	1.9%	21	0.1%	3,282	13.9%	836	3.5%	7,584	32.0%	8,801	37.1%
Mecca	1,302	24.1%	6	0.1%	55	1.0%	40	0.7%	0	0.0%	3,817	70.7%	182	3.4%	5,295	98.0%	5,359	99.2%
Niland	626	54.8%	36	3.1%	23	2.0%	52	4.5%	0	0.0%	321	28.1%	85	7.4%	632	55.3%	735	64.3%
Westmorland	1,188	55.7%	22	1.0%	15	0.7%	7	0.3%	1	0.0%	840	39.4%	58	2.7%	1,752	82.2%	1,786	83.8%
Counties																		
Imperial	70,290	49.4%	5,624	4.0%	2,666	1.9%	2,836	2.0%	119	0.1%	55,634	39.1%	5,192	3.6%	102,817	72.2%	113,593	79.8%
Riverside	1,013,478	65.6%	96,421	6.2%	18,168	1.2%	56,954	3.7%	3,902	0.3%	288,868	18.7%	67,596	4.4%	559,575	36.2%	756,556	49.0%
State																		
California	20,170,059	59.5%	2,263,882	6.7%	333,346	1.0%	3,697,513	10.9%	116,961	0.3%	5,682,241	16.8%	1,607,646	4.7%	10,966,556	32.4%	18,054,858	53.3%

Source: U.S. Census Bureau 2000a.

Table 3.17-15 illustrates the median household income, per capita income, and proportion of people living below the poverty threshold for potentially affected communities and block groups within the West Chocolate Mountains REEA in Riverside and Imperial counties in 1999.

The proportions of individuals living in poverty range from 4.1 percent to 45.4 percent in census block groups within the 5-mile buffer (20.3 percent in total), and from 7.8 percent to 44.9 percent in nearby communities.

It should be noted that the data are somewhat incomplete for block group 458.00.3, which contains sparsely populated areas, Chuckawalla Valley State Prison, and the area south of Blythe. Regardless, it is clear that a relatively large proportion of residents in the REEA earn wages below the poverty threshold. Imperial County, in particular, has a large population in poverty, exceeding the proportion of California by 6.9 percent.

Many of the communities near the West Chocolate Mountains REEA have high proportions of residents in poverty, including Mecca, Coachella, Westmorland, Brawley, and Calexico.

Table 3.17-15 Population Below the Poverty Level and Key Economic Indicators

Geographic Area	Median Household Income	Per Capita Income	Below Poverty Line		Total Population
			#	%	
5-Mile Buffer Area					
Block Group 101.00.4	$21,921	$16,334	199	4.1%	4,862
Block Group 101.00.5	$25,592	$11,297	258	21.4%	1,205
Block Group 101.00.6	$40,417	$13,716	59	17.2%	343
Block Group 123.02.3	$22,596	$16,153	231	33.8%	684
Block Group 124.00.1	$23,490	$16,629	174	17.1%	1,016
Block Group 124.00.2	$16,389	$13,286	182	28.6%	637
Block Group 456.04.1	$24,412	$10,000	1,597	42.1%	3,789
Block Group 456.04.2	$22,776	$6,755	2,809	45.4%	6,191
Block Group 458.00.2	$0	$0	0	NA	0
Block Group 458.00.3	$0	$5,472	0	0.0%	8,348
Total	n/a	n/a	5,509	20.3%	27,075
Communities					
Brawley	$31,277	$12,881	5,806	26.3%	22,096
Calexico	$28,929	$9,981	6,918	25.6%	27,042
Calipatria	$30,962	$13,970	771	10.6%	7,247
Coachella	$28,590	$7,416	6,468	28.8%	22,490
El Centro	$33,161	$13,874	8,405	22.2%	37,801

Table 3.17-15 Population Below the Poverty Level and Key Economic Indicators

Geographic Area	Median Household Income	Per Capita Income	Below Poverty Line		Total Population
			#	%	
Heber	$28,221	$8,847	688	22.9%	3,007
Holtville	$36,318	$12,505	1,002	17.8%	5,632
Imperial	$49,451	$16,538	852	11.5%	7,418
Indio	$34,624	$13,525	10,419	21.2%	49,159
La Quinta	$54,552	$27,284	1,847	7.8%	23,654
Mecca	$22,973	$6,389	2,413	44.9%	5,380
Niland	$25,592	$11,297	258	21.4%	1,205
Westmorland	$23,365	$8,941	588	27.2%	2,160
Counties					
Imperial	$31,870	$13,239	29,681	20.8%	142,361
Riverside	$42,887	$18,689	214,084	13.9%	1,545,387
State					
California	$47,493	$22,711	4,706,130	13.9%	33,871,648

Source: U.S. Census Bureau 2000b.

Figures 3.17-2 and 3.17-3 show the locations of block groups and communities presented in this analysis, as well as an indication as to which block groups contain high proportions of minority residents, high proportions of residents living in poverty, or both.

3.18 Transportation and Traffic

This section discusses applicable plans, policies, and regulations for transportation and circulation and identifies the existing circulation element and level of service (LOS) in the West Chocolate Mountains REEA. During the scoping period, meetings were conducted with the public and government agencies to identify their concerns. Two written comments were received related to transportation. The issues that were raised during scoping pertained to increased traffic and the type of congestion plans are in place and impacts to local roads. These comments will be addressed in Section 3.18.3, Existing Conditions, and in Chapter 4, Environmental Consequences, Section 4.18.

3.18.1 Definition of the Resource

Transportation Resources include public and private roadways and other routes or modes of transport that may be affected by the proposed plan.

3.18.2 Applicable Plans, Policies, and Regulations

3.18.2.1 Federal

California Desert Conservation Area Plan

On federal lands managed by the BLM, motorized routes, in addition to roads that are within the state or locally maintained roadway system, are designated for public use through the BLM's CDCA Plan (BLM 1980). The majority of these routes are unmaintained. A few major arterial roadways are maintained or paved by the BLM (or both). Most routes receive light use and do not have specific policies or regulations governing their use. A few routes that provide access to major use areas or trailheads receive moderate use and may be hardened or maintained. The CDCA Plan designates roads as open, closed, or limited for vehicle use by use class area; however, the West Chocolate Mountains REEA is within an unclassified use area (BLM 1980). The area designations are made on the basis of multiple-use classes with certain exceptions (BLM 1980).

The goal of the Motorized-Vehicle Access Element of the CDCA Plan is to provide a system and set of rules governing access to the CDCA by motor vehicles. The specific objectives in the CDCA Plan (BLM 1980) are as follows:

- Provide for constrained motorized vehicle access in a manner that balances the needs of all desert users, private landowners, and other public agencies;
- When designating or amending areas or routes for motorized vehicle access, to the degree possible, avoid adverse impacts on desert resources; and
- Use maps, signs, and published information to communicate the motorized vehicle access situation to desert users. Be sure all information materials are understandable and easy to follow.

Western Colorado Desert Routes of Travel Designations Plan Amendment

The WECO Plan Amendment establishes strategies to conserve and protect sensitive resources within the WECO planning area and provides amended route designations (BLM 2002). Currently, the route designations are codified under 43 CFR Part 8342.1 as follows:

> The authorized officer shall designate all public lands as open, limited, or closed to off-road vehicles. All designations shall be based on the protection of the resources of the public lands, the promotion of the safety of all the users of the public lands, and the minimization of conflicts among various uses of the public lands; and in accordance with the following criteria:
>
> (a) Areas and trails shall be located to minimize damage to soil, watershed, vegetation, air, or other resources of the public lands, and to prevent impairment of wilderness suitability.
>
> (b) Areas and trails shall be located to minimize harassment of wildlife or significant disruption of wildlife habitats. Special attention will be given to protect endangered or threatened species and their habitats.

(c) Areas and trails shall be located to minimize conflicts between off-road vehicle use and other existing or proposed recreational uses of the same or neighboring public lands, and to ensure the compatibility of such uses with existing conditions in populated areas, taking into account noise and other factors.

(d) Areas and trails shall not be located in officially designated wilderness areas or primitive areas. Areas and trails shall be located in natural areas only if the authorized officer determines that off-road vehicle use in such locations will not adversely affect their natural, esthetic, scenic, or other values for which such areas are established.

3.18.2.2 State

California Department of Transportation

California Department of Transportation (Caltrans) is the agency responsible for funding and maintaining the state and interstate system (Caltrans 2008).

3.18.2.3 Local

Imperial County General Plan, Circulation and Scenic Highways Element

The purpose of Imperial County General Plan is to provide the latest information about the transportation needs of Imperial County and the various modes available to meet these needs. It is also intended to provide a plan to accommodate a pattern of concentrated growth, providing both regional and local linkage systems between unique communities, and its neighboring metropolitan regions. In accordance with California's 2003 General Plan Guidelines the plan:

- Coordinates the transportation and circulation system with planned land uses;
- Promotes the safe and efficient transport of goods and the safe and effective movement of all segments of the population;
- Makes efficient use of existing transportation facilities; and
- Protects environmental quality and promotes the wise and equitable use of economic and natural resources.

Imperial County, through the Department of Public Works, administers and coordinates the development of local transportation resources, financing, and road maintenance in a manner compatible with local land use planning, development patterns, and the environment. An important county goal is to provide leadership, staff, and liaison with local and regional permitting and regulatory agencies in order to prepare plans, regulations and standards which can facilitate the transportation network development process (County of Imperial 2003).

Imperial County 20-Year Transportation Plan, Transit Vision Element

The Imperial County 20-Year Transit Vision Report was prepared for the Imperial Valley Association of Governments and released in April 2000. The Plan evaluates existing public transit services in Imperial County and provides long-term recommendations. The Plan includes specific recommendations based upon census data.

Regional Transportation Plan

The Regional Transportation Plan (RTP) is a multi-modal, long-range planning document prepared by the Southern California Association of Governments in coordination with federal, state, Imperial Valley Association of Governments (IVAG), and other regional, sub-regional, and local agencies in Southern California. The RTP includes programs and policies for congestion management, transit, bicycles and pedestrians, roadways, and finances. The RTP is prepared every three years and reflects the current future horizon based on a 20-year projection of needs.

3.18.3 Existing Conditions

3.18.3.1 Existing Access

Regional access to the West Chocolate Mountains REEA is available via Interstate 8 to the south and Interstate 10 to the north. These freeways connect to SR 111 which directly crosses the REEA.

SR 111 begins at the International Border traveling north with two travel lanes in each direction to Interstate 8 with an average daily traffic (ADT) range from 29,000 to 37,000. North of Interstate 8, the ADT ranges from 6,000 to 15,000 (County of Imperial 2003). SR 111 is eligible for future Scenic Highway Designation where it travels along the northeast shore of the Salton Sea and from Bombay Beach to the county line (see Section 3.11, Visual Resources).

Roads within the West Chocolate Mountains REEA include Coachella Canal Road, Wilkins/Weist/Highland Canal Road, Honey Wagon Road, Hot Mineral Spa Road, Spa Road, Frink Road, Niland Marina Road, Winslow Road, Old Niland/English Road, Gas Line Road, Beal Road, Tank Road, Low Road, Noffsinger/Nider Road, Flowing Wells Road, Niland-Glamis/Niland-Pegleg Well Road, and Ted Kipf Road.

3.18.3.2 Existing Traffic Volumes

Imperial County Roadway Classification System

Functional classification is the process by which roads and highways are grouped into classes or systems according to the type of service they are intended to provide. Basic to this process is the recognition that individual roads do not serve the traveling public independently in any major way. Rather, most travel involves movement through a network of roads. It therefore becomes necessary to determine how this travel can be channelized within the network in a logical, efficient manner. Functional classification defines the nature of this channelization process by defining the role that any particular road will serve for the flow of vehicles through a highway network. (Note: Provided ROWs are the minimum; more ROWs may be required on a case-by-case basis.)

- **Expressway:** The main function of this classification is to provide regional and intra-county travel services. Features include high design standards with six travel lanes; wide, landscaped medians; highly restricted access; provisions for public transit lanes including but not limited to, bus lanes, train lanes, or other mass transit type means; and no parking. Minimum ROW is 210 feet consisting of three travel lanes per direction, a 56-foot median, and shoulders along both sides of the travel way. The

ROW width is exclusive of necessary adjacent easements such as for IID facilities, as these vary. The minimum intersection spacing is one mile. (Note: ROWs may be greater if the road segment also serves as a corridor for public utilities.)

- **Prime Arterial:** The main function of this classification is to provide regional, sub regional, and intra-county travel services. Features include high design standards with four to six travel lanes, raised and landscaped medians, highly restricted access, which in most cases will be a one-mile minimum, provisions for public transit lanes, including but not limited to bus lanes, train lanes, or other mass transit type means, and no parking. The absolute minimum ROW without public transit lanes is 136 feet. (Note: ROWs may be greater if the road segment also serves as a corridor for public utilities.)
- **Minor Arterial:** These roadways provide intra-county and sub-regional service. Access and parking may be allowed, but closely restricted in such a manner as to ensure proper function of this roadway. Typical standards include the provision for four and six travel lanes with raised and landscaped medians for added safety and efficiency by providing protected left turn lanes at selected locations. Some may also contain provisions for public transit lanes or other mass transit type means. The minimum ROW is 102 feet for four lanes and 126 feet for six lanes.
- **Major Collector (Collector):** These roadways are designed for intra-county travel as a link between the long haul facilities and the collector/local facilities. Although it frequently provides direct access to abutting properties, that is not its primary purpose. Typical design features include provisions for four travel lanes without a raised median and some may also contain provisions for public transit lanes or other mass transit type means. The minimum ROW is 84 feet. Parking is generally not permitted.
- **Minor Local Collector Street (Local Collector):** These are designed to connect local streets with the adjacent collectors or arterial street system. Design standards include provisions for two travel lanes and parking, except in specific locations where parking is removed to provide a turn lane at intersections. Local collector streets frequently provide direct access to abutting properties, although that should be avoided where feasible. The minimum ROW is 70 feet.
- **Residential Street:** This street type also includes residential cul de sacs and loop streets and is designed to provide direct access to abutting properties and to give access from neighborhoods to the local street and collector street system. This classification should be discontinuous in alignment such that through-trips are discouraged. Typical design standards include provision for two travel lanes, parking on both sides, and direct driveway access. The minimum ROW is 60 feet.
- **Major Industrial Collector (Industrial):** The main function of this classification is to provide for efficient movement of goods for regional, sub-regional, and intra-county travel services. Access and parking may be allowed, but closely restricted in such a manner as to ensure safe and proper function of industrial traffic on this roadway. Typical design standards include provisions for up to four travel lanes and parking on both sides. The minimum ROW is 96 feet.

- **Industrial Local Street:** This classification is designed to connect industrial properties and areas with the adjacent industrial collector, residential, collector, or arterial system. Design standards include provisions for two travel lanes with a minimum width of 13 feet each, and parking. Industrial streets frequently provide direct access to abutting industrial sites and parking of industrial-sized vehicles. The minimum ROW is 64 feet.

In addition, the potential designation of Scenic Highway has been placed on specified roadways in the county and may be added to other roadways in the future. The purpose of this designation is to protect and enhance the county's scenic aesthetic resources that are visible from major county and state routes. Scenic Highways are further discussed in Section 3.11, Visual Resources. Table 3.18-1 summarizes the LOS for each standard street classification based on average daily vehicle trips.

Table 3.18-1 Imperial County Standard Street Classification Average Daily Vehicle Trips

Road Class	No. of Lanes, Width (feet)	X-Section[2]	Level of Service (LOS)[1]				
			A	B	C	D	E
Expressway	6, 12	154/210	30,000	42,000	60,000	70,000	80,000
Prime Arterial	6, 12	106/136	22,200	37,000	44,600	50,000	57,000
Minor Arterial	4, 12	82/102	14,800	24,700	29,600	33,400	37,000
Collector	4, 12	64/84	13,700	22,800	27,400	30,800	34,200
Local Collector	2, 12	40/70	1,900	4,100	7,100	10,900	16,200
Residential Street	2, 12	40/60	1	1	1	1	1
Residential Cul-de-Sac or Loop Street	N	40/60	1	1	1	1	1
Industrial Collector	4, 12	76/96	5,000	10,000	14,000	17,000	20,000
Industrial Local Street	2, 13	44/64	2,500	5,000	7,000	8,500	10,000

Source: County of Imperial 2003.

Notes:
1 Levels of service are applied to residential streets since their primary purpose is to serve abutting lots, not carry through traffic. Levels of service normally apply to roads carrying through traffic between major trip generators and attractors.
2 Curb to curb width (feet)/ROW width (feet).

Existing Traffic Volumes and Road Information

Table 3.18-2 shows 2008 traffic volumes on SR 111, the only major access roadway in the West Chocolate Mountains REEA. LOS is used to provide a qualitative evaluation based on certain quantitative calculations which are related to empirical values. All roads within the REEA are currently at LOS A (County of Imperial 2010). Table 3.18-3 shows Imperial County Traffic Data for Roads within the REEA including classifications, ADT, and LOS.

Table 3.18-2 2008 Traffic Volumes for State Route 111

Segment	Classification	Peak Hr Volume (back)	Peak Hr Volume (ahead)	Annual Avg. Daily Traffic (back)	Annual Avg. Daily Traffic (ahead)	LOS
Beal Road	Local Road	510	390	3,450	2,650	A
Imperial/Riverside County Line	SR	210	220	1,650	1,600	A

Sources: Caltrans 2008; County of Imperial 2010.

Table 3.18-3 Imperial County Traffic Data for Roads within the West Chocolate Mountains REEA

Road Name	From	To	Classification[1]	ADT	LOS
Coachella Canal Rd.	Ted Kipf Rd.	Frink Rd.	Major Collector-Collector	7	A
Wilkins/Weist/Highline Canal Rd.	Wilson Boyd	Perez Keystone	Minor Collector-Local Collector	25	A
Honey Wagon Rd.	Hot Mineral Spa	end	Local Road	1	A
Hot Mineral Spa Rd.	SR 111	Spa Rd.	Major Collector-Collector	209	A
Spa Rd.	Mineral Spa	End	Minor Collector-Local Collector	80	A
Frink Rd.	SR 111	Coachella Canal	Major Collector-Collector	345	A
Niland Marina Rd.	SR 111	Salton Sea	Major Collector-Collector	45	A
Winslow Rd.	Wilkins	end	Local Road	37	A
Old Niland/English Rd.	Hazard	SR 111	Not listed in ICMML	97	A
Gas Line Rd.	NA	NA	Not listed in ICMML	NA	NA
Beal Rd.	Coachella Canal	End	Local Road	14	A
Tank Rd.	NA	NA	Not listed in ICMML		
Low Rd.	Ross	Boone		7	A
Noffsinger Rd.	Burke	Flowing Wells	Minor Collector-Local Collector	40	A
Nider Rd.	Noffsinger	Stanley	Minor Collector-Local Collector	7	A
Flowing Wells Rd.	Noffsinger	Coachella Canal	Local Road	7	A
Niland-Glamis/Niland-Pegleg Well Rd.	NA	NA	Not listed in ICMML	NA	NA
Ted Kipf Rd.	Hwy 78	Ogilby	Local Road	45	A

Sources: County of Imperial 2010; Pacheco 2010.

Note:
[1] As listed in the Imperial County Maintain Mileage Logs (ICMML).

BLM Routes of Travel Designations

Routes within the West Chocolate Mountains REEA are as follows: T670433, T670432, T670434, T670416, T670417, T670436, T670417, T670431, T670447, T670445, T670438, T670437, T670446, T670458, T6701447, T670454, T670452, T670439, and T670453 (BLM 2002). These routes are all designated as Open Routes, which means they are available for all types of vehicles, with the exception of T670447 and T670452 which are unlisted (BLM 2002).

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4 Environmental Consequences

Introduction

Future development of renewable energy resources that might take place under each of the alternatives outlined in Chapter 2 may cause, directly or indirectly, changes in the human and physical/natural environment. This EIS assesses and analyzes these potential changes and discloses the effects to decision makers and the public. This process of disclosure is one of the fundamental aims of NEPA.

This EIS analyzes impacts to all resources, including habitat and protected species from possible future development, to the extent necessary for a programmatic document, subject to the availability of existing data availability. Site-specific analyses, based on data compiled from detailed studies, will be conducted for site-specific proposals. If the constraints discussed in Section 2.1 are discovered during project planning or following further future studies, as determined necessary by an authorized officer, development-specific impacts would be assessed under a separate NEPA document prior to individual project development. If constraints are discovered during individual project planning or following further future studies, as determined necessary by an Authorized Officer, portions of the REEA may be determined to be closed to and unsuitable for geothermal development through future planning efforts or the project may be denied without changing the plan decision regarding site suitability.

The following sections define and clarify the concepts and terms used in this EIS when discussing the impacts assessment. A summary of impacts for all development alternatives including the no action and the no development alternative is provided as Table 4-1.

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Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
Air Quality and Climate (Section 4.1)				
Geothermal **Construction Emissions:** • VOC levels from construction could be 7.21 tons during the first year and 22.3 tons for the remaining three years. • PM_{10} and NO_X with 129.36 tons and 250.80 tons, on average, respectively, could both exceed de minimis thresholds between years 2 and 4 and yearly emissions of CO_2e could be 3,212 tons during that timeframe. • CO_2e emissions could be 2,850 tons in year 1. **Operations Emissions:** • VOCs could amount to 0.02 tons per year (tpy), NO_X to 0.02 tpy, and PM_{10} to 4.27 tpy. **General Conformity Review for Full Geothermal:** • VOCs would not exceed the de minimis threshold. • NO_X and PM_{10} could both exceed de minimis thresholds in years 2 through 4. **Direct Impacts:** • 1,206 acres of land could be disturbed and up to 150 MW of energy supplied by fossil fuel power facilities could be replaced. • The power plant would use a closed loop process, so significant sources of air pollution during operations would not be expected. **Indirect Impacts:** • Regional effects on air quality and reduction of fossil fuel dependency. • The power plant would use a closed loop process, so significant sources of air pollution during operations would not be expected. 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 SEZ, including geothermal energy development, which could lead to an increase in air emissions from geothermal energy projects.	**Geothermal** • Same as Alternative 3.	**Geothermal** **Direct Impacts:** • Only one plant would be constructed and could replace up to 50 MW of fossil fuel power facilities. Effects on air quality are expected to be reduced compared to Alternative 3 and operational emissions could be about one-third of those estimated for Alternative 3. • The cumulative effects from multiple renewable projects could contribute to an increase in emissions of GHGs. • Under this alternative, the existing non-competitive geothermal lease application (640 acres) would be approved. Geothermal exploration would begin which would result in the air emissions for geothermal exploration. **Indirect Impacts:** • Regional air quality could be impacted, but the partial RFD scenario could contribute to reducing fossil fuel dependency from power plants that have greater operational emissions. • 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 SEZ, including geothermal energy development, which could result in the development of geothermal energy projects and impacts to air quality from the construction and O&M of geothermal power plants. • The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).	**Geothermal** Same as Alternative 3. • Lands west of the Coachella Canal would be identified as an SEZ, which would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments to occur within the West Chocolate SEZ, including geothermal energy development. The lands east of the Coachella Canal would not be considered for an SEZ. • The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).	• Given the analysis in Section 4.1, it is expected that the proposed development could lead to a short-term, localized increase in particulates and emissions. Along with current and reasonably expected levels of air emissions in the cumulative effects study area, a corresponding short-term increase in cumulative air emissions could be generated by implementation of any of the development alternatives. • The largest increase in air emissions, primarily occurring during construction, could take place under Alternative 3. Whether these emissions would trigger federal conformity or otherwise degrade air quality to cause a change in attainment status is speculative at this time. It is reasonable to assume, however, that if full build-out occurred within a four-year period, potentially substantial dust and other emissions could significantly degrade air quality in the two regulated basins. Construction could generate emissions of CO, NO_X, VOCs, SO_2, PM_{10}, and $PM_{2.5}$. • Daily construction emission rates under the alternatives are based on the assumption that all construction activities would occur concurrently and that all equipment for each activity would be operating on the same day. This assumption is expected to produce a conservative estimate of the maximum daily emissions during construction. The emissions would be localized to those locations under construction. • Construction of the reasonably foreseeable projects within the same cumulative effects study area as the West Chocolate REEA would generate similar types of emissions and could contribute cumulatively to impacts to air quality. Individually, the foreseeable projects could exceed the daily construction emission thresholds for the same or different criteria pollutants as the proposed project.

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
Solar **500-MW CSP Construction Emissions:** • A single project could generate construction emissions of 19.6 tpy VOCs, 138.4 tpy NO_X and 54.5 tpy PM_{10}. The total CO_2e during construction could amount to 51,950 tpy. **50-MW PV Construction Emissions:** • A single project could generate 73 lbs/day of NO_X, 95 lbs/day for year 1 and 110 lbs/day for year 2 of PM_{10}, and 7,957 lbs/day of CO_2e. **500-MW CSP Operations Emissions:** • Emissions could be 11.78 tpy VOC, 19.42 tpy NO_X, and 62.22 tpy PM_{10}. **500-MW PV Operations Emissions:** • Emissions could be 3.3 tpy NO_X, 0.7 tpy PM_{10}, and 1.3 tpy CO_2e. **General Conformity Review for Full Solar:** • VOC emissions for the solar RFD could be between 20.3 and 36.5 tpy, which would not exceed the de minimis threshold. • NO_X emissions could vary between 22.7 and 144.5 tpy, exceeding the de minimis threshold during the first three years. • PM_{10} would not exceed the de minimis threshold and could vary between 55.2 and 62.9 tpy. **Direct Impacts:** • 6,637 acres of CSP or 29,758 acres of PV could be developed and long-term effects on air quality would be minimal. • Fugitive dust emissions from soil disturbances during the entire construction phase would be a major concern, but would be short-term. **Indirect Impacts:** • Construction, operation, and traffic-related emissions could affect regional air quality, but could contribute to reducing GHG emissions and criteria air pollutants in the long term. • The development cap would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).	**Solar** • No solar impacts.	**Solar** • Same as Alternative 3. • Direct and Indirect Impacts: • The development cap would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).	**Solar** **Direct Impacts:** • Up to 6,637 acres of dish engine technology CSP or up to 29,758 acres of solar PV power could be developed. • Emissions from a single plant would be the same as those in Alternative 3, but cumulative air quality impacts from a maximum of three CSP projects could be reduced. **Indirect Impacts:** • Regional air quality could be impacted, but the partial RFD scenario could contribute to reducing fossil fuel dependency from power plants that have greater operational emissions. • The development cap would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).	

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
Wind **Construction Emissions:** • 4.2 tpy NO_X, 6.2 tpy PM_{10}, 537 tpy CO_2e. **Operations Emissions:** • None expected. **General Conformity Review for Full Wind:** • 1.2 tpy VOC would not exceed the de minimis threshold. • 221 tpy NO_X and 593 tpy PM_{10} could exceed de minimis thresholds. **Direct Impacts:** • A wind farm could disturb up to 76 acres and could result in short-term air quality impacts from construction engine exhaust, but could have minimal long-term GHG emissions while supporting state and national climate change policies. **Indirect Impacts:** • Construction, operation, and traffic-related emissions could affect regional air quality, but also could contribute to reducing GHG emissions and criteria air pollutants in the long term. • 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 SEZ, including wind energy development, which could lead to an increase in air emissions from construction of wind energy projects • The development cap would limit wind energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). **Preliminary Conformity Review for Alternative 3** • Total VOC levels could vary between 28.7 and 60.0 tpy, only exceeding the de minimis threshold in years 3 and 4. • NO_X emissions would always exceed the de minimis threshold and could vary between 435.5 and 616.3 tpy. • PM_{10} emissions would always exceed the de minimis threshold and could vary between 691.4 and 785.3 tpy.	**Wind** • No wind impacts.	**Wind** • No wind impacts.	**Wind** • No Wind impacts.	

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
Direct Impacts: • Alternative 3 could have the greatest beneficial impact on climate change and no effects on forest resources.				
Noise (Section 4.2)				
Geothermal **Site Evaluation/Exploration:** • Temporary 74 to 94 dBA at 50 feet. • Use of light-duty trucks, backhoes, water trucks, generators, and mud pumps among others are included. **Construction:** • Temporary 78 to 85 dBA at 50 feet. • Cranes, graders, loaders and generators among others are included. **Operation and Maintenance:** • 71 to 83 dBA at 0.5 mile for two to 20 years. • High-pressure piping cleaning could produce noise levels up to 118 dbA that could be attenuated to 44dBA with a noise silencer. **Decommissioning:** • Similar to construction levels for less than one year. **Direct Impacts:** • Ambient sound levels are assumed to be low and localized effects on human receptors could be minor to negligible. • 58 percent of the proposed site is privately owned and could be subject to Imperial County regulations with which this practice would comply. • T the pending geothermal lease application (640 acres) would be approved. Geothermal exploration would begin which would result in the noise emissions for geothermal exploration. **Indirect Impacts:** • 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 SEZ, including geothermal energy development, which could lead to an increase in noise emissions	**Geothermal** • Same as Alternative 3.	**Geothermal** **Direct Impacts:** • Only one plant would be constructed. Impacts could be of lesser intensity than the ones estimated for Alternative 3. • Under this alternative, the WCM REEA would be designated as an SEZ, which would allow other compatible renewable energy developments to occur. An SEZ would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments to occur within the West Chocolate SEZ, including geothermal energy. • The existing non-competitive geothermal lease application (640 acres) would be approved. Geothermal exploration would begin which would result in the noise emissions for geothermal exploration **Indirect Impacts:** • Same as Alternative 3. • 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 SEZ, including geothermal energy development, which could lead to an increase in noise emissions. • The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).	**Geothermal** **Direct/Indirect Impacts:** • The lands west of the Coachella Canal would be identified as an SEZ, which would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments to occur within the West Chocolate SEZ, including geothermal energy development. The lands east of the Coachella Canal would not be considered for an SEZ. • The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). • Same as Alternative 3.	• Noise impacts would be limited to locations where there are receptors to hear noise. There are no regulated noise receptors within the West Chocolate REEA and, therefore, no direct, indirect, or cumulative impacts would occur.

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
from geothermal energy projects. • The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).				
Solar **Site Evaluation/Exploration** • Temporary 74 to 97 dBA at 50 feet including, but not limited to, use of vibratory post driver, graders, excavators, rollers, forklifts, and scrapers. Construction: • Temporary 74 to 91 dBA at 50 feet including, but not limited to, the use of bulldozers, cranes, rollers, graders, backhoes, and loaders. • Ground-borne vibration from heavy machinery above 75 VdB would attenuate over distance and reach background levels at 0.1 mile from site. Potential noise impacts associated with solar projects in the West Chocolate Mountains REEA would occur during all phases of the projects. During the construction phase, potential noise impacts associated with operation of heavy equipment and vehicular traffic on nearby residences (within 500 feet) would be anticipated, albeit of short duration.	**Solar** No solar impacts.	**Solar** • Same as Alternative 3. • The development cap would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).	**Solar** **Direct Impacts:** • Noise impacts from dish engine solar technology would be similar to PV technology and overall operational noise levels could be expected to be lower than Alternative 3. **Indirect Impacts:** • The development cap which would limit geothermal and solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).	
Operation and Maintenance: • 71 to 83 dBA at 50 feet for two to 20 years. • Electric transformers and inverters could contribute the most to the composite noise at the site. • During the operations phase, potential impacts on nearby residences would be anticipated, depending on the solar technologies employed. **Decommissioning:** • Similar to construction levels for less than one year. Localized increase in ambient sound levels during the process. **Direct Impacts:** • Vibration levels from construction could create highly localized effects that would reach background noise levels at a 0.5-mile distance from the site. Compliance with local regulations would be required. • Long-term noise effects could be minor to negligible.				

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
Indirect Impacts: • The development cap would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).				
Wind **Construction:** • Temporary 78 to 89 dBA at 50 feet including, but not limited to, use of backhoes, generators, cranes, scrapers, and pneumatic tools. • Noise levels could be the greatest during construction, excavation, trenching, and use of cranes and construction of 6 miles of new roads. **Operation and Maintenance:** • 71 to 83 dBA at 50 feet for 2 to 20 years. • Amplitude modulation could occur and be heard some distance away; the specifics depend on the type and size of wind turbine used. **Decommissioning:** • Similar to construction levels for less than one year. **Direct Impacts:** • Expected to be negligible. **Indirect Impacts:** • 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 SEZ, including wind energy development which could lead to an increase in noise emissions from construction and O&M of wind energy projects. • The development cap would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).	**Wind** • No wind impacts.	**Wind** • No wind impacts.	**Wind** • No Wind impacts.	
Topography, Geology, and Geologic Hazards (Section 4.3)				
Geothermal **Direct Impacts:** • Detonation of explosives could disturb the area in the short term. • Long-term impacts could occur from new roads	**Geothermal** • Same as Alternative 3.	**Geothermal** **Direct Impacts:** • 40 wells could be drilled and could result in the net addition of access to roads and well pads. Impacts also could result in increased surface exposures	**Geothermal** • Same as Alternative 3. • The lands west of the Coachella Canal would be identified as an SEZ, a designation that would allow project-specific consideration, processing, and	• Cumulative impacts on geologic resources or seismic characteristics from geothermal exploration, drilling and development are expected to be minor. Any impacts from development that might occur would be minimal and largely limited to the REEA. The construction of new access roads,

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
and could disturb up to 144 acres. Drilling could result in a 2-acre disturbance and well equipment could result in a disturbance of 1.2 acres per mile. Installing transmission lines could disturb 12.1 acres per mile for 3 miles. • Following BLM guidelines could result in minor short- and long-term effects. • Micro-seismic events due to production and injection could occur as an indirect impact but would have insignificant impacts. **Indirect Impacts:** • 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 geothermal energy development which could lead to potential impacts to topography, geology, and geologic hazards from geothermal energy projects similar to those described above, • The development cap would limit geothermal, solar, and wind energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).		and induced erosion. • The existing noncompetitive geothermal lease application (640 acres) would be approved. Geothermal exploration would begin which would result in the impacts to topography, geology, and geologic hazards from geothermal exploration taking place. • By following BLM guidelines, sensitive geologic resources would be avoided. Specifically, stipulations and WEMs for development on soils with greater than three percent slopes, with extremely erodible or slumping soils, or soils with severe erosion hazards, badlands, rock outcrops, or slopes susceptible to mass failure, would be imposed. **Indirect Impacts:** • 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 geothermal energy development, which could lead to an increase in impacts to topography, geology, and geologic hazards from development of geothermal energy projects. • The development cap would limit geothermal and solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).	potential approval of compatible non-solar renewable energy developments to occur within the West Chocolate Mountains SEZ, including geothermal energy development. The lands east of the Coachella Canal would not be considered for an SEZ. • The development cap which would limit geothermal and solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).	improvements to existing roads and bridges, and installation of wells and facilities would involve cut and fill operations. If large amounts of fill material would be necessary, increased demands on off-site supplies of sand, gravel, and crushed rock could occur. If multiple construction projects were developed within a single area, local supplies of required fill material, particularly gravel or crushed rock, could be reduced to the point of impacting the needs of roadways and other construction projects. Local changes in topography could be caused by construction of roads, well pads, pipelines, and the power plants. Seismic events related to geothermal reservoir injection could cumulatively contribute to seismic events triggered by other geothermal development.
Solar **Direct Impacts:** • Short-term impacts could occur from exploration, clearing, and grading. Long-term impacts could occur from new roads. **Indirect Impacts:** • Indirect impacts could include long-term adverse, downstream erosion due to increased runoff. • The development cap would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).	**Solar** • No solar impacts.	**Solar** • Same as Alternative 3. • The development cap would limit solar development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). A wide variety of uses, including energy and utility development would be allowed. Any damage that permitted uses cause would be required to be mitigated.	**Solar** **Direct Impacts:** • 30 to 111 solar PV projects of 50 MW each could occur, resulting in short-term impacts such as clearing and grading activities. • By following BLM guidelines, sensitive geologic resources would be avoided. Specifically, stipulations and WEMs for development on soils with greater than three percent slopes, with extremely erodible or slumping soils, or soils with severe erosion hazards, badlands, rock outcrops, or slopes susceptible to mass failure, would be imposed. **Indirect Impacts:** • Same as Alternative 3. • The development cap would limit solar energy	

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
			development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).	
Wind **Direct Impacts:** • Impacts could be from new roads and would be similar to those of geothermal. • After reclamation, only 40 acres of BLM and private land would be disturbed. **Indirect Impacts:** • Indirect impacts could include increased surface water runoff and downstream erosion, but are not expected to be adverse. • 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 topography, geology, and geologic hazards from construction of wind energy projects. • The development cap would limit wind energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). Although reasonable protection would be provided for sensitive natural values, and mitigation of impacts and rehabilitation of impacted areas would occur when possible, the goal would be to allow development to occur within this area.	**Wind** • No wind impacts.	**Wind** • No wind impacts.	**Wind** • No wind impacts.	
Soils (Section 4.4)				
Geothermal **Direct Impacts:** • Runoff potential could increase and long-term impacts could occur during the exploration of 75 acres of the total REEA. • Surface runoff could result in short-term impacts to delicate biological soil crusts. • Hazardous waste could result from drilling and geothermal fluids could be ponded or re-injected. • By following BLM guidelines, sensitive soil resources would be avoided. Specifically, stipulations and WEMs for development on soils with greater than three percent slopes, with	**Geothermal** • Same as Alternative 3	**Geothermal** **Direct Impacts:** • 40 wells could be drilled and could result in the net addition of access to roads and well pads. This could result in increased surface exposures and induced erosion. **Indirect Impacts:** • Surface runoff could result in short-term and indirect impacts to delicate biological soil surfaces. • 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	**Geothermal** • Same as Alternative 3. • The lands west of the Coachella Canal would be identified as an SEZ, a designation that 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 geothermal energy development. The lands east of the Coachella Canal would not be considered for an SEZ. • The development cap would limit geothermal energy development east of the Coachella Canal to	

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
extremely erodible or slumping soils, or soils with severe erosion hazards, badlands, rock outcrops, or slopes susceptible to mass failure, would be imposed. • Impacts due to increased public access on new road construction could be short-term as the roads allowing the increased public access could be reclaimed after exploration activities are complete. **Indirect Impacts:** • 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 geothermal energy development which could lead to potential impacts to soil resources from geothermal energy projects similar to those described above. • The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).		Chocolate Mountains SEZ, including geothermal energy development which could lead to an increase in impacts to soils from geothermal energy projects. • The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).	a maximum of 10 percent of the BLM land (700 acres).	
Solar **Direct Impacts:** • Runoff and soil crust impacts similar to geothermal. • By following BLM guidelines, sensitive soil resources would be avoided. Specifically, stipulations and WEMs for development on soils with greater than three percent slopes, with extremely erodible or slumping soils, or soils with severe erosion hazards, badlands, rock outcrops, or slopes susceptible to mass failure, would be imposed. **Indirect Impacts:** • Could include increased surface exposures and induced erosion. • The development cap would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).	**Solar** • No solar impacts.	**Solar** • Same as Alternative 3. • The development cap would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).	**Solar** **Direct Impacts:** • 400 acres could be under permanent disturbance and each CSP dish engine plant could result in land disturbance of 2,500 acres. Higher erosion potential and alteration of off-site drainage patterns is possible. • By following BLM guidelines, sensitive geologic resources would be avoided. Specifically, stipulations and WEMs for development on soils with greater than three percent slopes, with extremely erodible or slumping soils, or soils with severe erosion hazards, badlands, rock outcrops, or slopes susceptible to mass failure, would be imposed. **Indirect Impacts:** • The conversion of 46 percent of the REEA to impervious surfaces may contribute to higher erosion potential. • Increased surface exposures and through potential development induced erosion. • The development cap which would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700	

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
			acres).	
Wind **Direct Impacts:** • Runoff and erosion could potentially increase through compaction of roads, MET pads, and other surfaces developed during the process. Increased runoff could result in higher than normal erosion and could cause sheet, rill, and gully erosion. • 36 acres of land could be permanently disturbed and could significantly alter drainage patterns or adversely impact erosion potential in addition to affecting biological soil surfaces. • Long-term impacts to soil resources could occur where construction of large impermeable surfaces could increase runoff potential. • By following BLM guidelines, sensitive soil resources would be avoided. Specifically, stipulations and WEMs for development on soils with greater than three percent slopes, with extremely erodible or slumping soils, or soils with severe erosion hazards, badlands, rock outcrops, or slopes susceptible to mass failure, would be imposed. **Indirect Impacts:** • Could include increased surface exposures and induced erosion. • 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 soils from wind energy projects. • The development cap would limit wind energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).	**Wind** • No wind impacts.	**Wind** • No wind impacts.	**Wind** • No wind impacts.	
Water Resources (Section 4.5)				
Geothermal **Direct Impacts:** • Construction activities would have insignificant hydrological alterations. • Surface water quality could be adversely impacted	**Geothermal** • Same as Alternative 3.	**Geothermal** • Same as Alternative 3. • The designation as an SEZ would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable	**Geothermal** **Direct Impacts:** • Vegetation removal and construction of impervious surfaces. • Surface water quality impacts related to disturbance	**Geothermal** Same as Alternative 3.

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
by sediment loading and drilling and geothermal fluids. Local surface water could be impacted. • Drilling of 120 wells could impact shallow aquifers and alter hydraulically connected shallow groundwater temperature. Drawdown would depend on consumptive use of the power plant. • Flood risk could increase, but floodplain impacts would not be significant with proper siting and implementation of mitigation measures. • Water supply impacts from construction may be short- or long-term, but insignificant. Operations, however, could have long-term impacts on supply and water quality due to the risk of fluid discharge. Power plants would require 17,885 AF/year. • Water needed by geothermal power plants would represent less than 1 percent of Imperial Valley's storage capacity. **Indirect Impacts:** • The water quality adjacent to the Salton Sea could be impacted and future water supplies may also be impacted. • BLM would impose specific stipulations to protect water resources related to the use of groundwater to minimize impacts associated with high operational water demand (e.g., aquifer drawdown on- and offsite and, drinking water availability). • 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 SEZ, including geothermal energy development which could lead to an increase in impacts to water resources from geothermal energy projects. • The stipulations to protect water resources and the development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres) would minimize the impact to water resources.		energy developments to occur within the West Chocolate Mountains SEZ, including geothermal energy development which could lead to an increase in impacts to water resources from geothermal energy projects • The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).	and erosion would be negligible. Flood risk could exist if proper measures are not implemented. • Operational water demand could be significant and could have direct impacts on water supplies within the REEA in the short and near term, but it is unlikely this would impact drinking water supply. **Indirect Impacts:** • The Salton Sea's water quality could be indirectly impacted, and long-term water demand may affect availability of future water supplies. • The lands west of the Coachella Canal would be identified as an SEZ, a designation that 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 geothermal energy development. The lands east of the Coachella Canal would not be considered for an SEZ. • The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).	

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
Solar **Direct Impacts:** • Widespread disturbance may increase flood risk and erosion, sediment loading to surface waters and substantial alterations to existing ephemeral and intermittent drainages. Water demand for construction is expected to be negligible. • **Indirect Impacts:** • Could include increased off-site drainage patterns and water quality at the Salton Sea by increased sediment loading. Operational water needs to wash the solar trough technologies could be supplied by local groundwater. Drawdown may result, but only if a large quantity of water is required in a very short period of time. • The development cap and stipulations to protect water resources would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).	**Solar** • No solar impacts.	**Solar** • Same as Alternative 3. • The stipulations to protect water resources and the development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).	**Solar** **Direct Impacts:** • Existing hydrology and drainage within the REEA could be substantially altered. Water supplies could be impacted if construction for these projects occurred simultaneously. **Indirect Impacts:** • The Salton Sea could be impacted by sediment loading and long-term water supplies could be impacted within the REEA and in surrounding areas. The total cumulative operational water demand could be 49,950 AF/year/MW. Quantity and timing of use would affect the degree of such impacts. • The development cap would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).	• Cumulative impacts to geology, topography, and geologic hazards are not analyzed because the analysis did not identify any direct or indirect impacts under the alternatives.
Wind **Direct Impacts:** • Increased flood risk, sedimentation, and erosion. Dust suppression may be required, but water quantities would be negligible. Drainage patterns, water quality, and groundwater likely would not be impacted. • Avoidance of project development in wetlands and setback stipulations would be strictly enforced. **Indirect Impacts:** • Could be negligible as little or no water would be required for operations. • 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. • The stipulations to protect water resources and the development cap would limit geothermal wind energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700	**Wind** • No wind impacts.	**Wind** • No wind impacts.	**Wind** • No wind impacts.	

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
acres).				
Vegetation (Section 4.6)				
Geothermal **Direct Impacts:** • Construction: 123 acres of vegetation could be impacted in the long term. Specifically from transmission lines, 21.6 acres of vegetation could have long-term disturbance. • Wells: Vegetation impacts associated with TG wells could be short-term and disturb 95 acres. FD wells could impact 240 total acres and, in the long term, could directly impact 816 acres of vegetation. • Mowing and local plan community: Mowing within the perimeter fence and along access roads would reduce the plants' biomass and some plant species could die or be damaged. Local plant community composition could be shifted, which could favor propagation of invasive weed species. • Universal plant assemblages associated with springs, seeps, and near-surface water largely consisting of mesquite thickets in a variety of localities throughout the CDCA would be removed. • Rangeland: No effects. • A sudden introduction of additional water could impact composition of local plant community and top soils could be lost due to soil disturbance. This could lead to an increase in invasive species such as Sahara mustard that may out-compete native species. Changes in riparian and wetland hydrology from water extraction could contribute to this effect and the invasive Saltcedar species could out-compete native plant species. **Indirect Impacts:** • Short- or long-term indirect impacts from potential fuel spills. • 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 SEZ, including geothermal energy development which could lead to an increase in impacts to vegetation from geothermal energy projects. • The development cap, which would limit geothermal energy development east of the	**Geothermal** • Same as Alternative 3.	**Geothermal** **Direct Impacts:** • Access roads could impact 3.6 acres per mile of vegetation. Transmission lines could impact 36.3 acres or 7.2 acres with restoration. 41 acres of native vegetation could be impacted in the long term. • FD well pads could affect 80 acres and TG could disturb 95 acres. Roads from FD wells could have long-term impacts on 144 acres and pipelines could affect an additional 48 acres of vegetation. In the long term, FD wells could impact a total of 272 acres of vegetation. **Indirect Impacts:** • 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 geothermal energy development which could lead to an increase in impacts to water resources from geothermal energy projects. • The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). • No impacts on rangeland. • Same as those for local plant communities described in Alternative 3.	**Geothermal** • Same as Alternative 3. • The lands west of the Coachella Canal would be identified as an SEZ, a designation that 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 geothermal energy development. The lands east of the Coachella Canal would not be considered for an SEZ. • The development cap which would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).	

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
Coachella Canal to a maximum of 10 percent of the BLM land (700 acres), would minimize the impact to vegetation east of the Canal. Although reasonable protection would be provided for sensitive natural values, and mitigation of impacts and rehabilitation of impacted areas would occur when possible, the goal would be to allow development to occur within this area.				
Solar **Direct Impacts:** • CSP: Solar arrays for each CSP plant could directly impact 2,000 acres of vegetation and 300 acres due to transmission lines in the long term. The only short-term impact could be the parking laydown area of 50 acres, which could be revegetated with native species. With five CSP plants, the overall long-term impact could be 6,637 acres of vegetation. • PV: Direct impacts could be much less acreage than CSP with 449.5 acres being impacted long-term and 0.5 acres being short-term. Full PV power development could impact 29,758 acres of vegetation. • Mowing and local plant community: Similar to geothermal. • Rangeland: Potential long-term adverse effects from increased dust and possible new invasive species that could affect existing forage. **Indirect Impacts:** • Could include added water to the site for dust control, cooling towers, panel washing, and other activities that could impact the local plant community. Artificial shading under the panels and mirrors could decrease photosynthesis, reduce temperatures, and could facilitate the propagation of invasive species. Changes in riparian and wetland hydrology from water extraction also could occur. The development cap would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres)	**Solar** • No solar impacts.	**Solar** • Same as Alternative 3. • The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres	**Solar** **Direct Impacts:** • 2,482 acres could have long-term impacts and 50 acres could have short-term impacts. • Dust could increase and new invasive species could possibly be introduced to the existing forage. **Indirect Impacts:** • Same as Alternative 3. • The development cap would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).	• Construction of the energy projects under the alternatives would involve grading certain areas to level the sites and to construct flood control structures, if necessary, to mitigate impacts from large storm events. Erosion could occur in these areas due to the removal of vegetation and soil exposure. Developers would implement an erosion control plan to minimize the amount of any soil erosion during construction. • Due to the potential for water-driven erosion at some project locations, such as alluvial fans, developers would be required to construct an erosion control and stormwater flow system. Erosion could occur during flash flood events, but the potential adverse effects of erosion would be addressed and minimized by the erosion control design to slow flow or impound high water for later release. Some control structures would allow sheet flow to on- and off-site drainages, thereby minimizing downcutting of soils. Drainage plans may improve existing natural washes by reinforcing their banks and allowing the remaining stormwater flow to pass through the site naturally. Construction of the erosion control and stormwater detention system would reduce water erosion susceptibility within project sites and to downgradient lands. • To further ensure that effects related to soil erosion are minimized, applicants may use BMPs in their plans of development to reduce localized soil impacts resulting from wind and water erosion; however, they would not eliminate all soil loss within project sites. Wind erosion could be exacerbated due to the removal and maintenance of vegetation within the project site, likely resulting in a localized loss of topsoil. Also, placement of impervious surfaces (primarily solar arrays, but also other energy infrastructure) may alter the drainage characteristics of the site, limiting the effectiveness of stormwater detention systems during monsoonal

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
				precipitation events. • As with construction, there would be the potential for erosion and topsoil loss during decommissioning, but the legally required erosion control measures would be implemented. Therefore, decommissioning of projects would not contribute to substantial soil erosion or loss of topsoil in the area. • All other foreseeable construction projects in the cumulative effects area for soils would be required by law to implement similar control measures to prevent erosion. However, the acreage affected by the other foreseeable projects could contribute to an overall cumulative impact to soil resources over the life of a project. • To reduce effects on soil production, applicants may be required to salvage native soil where flood control berms are built. After construction of the berms, salvaged soil would be replaced to provide a homogenous appearance as well as preserve sensitive soils and seed banks. Implementation of this type of measure could be expected for the other projects in the cumulative effects area for soils. On a local scale, the cumulative effects could be significant, given the amount of vegetation clearing and grading.
Wind **Direct Impacts:** • Local plant community: Similar to those for solar. • Areas affected would be adjacent to the turbines and along access roads. **Indirect Impacts:** • 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 vegetation from wind energy projects. • The development would be allowed, although the development cap, which would limit wind energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres), would minimize the impact to vegetation.	**Wind** • No wind impacts.	**Wind** • No wind impacts.	**Wind** No wind impacts.	

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
Fish and Wildlife (Section 4.7)				
Geothermal **Direct Impacts:** • Construction: Habitat loss for wildlife and potentially for fish could result from construction and exploration activities. There could be a direct loss of 123 acres of habitat, displacing or killing the wildlife present in that area. 108.9 acres of habitat loss to wildlife and potentially fish could result from transmission lines. However, restoration could reduce habitat loss to 21.6 acres from transmission lines. Erosion from construction, soil disturbance, increase in turbidity, and grading could alter fish and wildlife habitats. Mobile species also could be affected by an increase in vehicle use during construction and operation. • Wells: TG wells could result in habitat loss of 95 acres. FD wells could result in 240 acres of habitat loss. The long-term loss could be 816 acres of wildlife habitat. • Mowing and invasive species: The altered wildlife habitat described in Section 4.6 could be of less value to some wildlife species and more to others in the area resulting in a shift in wildlife species in the vicinity of mowed areas. Invasive species affect birds the most, may not be edible, and could degrade habitat quality of life. • Noise: Extensive noise could cause hearing loss in small animals and would occur at around 100 dBA. Noise impacts would be localized. • In the case of a construction-related spill, pollutants could be carried through groundwater or runoff and could impact fish and wildlife. • The BLM has imposed stipulations that would not permit surface use and occupancy within 100 feet of the 25-year floodplain of a riparian or wetland feature or 300 feet of artificial surface waters and associated wetlands and within 300 feet of any hydrologic feature east of the Coachella Canal. In addition, the BLM would impose stipulations to protect water resources related to the use of groundwater within the REEA. **Indirect Impacts:** • Could include potential blocks to a foraging area or water supply depending on the site selection.	**Geothermal** • Same as Alternative 3.	**Geothermal** **Direct Impacts:** • Similar to Alternative 3, but their occurrence could be reduced by one-third. Only 312 acres of BLM and other land could be disturbed. **Indirect Impacts:** • Same as Alternative 3, but not on a large scale. • 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 geothermal energy development which could lead to an increase in impacts to fish and wildlife from geothermal energy projects. • The stipulations to protect fish and wildlife and the development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).	**Geothermal** • Same as Alternative 3. • The lands west of the Coachella Canal would be identified as an SEZ, a designation that 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 geothermal energy development. The lands east of the Coachella Canal would not be considered for an SEZ. • The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).	

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
Habitat fragmentation could occur, affecting migratory corridors for wildlife populations. Displaced wildlife, especially the common raven, could cause resource competition. • Decrease or prevention of movement would increase disease, death, fire and decrease gene flow, pollen and seed dispersal and movement of food sources. If geothermal piping is too close to a corridor, it may prevent or deter individuals from passing through. Fencing around the solar power plant would remove habitat. If the removed habitat is high quality, it would force species into a lower quality area where there is already a population, potentially causing a food shortage or die-off. • Groundwater extraction could lower groundwater tables and degrade aquatic habitat for fish and other wildlife. Since more access roads would be built, human presence could increase and lead to increases in hunting or poaching which could reduce the populations of the area's species. • 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 geothermal energy development which could lead to an increase in impacts to fish and wildlife from geothermal energy projects. • The development cap, which would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres), would minimize the impact to fish and wildlife east of the Canal.				
Solar **Direct Impacts:** • CSP: Solar arrays for each CSP plant could directly impact 2,000 acres of wildlife and 300 acres due to transmission lines in the long term. The only short-term impact would be the parking laydown area of 50 acres where small mammals and reptiles could be injured or killed. With five CSP plants, the overall impact could be 6,637 acres of habitat loss which could result in a long-term reduction in wildlife abundance and richness within the project area. • Disturbance to bird breeding and breeding success	**Solar** • No solar impacts.	**Solar** • Same as Alternative 3. • The development cap would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). • A wide variety of uses, including energy and utility development would be allowed. Any damage that permitted uses cause would be required to be mitigated.	**Solar** **Direct Impacts:** • Same as Alternative 3, but impacts from CSP would be less and those for solar PV would remain the same. • The lands west of the Coachella Canal would be identified as an modified EZ, a designation that 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 geothermal energy development. The lands east of the Coachella Canal would not be	• These projects would use water for dust suppression during construction and, to a lesser degree, during operations. Geothermal power plants use groundwater for cooling and to make up a loss of geothermal reservoir water over time. Solar projects also use water to clean panels, with CSP generally requiring more cleaning than solar PV facilities. Wind farm operations do not require any water for the life of the project. The water for these purposes could be obtained from the IID from its apportionment of the Colorado River. Some water rights could be purchased from landowners.

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
in Important Bird Areas. • Noise could disrupt critical life-cycle activities (e.g., mating and nesting). For instance, disturbance of birds during the nesting season could result in nest or brood abandonment. The eggs and young of displaced birds would be more susceptible to cold or predators. • Potential for birds, bats, and insects that fly through a solar energy project to be burned by flying through standby points and reflection beams in the reflector area. Glare could also affect birds at solar energy facilities, ranging from disorientating a bird in flight to causing eye damage. • PV: Direct impacts could be less severe than CSP with 30 acres of habitat loss from transmission lines. Full PV power development could result in a loss of up to 29,758 acres of wildlife habitat. • Mowing: Solar projects require more mowing than geothermal development, so impacts from additional water inputs could be similar in severity to geothermal impacts. • Erosion: Effects for PV projects could be more severe than geothermal as they may be built in areas with slopes less than 5 percent. • Vehicles: CSP plants require more people for routine operations and could have the greatest impact on wildlife by crushing or directly killing wildlife species. • Spills: Accidental spills of hazardous materials are more likely for CSP technologies and could impact fish and wildlife. **Indirect Impacts:** • Indirect impacts could result in increased competition for resources, with impacts from common ravens and invasive species similar to those described above for geothermal development. Impacts from increased human presence would be similar to those for geothermal. • The development cap, which would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres), would minimize the impact to fish and wildlife east of the Canal.			considered for an SEZ. • The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). **Indirect Impacts:** • Same as Alternative 3.	**Water Use** • Under Alternative 3, the total water needs for all projects during a four-year construction cycle would be significant and could exceed hundreds of AF/year for dust control. Other foreseeable projects could require similar amounts of water, which would need to be supplied from the same sources. • Given that the IID has indicated that it may have up to 25,000 AF/year available for renewable energy projects, this would represent a significant shortfall and could presumably limit the numbers of projects or the timing of their construction. • Operational water needs would vary depending on the project size and technology chosen. If three of the solar projects in the West Chocolate Mountains REEA were wet cooled trough technology, they could consume up to 17,136 AF/year of water for the life of the projects. In many areas of the West, the scarcity of water has driven some developers towards technologies that are less water intensive, such as solar PV and dish-engine. If all of these projects used less-intensive water technologies, they could consume up to 3,219 AF/year for panel cleaning. If the other 11 foreseeable solar energy projects within the cumulative effects study area (i.e., within 40 miles) used less-intensive water technology, they would need similar quantities of water. • These projects could individually and collectively place a burden on surface and groundwater supplies in the area. As of 2011, there would not be enough potential water to supply all the projects for dust suppression during construction and for all operational water needs, including geothermal plants and solar projects. • Within the cumulative effects study area for hydrology, about 12 projects in Imperial and Riverside Counties may contribute to a cumulative hydrologic impact. Other solar and geothermal energy projects would also need water during construction, which could require up to 200 AF/year each for dust suppression, depending on site and soil conditions. Given that about eight of these kinds of projects currently are being proposed, up to 1,600 AF/year could be needed for dust suppression. Operational water needs (panel cleaning and domestic use) could require about 1

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
				AF/year/MW to clean solar PV and CSP panels (as well as cool trough and power tower projects). A recently proposed solar PV project near Las Vegas requires about 29 AF/year to clean up to 400 MW of solar PV panels. **Water Quality** • Water quality could also be adversely and cumulatively affected by large-scale renewable energy development in the West Chocolate Mountains REEA and surrounding areas. This would occur primarily from hazardous material spills at construction sites. Any project that would have aboveground oil storage capacity greater than 1,320 U.S. gallons, or completely buried oil storage capacity greater than 42,000 U.S. gallons, would be required by law to implement a SPCC plan, although it is unlikely that any would reach this threshold. • With successful implementation of the spill prevention measures, any release from either the proposed this project or any foreseeable project could have short-term and localized effects. Given the depth to groundwater in the area and the requirements for spill prevention and cleanup, considerable cumulative impacts to water quality would not be likely. • The combined effects of the alternatives could have a potential cumulative impact on surface water quality by increasing erosion and sedimentation, or introducing contaminated waters. • During construction of renewable projects within the West Chocolate Mountains REEA, implementation of a SWPPP and BMPs would be required by a General Permit. All other foreseeable construction projects also would be required by law to implement a SWPPP to prevent erosion. Therefore, there would not be a significant cumulative impact to erosion in the cumulative effects area. • Drainage within any project could cause sheet flow to migrating channels, which is typical of desert landscapes, especially on alluvial fans. In the Lower Sonoran Desert, these include the random summer cloudbursts that occur infrequently but could supply a large amount of water to a small area, as well as larger storms such as extra-tropical storms. Any of these storms could result in

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
				flooding that could cause significant damage across the analysis area and significant localized destruction. • Some projects under the alternatives could directly or indirectly affect jurisdictional waters as regulated by the U.S. Army Corps of Engineers. It is possible that one or more projects in combination with other past, present, or reasonably foreseeable projects could create a cumulative impact to regulated jurisdictional waters. Increased sedimentation and degraded water quality would be the primary cumulative impacts of these projects.
Wind **Direct Impacts:** • Construction: After restoration, there could be a long-term loss of 40 acres of habitat (initially 76 acres). • Mowing and invasive species: Similar impacts to geothermal energy development, but could be less significant. • Erosion: Similar impacts to geothermal energy development, but could be less significant. • Collisions: Collisions with wind turbines and/or meteorological towers could kill animals; impact could be more significant than geothermal development due to direct mortality to birds and bats during operation. Vehicle impacts could be much less significant than with CSP and geothermal, but similar to those of solar PV projects. **Indirect Impacts:** • Indirect impacts from roads, invasive species, resource competition, and increase in human presence would be similar to, but generally less severe than, those described for geothermal development. • 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 vegetation from wind energy projects. • The development cap, which would limit wind energy development east of the Coachella Canal to	**Wind** • No wind impacts.	**Wind** • No wind impacts.	**Wind** • No wind impacts.	

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
a maximum of 10 percent of the BLM land (700 acres), would minimize the impact to fish and wildlife east of the Canal.				
Special Status Species (Section 4.8)				
Geothermal **Direct Impacts:** • Construction: Loss of 90 acres could displace or kill special status species and, if transmission lines are used, could increase to 108.9 acres. • Wells: TG wells could result in short-term habitat loss. The overall effects would be similar to those discussed for plant and animal species and could be limited to 816 acres. • Listed Plant Species: Direct effects could be limited to 95 acres within the West Chocolate Mountains REEA: - Peirson's milk *vetch (Astragalus magdalenae vat. peirsonii);* - Triple-ribbed milkvetch (*Astragalus tricarinatus*); - San Diego button celery (*Eryngium aristulatum*); and - Mexican flannel bush (*Fremontodendron mexicanum*). • Direct effects also could occur to BLM sensitive species and species listed under the CESA. Effects from exploration could occur to some plant species in less dominant vegetation communities. • Listed wildlife species: Flat-tailed horned lizard and Palm Springs pocket mouse (*Perognathus longimembris bangsi*) within 95 acres in West Chocolate Mountains REEA. • Mowing and invasive species: Long-term effects could cause some special status species to decline and perhaps die out in localized areas. • Listed birds with Federal Endangered (FE); State Endangered (SE); and State Threatened (ST) status: - Southwestern willow flycatcher (*Empidonax traillii extimus*) – FE, SE - Least Bell's vireo (*Vireo bellii pusillus*) – FE,	**Geothermal** • Same as Alternative 3.	**Geothermal** **Direct Impacts:** • Similar to Alternative 3, but their occurrence could be reduced by one-third. Only 272 acres of REEA would be disturbed and 40 wells would be drilled. **Indirect impacts:** • Same as Alternative 3, but less significant. • 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 geothermal energy development which could lead to an increase in impacts to vegetation from geothermal energy projects • The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).	**Geothermal** • Same as Alternative 3. • The BLM would impose additional resource protection stipulations for the following species: the lands west of the Coachella Canal would be identified as an SEZ, a designation that 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 geothermal energy development. • The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). The lands east of the Coachella Canal would not be considered for an SEZ.	

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
SE - California brown pelican (*Pelecanus occidentalis californicus*) – FE, SE - Yuma clapper rail (*Rallus longirostris yumanensis*) – FE, ST Birds account for 13 of the 28 special status wildlife species and are likely to occur in the REEA. All native migratory birds are protected under the MBTA. The impacts could be substantial, especially because invasive plant species could potentially increase. • Erosion: Increased water turbidity could cause direct mortality to desert pupfish (*Cyprinodon macularius*) and razorback sucker (*Xyrauchen texanus*). • Collisions: Could result in direct mortality or injury to special status species and the construction of the well pad could have the greatest impact. • Noise: Prolonged noise could affect special status lizards, small mammals, and species that are less mobile. In the case of hearing loss, it could lead to mortality due to increased predation susceptibility. • Piping: Extremely hot pipes could injure or kill special status species when they come in direct contact; birds are the most likely to be impacted. • Spills: Impacts to special status species would be similar to those discussed for wildlife and plants and could be short- or long-term. **Indirect Impacts:** • Fragmentation: Impacts similar to those discussed for wildlife. Nelson's bighorn sheep would be the most susceptible to habitat fragmentation as they make considerable movements between mountain ranges; their long-term viability could be negatively impacted. • Common raven, invasive plant species and riparian areas: Impacts similar to those discussed for wildlife; especially marked for special species if alterations give non-special status species competitive advantages. • 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 geothermal energy				

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
development which could lead to an increase in impacts to vegetation from geothermal energy projects. • The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).				
Solar **Direct Impacts:** • CSP: Impacts for special status species (e.g., desert tortoise) would be similar to those described for wildlife in similar acreage. The direct impact could be on 6,637 acres of habitat. • PV: Direct impacts could be less severe than CSP and full PV power development could result in a loss of up to 29,758 acres of wildlife habitat. • Listed plant species: Impacts would be the same as those listed under geothermal. These plants, BLM sensitive species, and those listed under less dominant vegetation communities could be under direct effects of solar, and displacement could occur under a wider area than geothermal. • Mowing and invasive plant species: Effects would be similar to geothermal, but on a more significant scale. Impacts from individual CSP projects could be greater than individual solar PV due to the larger acreage required. • Erosion: Effects would be similar to those described for wildlife and erosion could be more severe for solar PV projects. • Vehicles: Same effect as for geothermal with CSP projects having more significant effects than solar PV. • Spills: Accidental spills of hazardous materials are more likely for CSP technologies and could impact special status fish and wildlife. **Indirect Impacts:** • Could result in increased competition for resources. Special status species could be impacted by common ravens and invasive species as described for wildlife for geothermal development. Impacts by increased human presence similar to geothermal. • Fragmentation and degradation of habitat may	**Solar** • No solar impacts.	**Solar** • Same as Alternative 3. • The development cap would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). • A wide variety of uses, including energy and utility development would be allowed. Any damage that permitted uses cause would be required to be mitigated.	**Solar** **Direct Impacts:** • Less severe than Alternative 3, but effects could be long-term and adverse. • Water sources used by special species would not be affected by CSP development. • The same amount of land could be developed for solar PV and the effects would be the same as Alternative 3. **Indirect Impacts:** • Same as Alternative 3. Effects could be more significant if multiple power plants were clustered in one particular area. • The development cap would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).	• The potential for vegetation impacts to combine with the effects of other projects within the geographic extent of the cumulative analysis is described below. Projects envisioned within the West Chocolate Mountains REEA could have adverse impacts on vegetation both during construction and operation. • Cumulative impacts to vegetation can be additive, that is, directly proportional in severity to the quantity of the resource affected (such as vegetation loss or wetland fill), or exponential. For exponential impacts, increasing levels become disproportionately more significant if they affect biological features that are critical to the survival of a species. • Cumulative impacts on vegetation could be exacerbated as a result of project schedules. Construction of multiple projects within the same time period could result in greater impacts from construction equipment and vehicle traffic, and overall habitat degradation and loss. If projects are constructed consecutively, project impacts could be reduced in intensity but prolonged in duration, and given the number of projects planned in the Imperial Valley and Coachella Valley region, concurrent construction likely would occur. • Projects within the West Chocolate Mountains REEA could remove cover and forage vegetation. Of particular concern would be loss to habitat and food sources used by sensitive species, such as the desert tortoise, burrowing owl, flat-tailed horned lizard, Nelson's bighorn sheep, and several bird species. The alternatives, in conjunction with other projects, could result in cumulative impacts on native vegetation communities, including spiny shrubs, cacti, ephemeral annuals, and hard grasses. Vegetation would be cleared for construction activities and, while vegetation would be allowed to repopulate areas where there would not be permanent project features, the area would

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
occur (i.e., clearing of land may destroy tortoise burrows). • Construction would create noise and would likely steer the tortoise away from the development temporarily or permanently. • The development cap, which would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres), would minimize the impact to special status species east of the Canal.				be maintained via regular mowing. Additionally, washing of the solar panels would introduce new sources of water and the solar panels would introduce new areas of shading, which could adversely affect native vegetation. Drainage and berms would alter the topography of the REEA, which could impact native vegetation. It is anticipated that other planned renewable projects in the Imperial and Riverside counties could have similar impacts to vegetation and existing habitat to the REEA.
Wind **Direct Impacts:** • Construction: Impacts to habitat available to special status species would be the same as for geothermal. • Mowing and invasive species: Impacts similar to those of geothermal energy development, but could be less significant. • Erosion: Impacts similar to geothermal energy development, but could be less significant. • Collisions: Impacts similar to those for wildlife; bats are especially affected partly due to barotrauma. The California species of special concern include: pallid bat, pocketed free-tailed bat, western mastiff bat, and western yellow bat. • Collisions with wind turbines could kill animals; impacts could be more significant than geothermal development due to direct mortality to birds and bats during operation. The federally listed bird species include: - Least Bell's vireo - California brown pelican - Yuma clapper rail - Southwestern willow flycatcher • Vehicle impacts could be much less significant than with CSP and geothermal. **Indirect Impacts:** • Same as geothermal. • Indirect impacts on special species from roads, invasive species, resource competition, and	**Wind** • No wind impacts.	**Wind** • No wind impacts.	**Wind** • No wind impacts.	

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
increases in human presence would be similar yet generally less significant than those described for geothermal.				
Cultural Resources (Section 4.9)				
Geothermal **Direct Impacts:** • Construction: Could be direct impacts on up to 1,026 acres on BLM and other land and on up to 95 acres during exploration. • Further investigation in the West Chocolate Mountains REEA is needed to determine the direct impacts on significant cultural resources. **Indirect Impacts:** • Impacts resulting from erosion are unlikely. Unauthorized surface collection could result in cultural resource impacts. • 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 geothermal energy development, which could lead to an increase in impacts to cultural resources from geothermal energy projects. • The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).	**Geothermal** • Same as Alternative 3.	**Geothermal** • Impacts could be on a total of 272 acres and similar to Alternative 3. • 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 geothermal energy development which could lead to an increase in impacts to cultural resources from geothermal energy projects. • The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).	**Geothermal** • Same as Alternative 3. • The lands west of the Coachella Canal would be identified as an SEZ, a designation that would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments to occur within the West Chocolate SEZ, including geothermal energy development. The lands east of the Coachella Canal would not be considered for an SEZ. • The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).	
Solar **Direct/Indirect Impacts** • Same as those for geothermal for 6,637 acres of CSP and up to 29,758 acres of PV. • The development cap, which would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres), would minimize the impact to cultural resources east of the Canal.	**Solar** • No solar impacts.	**Solar** • Same as Alternative 3. • The development cap would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). • A wide variety of uses, including energy and utility development would be allowed. Any damage that permitted uses cause would be required to be mitigated.	**Solar** • Impacts for solar RFD would be the same as Alternative 3 using only dish engine technology for CSP. • The development cap would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).	• The potential for impacts to vegetation to combine with the effects of other projects within the geographic extent of the cumulative analysis is described below. Projects envisioned within the West Chocolate Mountains REEA could have adverse impacts on vegetation both during construction and operation. • Cumulative impacts to vegetation can be additive or exponential. For exponential impacts, increasing levels become disproportionately more significant if they affect vegetation or habitat that is critical to the survival of a species. An example of an exponential impact is habitat fragmentation, where the result of the construction of multiple projects in a particular area results in fragmentation of areas that formerly provided contiguous habitat into

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
				separate areas too small to support dependent species. • Cumulative impacts on vegetation could be exacerbated as a result of project schedules. Construction of multiple projects within the same time period could result in greater impacts from emissions, noise, construction equipment, and vehicle traffic, and overall habitat degradation and loss. If projects are constructed consecutively, project impacts could be reduced in intensity but prolonged in duration, resulting in adverse impacts on the life cycles of species and/or resulting in prolonged or permanent displacement of wildlife from critical habitats. Given the number of projects planned in the Imperial Valley and Coachella Valley region, concurrent construction likely would occur. • Projects within the West Chocolate Mountains REEA could fragment and degrade habitat and remove cover and forage vegetation. Habitat loss of up to about 50,000 acres within the REEA and additional lands within a 40 mile radius of the REEA could result in a substantial permanent conversion of desert habitat to industrial/commercial uses. This could have a considerable impact on a variety of species through direct habitat loss and/or habitat fragmentation.
Wind **Direct Impacts:** • Same as geothermal. Also, visual impacts to historic or prehistoric resources from construction through decommissioning could be direct, adverse, and long-term. **Indirect Impacts:** • Same as geothermal.	**Wind** • No wind impacts.	**Wind** • No wind impacts.	**Wind** • No wind impacts.	
Paleontological Resources (Section 4.10)				
Geothermal **Direct Impacts:** • Exploration: Increased illegal collecting and vandalism. • Construction: Direct impacts on paleontological resources could be on up to 1,026 acres of BLM and other land; on up to 95 acres during	**Geothermal** • Same as Alternative 3.	**Geothermal** • Minor long- and short-term impacts could occur during construction; long-term impacts could occur during operation and maintenance. 40 wells would be drilled and 110 acres could be permanently altered. • Implementation of BMPs and erosion control	**Geothermal** • Same as Alternative 3. • The lands west of the Coachella Canal would be identified as an SEZ, a designation that would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments to occur within the	

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
exploration. • Physical impacts could go from the construction phase through decommissioning and could be adverse, permanent, and irreversible as paleontological resources are non-renewable and cannot be recreated. **Indirect Impacts:** • Impacts could occur through increased surface exposure and erosion; however, BMPs and erosion control measures could mitigate erosion impacts. • 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 geothermal energy development which could lead to an increase in impacts to paleontological resources from geothermal energy projects. • The development cap would limit geothermal development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). • Stipulations would be imposed requiring any land development that would eventually require decommissioning, removal of infrastructure, and environmental rehabilitation.		measures would make erosion impacts negligible. **Indirect Impacts:** • 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 geothermal energy development which could lead to an increase in impacts to paleontological resources from geothermal energy projects. • The development cap would limit geothermal development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).	West Chocolate Mountains SEZ, including geothermal energy development. The lands east of the Coachella Canal would not be considered for an SEZ. • The development cap would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).	
Solar • Same as geothermal. • A new pipeline may impact a previously undisturbed resource. **Indirect Impacts:** • The development cap, which would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres), would minimize the impact to paleontological resources east of the Canal. Although reasonable protection would be provided for sensitive natural values, and mitigation of impacts and rehabilitation of impacted areas would occur when possible, the goal would be to allow development to occur within this area.	**Solar** • No solar impacts.	**Solar** • Same as Alternative 3. • The stipulations to protect paleontological resources and the development cap would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). A wide variety of uses, including energy and utility development would be allowed. Any damage that permitted uses cause would be required to be mitigated.	**Solar** • Same as Alternative 3 on 6,637 acres of CSP or 29,758 acres of PV. **Indirect Impacts:** • The development cap would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).	• The potential for impacts on special status species to combine with the effects of other projects within the geographic extent of the cumulative analysis is described below. Projects envisioned within the West Chocolate Mountains REEA could have adverse impacts on special status species both during construction and operation. • Cumulative impacts to special status species can be additive or exponential. For exponential impacts, increasing levels become disproportionately more significant if they affect vegetation or habitat that is critical to the survival of a species. An example of an exponential impact is habitat fragmentation, where the result of the construction of multiple projects in a particular area results in fragmentation of areas that formerly provided contiguous habitat into separate areas too small to support dependent species. • Additionally, cumulative impacts on special status

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
				species could be exacerbated as a result of project schedules. Construction of multiple projects within the same time period could result in greater impacts from emissions, noise, construction equipment, and vehicle traffic, and overall habitat degradation and loss. If projects are constructed consecutively, project impacts could be reduced in intensity but prolonged in duration, resulting in adverse impacts on the life cycles of species and/or resulting in prolonged or permanent displacement of these species from critical habitats. Given the number of projects planned in the Imperial Valley and Coachella Valley region, concurrent construction likely would occur. • Projects within the West Chocolate Mountains REEA could fragment and degrade habitat and could remove cover and forage vegetation. Of particular concern would be loss to habitats used by sensitive species, such as the desert tortoise, burrowing owl, flat-tailed horned lizard, Nelson's bighorn sheep, and several bird species. These species are known to inhabit the REEA, but no critical habitat has been designated at this time. Other projects outside the REEA also could contribute to a cumulative impact to these species, especially for any individuals that must be relocated or translocated prior to construction. Habitat loss of up to about 50,000 acres within the REEA and additional lands within a 40-mile radius of the REEA could result in a substantial permanent conversion of desert habitat to industrial/commercial uses. This could have a considerable impact on a variety of special status species through direct habitat loss and/or habitat fragmentation • The West Chocolate Mountains REEA contains eight special status plant species. These species are known to inhabit other areas nearby within a 40-mile radius of the REEA and could, thus, be similarly affected by other projects in the cumulative effects study area.
Wind • Same as geothermal.	**Wind** • No wind impacts.	**Wind** • No wind impacts.	**Wind** • No wind impacts.	

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
Visual Resources (Section 4.11)				
Geothermal **Direct Impacts:** • Short-term impacts from surface disturbance on 328 acres of BLM land during exploration or construction. • Exploration impacts on visual resources could include vegetation clearing and grading for roads and presence of drilling equipment. Effects could be the greatest for highly sensible viewer groups including SR 111 motorists and REEA residents. Given the low visual quality of REEA, visual effects could be minor. • Construction impacts could include clearing for access roads, well pads and power plant, alteration of land contours, building structures, and fugitive dust. Temporarily disturbed land could be recontoured or revegetated. Effects could be larger on scale than exploration, but would still remain minor. • Decommissioning impacts could include demolition work, regrading, revegetation work, truck trips, and fugitive dust which could be beneficial. All of the abovementioned effects would be consistent with iVRM Class IV designation. • Intermittent operation and maintenance impacts could occur on 359 acres of BLM land and could include new structures, steam plumes; presence of well maintenance equipment, and lighting that could encroach on scenic views in an undeveloped desert area. Plant siting effects on high-sensitivity viewer groups could be moderate, but would still be consistent with VRM Class IV goals. **Indirect Impacts:** • 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 geothermal energy development, which could result in the development of geothermal energy projects and impacts to visual resources from construction and O&M. • The development cap would limit geothermal development east of the Coachella Canal to a	**Geothermal** • Same as Alternative 3.	**Geothermal** • All short-term effects would be less than Alternative 3 and could occur on 342 acres so that the effect would be consistent with iVRM Class IV. • Long-term effects would be the same as short-term except they could occur on 313 acres. There would be no indirect effects. • 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 geothermal energy development, which could result in the development of geothermal energy projects and impacts to visual resources from the construction and O&M. • The development cap would limit geothermal development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).	**Geothermal** • Same as Alternative 3. • The lands west of the Coachella Canal would be identified as an SEZ, a designation that 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 geothermal energy development. The lands east of the Coachella Canal would not be considered for an SEZ. • The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).	

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
maximum of 10 percent of the BLM land (700 acres).				
Solar **Direct Impacts:** • Effects would be similar for CSP and PV technologies, but CSP visual effects could be greater than PV. • Visual effects during exploration would be negligible as solar meters could be removed after use, and new access roads are not needed for their installation. • Visual effects during construction could include vegetation loss, exposed soils, alteration to natural contours, building of structures, and fugitive dust with CSP effects being greater than those for solar PV. Effects on viewer groups would be the same as for geothermal. • Decommissioning effects could include clutter, fugitive dust, and regrading. Revegetation work could be beneficial. • Operation and Maintenance for CSP: 2,500 acres of land disturbance, presence of mirrors, a new source of light and glare, and truck traffic could all encroach on scenic views that could affect 4 percent of the total land considered for development in the West Chocolate Mountains REEA. Power towers may require FAA safety lighting, adding a new source of light. • Operation and Maintenance for PV: Visual effects could include 500 acres of land disturbance, presence of solar panels, and truck traffic. Effects on the most sensitive visual group could be moderate. **Indirect Impacts:** • None	**Solar** • No solar impacts.	**Solar** • Same as Alternative 3. •	**Solar** **Short-Term Effects** • Short-term effects could be less than for Alternative 3. **Long-Term Effects** • Long-term effects could be less than for Alternative 3, but could still result in adverse effects since the use of mirrors could introduce long-term glare. • Major adverse effects would be consistent with iVRM Class IV and there would be no indirect effects. • The development cap would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).	• The alternatives are not expected to have a cumulative impact on cultural resources. The proposed action is a decision of whether or not the area should be available for renewable energy development and does not include any ground-disturbing actions in and of itself. Impacts to cultural resources likely could occur if the CDCA Plan Amendment is approved and the areas in question are proposed for renewable energy development. At this time, full cultural resources studies would be required and impacts could be determined at that time.

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
Wind **Direct Impacts:** • Short-term impacts during exploration would affect 1 acre per site for clearing, MET presence, traffic, and clutter would be negligible effects. Construction: Same impacts as solar, including exposed soils for trenching and infrastructure associated with wind facilities; these are considered to be minor. • Decommissioning: Same impacts as solar. • Long-term impacts for operation and maintenance could include high visibility of turbines, new lines into the landscape from access roads, shadow flicker, blade glint, support facility presence, light pollution, and disassembly equipment could have visual effects for about 40 acres with 15 turbines. The towers may be painted a bright white color or be lit with flashing lights, adding new sources of light and glare that could result in a major impact for sensitive visual receptors.	**Wind** • No wind impacts.	**Wind** • No wind impacts.	**Wind** • No wind impacts.	
Lands and Realty (Section 4.12)				
Geothermal **Direct Impacts:** • Area: Lands within West Chocolate Mountains REEA would be “unclassified" and are managed by BLM on a case-by-case basis, so geothermal would not conflict with BLM multiple-use management objectives. Geothermal conforms to CDCA goals; CSLC lands would be developed according to CSLC guidelines. • Land use: There are 34 BLM land use authorizations in the area. Leasing subsurface geothermal resources would not affect existing realty agreements and long-term effects to the lands would not be adverse. Future land use authorizations and land tenure adjustments would not be affected. • The development cap, which would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres), would minimize the impact to lands and realty east of the Canal • Construction: Consultation with the FAA may be necessary if structures are taller than 200 feet. A	**Geothermal** • Same as Alternative 3.	**Geothermal** • Existing realty agreements and future land use authorizations and land tenure adjustments would not be affected. • Only 312 acres of BLM land would be developed and FAA requirements would be the same as for Alternative 3. • Geothermal could be sited away from CMAGR or ISDRA land uses due to small land use; effects on lands and realty program would be the same as Alternative 3.	**Geothermal** • Same as Alternative 3. • The lands west of the Coachella Canal would be identified as an SEZ, a designation that 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 geothermal energy development. The lands east of the Coachella Canal would not be considered for an SEZ.	

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
corridor conflict analysis would be required. **Indirect Impacts:** • Due to the small amount of land that would be developed, no effect would occur. However, if many projects are suddenly developed, then conversion of this land to geothermal energy use could prevent it from being developed for other uses and make development of other industries or programs less attractive.				
Solar **Direct Impacts:** • Area use: Solar development would not conflict with BLM's objectives and lands could be developed according to CSLC guidelines. Development of solar facilities could require new ROWs to be granted and could affect BLM's ability to address other lands and realty issues. • Land use: Large amount of ROWs could constrain BLM lands. • Construction: Same as geothermal. **Indirect Impacts:** • Due to the amount of land that could be developed for solar, it would not be possible to site the project clear of land uses such as the ISDRA or CMAGR, but there would be no effect to the operation of those land use authorizations. The effects on land attractiveness would be the same as for geothermal.	**Solar** • No solar impacts.	**Solar** • Same as Alternative 3.	**Solar** • Impacts on land use would be the same as Alternative 3. • Power tower technology would not be used so there would be no need for FAA consultation, but a corridor conflict analysis would still be required. • If the REEA were to see increased solar energy development, it could contribute to the development of surrounding lands for all types of renewable energy. This could be a long-term, adverse effect to lands and realty, as no other type of development would be compatible. This could also induce other energy development within the West Chocolate Mountains REEA and make development of other industries or other programs less attractive.	• Since the paleontological analysis concluded that the alternatives would result in no impact to paleontological resources, there would be no cumulative impacts; however, mitigation would be applied to ensure that, in the event significant subsurface paleontological resources are identified during construction, they would be addressed according to the stipulations of the BLM.
Wind **Direct Impacts:** • Area: Wind development would not conflict with BLM's objectives and would conform with CDCA goals; lands could be developed in accordance with CSLC guidelines. • Land use: ROWs and realty agreements would not be affected by granting wind energy ROWs. Long-term effects would not be adverse and future land use authorizations and land tenure adjustments would not be affected. Development of a new wind facility would require a new ROW grant. • Construction: Impacts related to the FAA and corridors would be the same as for geothermal.	**Wind** • No wind impacts.	**Wind** • No wind impacts.	**Wind** • No wind impacts.	

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
Indirect Impacts: • Wind turbines could pose impacts to airspace within the area. Private pilots use small airports within the Imperial Valley, so there would be no short- or long-term impacts to civilian air traffic; however, there could be long-term impacts to the military installation immediately to the east of the REEA. Consultation with the DOD is recommended. • Same as geothermal.				
Human Health and Safety / Hazards (Section 4.13)				
Geothermal **Direct Impacts:** • Construction: Adverse health and safety impacts could occur. Individuals could be exposed to well blow-outs, heat, and hydrogen sulfide among others. Hazardous materials could be released during operations or maintenance, but could be mitigated with the appropriate measures. Locating the project adjacent to the CMAGR could have long-term adverse safety impacts for workers and equipment. • Sites: Three sites within the area may contain chemical or hazardous materials, including an abandoned military camp. If any of those sites is disturbed, short-term, adverse health impacts for workers could occur. • Drilling and operations: Fuel or potential explosions if fuel pipelines were disrupted could have short-term, adverse impacts; fires could be caused by smoking or other types of combustion. **Indirect Impacts:** • Accidents may peak during construction and Navy facilities at CMGAR could present a public danger. • 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 geothermal energy development which could lead to an increase in impacts to human health and safety from the construction and O&M of geothermal energy projects. • The development cap would limit geothermal	**Geothermal** • Same as Alternative 3.	**Geothermal** • Similar to Alternative 3, but less significant.	**Geothermal** • Same as Alternative 3. • The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).	

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).				
Solar **Direct Impacts:** • Construction: Same as geothermal, except no impacts from drilling, such as blow-outs. Also, CSP technologies could generate small HTF amounts. PV panels could be hazardous, but only if the cells are broken. CMAGR poses a potential risk to workers even during operations due to live fire on those premises; explosions could occur if gas pipelines buried below the surface are disrupted. • Waste management: Improper disposal of waste such as damaged solar cells could have short-term adverse impacts. • Fire hazards: Same as geothermal. **Indirect Impacts:** • Same as geothermal.	**Solar** • No solar impacts.	**Solar** • Same as Alternative 3.	**Solar** • Impacts for PV would similar to Alternative 3. • There would be no airspace conflicts with CSP and HTF amounts and other hazardous materials would not be present.	• The potential for the aesthetic and visual impacts of the alternatives to combine with the effects of other projects within the geographic extent of the cumulative analysis is described below. The development alternatives in this EIS could result in changes in the scenic landscape. The area is designated, however, to allow the greatest change in the natural landscape. • Plumes from dust emissions caused by construction activities could extend beyond the 1-mile cumulative effects study area buffer. These would be limited to the construction phase and only on days with favorable meteorological conditions and construction activity. Long-term intermittent, visual impacts could occur from vapor plumes from geothermal power plants. Again, these would be limited to the rare cold days in the Lower Colorado Desert. • Any one of these projects could result in an alteration to the visual character and an introduction of contrast that would be consistent with the applicable iVRM Class IV.
Wind **Direct Impacts:** • Construction: Impacts would be the same as for geothermal and solar, except there would not be blow-outs, HTF amounts, or impacts from broken PV cells. Worker safety could involve risks associated with working at heights and around rotating equipment, and from electrical discharges. Risks associated with CMAGR would be the same as those for solar. • Operations: There could be risks associated with tower failures or electromagnetic interference including radar, radio, and microwave transmission. Fire and explosion risks would be similar to those described for solar. **Indirect Impacts:** • Same as solar.	**Wind** • No wind impacts.	**Wind** • No wind impacts.	**Wind** • No wind impacts.	

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
Energy and Minerals (Section 4.14)				
Geothermal **Direct Impacts:** • Construction and Decommissioning: The sand and gravel mining operation near Frink Spring could experience short-term access impacts. Maintenance crews could be limited when working on existing transmission lines. • Operations: Long-term loss of 938 acres of land which could potentially be used in other forms for energy and mineral resource development, but would still be consistent with the National Energy Policy. • The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). **Indirect Impacts:** • There could be a long-term beneficial impact from future energy projects being able to use the transmission line infrastructure required for this project.	**Geothermal** • Same as Alternative 3.	**Geothermal** • Direct and indirect impacts would be similar to Alternative 3 except that only 313 acres of BLM and other land could be lost.	**Geothermal** • Same as Alternative 3. • The lands west of the Coachella Canal would be identified as an SEZ, a designation of that 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 geothermal energy development. The lands east of the Coachella Canal would not be considered for an SEZ.	
Solar **Direct Impacts:** • Construction: Same as geothermal. • Operations: PV facilities could result in long-term loss of 450 acres that could be used in other developments. A CSP facility could result in 2,482 acres lost. **Indirect Impacts:** • Same as geothermal.	**Solar** • No solar impacts.	**Solar** • Same as Alternative 3 while being consistent with the National Energy Policy.	**Solar** • PV and CSP impacts would be similar except that CSP would only use dish engine technology.	• Impacts to lands and realty could involve curtailing land use authorizations currently allowed by the CDCA Plan, including ROWs, easements, and other lands actions, or limiting future lands actions. While the West Chocolate Mountains REEA is currently closed to renewable energy ROWs, other ROWs could be authorized, subject to additional NEPA review, under the CDCA Plan. The designation of all or part of the REEA for renewable energy ROWs and geothermal leases could limit future non-renewable energy ROWs or other lands actions. No currently pending ROW applications would be affected by the alternatives; therefore, there would be no direct, indirect, or cumulative impacts to the lands and realty program. Other, existing land use authorizations would not be affected because future applications would be subject to valid, existing rights.
Wind **Direct Impacts:** • Construction: Same as geothermal. • Operations: Same as solar, except that acreage	**Wind** • No wind impacts.	**Wind** • No wind impacts.	**Wind** • No wind impacts.	

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
lost could be 40 acres of BLM and other lands. **Indirect Impacts:** • Same as solar.				
Recreation Resources (Section 4.15)				
Geothermal **Direct Impacts:** • Geothermal would not conflict with the local recreation goals or plans. • Construction and decommissioning: Access to OHV trails and recreational areas could be limited. Siting away from OHV routes could minimize conflicts with residents and users of public lands. Short-term impacts from siting the project near sites such as ISDRA or Niland Marina Park could be completely avoided if the project was sited far away. • Wells: Depending on where wells are sited, designated trail segments may have to be rerouted. **Indirect Impacts:** • Hunters or birdwatchers could be affected by construction or decommissioning. Related noise, dust, or odor could disrupt users' enjoyment. Siting the project away from recreational areas would mitigate that impact and the overall impact would be low since the West Chocolate Mountains REEA does not have a high recreational draw. • The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).	**Geothermal** • Same as Alternative 3.	**Geothermal** • Same as Alternative 3.	**Geothermal** • Direct and indirect impacts would be similar to Alternative 3 but the total area could be reduced to 109 acres on BLM land and 312 on BLM and other lands. There would not be significant adverse impacts. • The lands west of the Coachella Canal would be identified as an SEZ.	**Geothermal** Same as Alternative 3.
Solar **Direct Impacts:** • Construction: Given the magnitude of the project, it would be difficult to site it away from recreational areas, and long-term effects to OHV routes could be adverse. • Operations: Access to recreational areas such as campgrounds and open OHV trails could be restricted or blocked, and user experience could be disrupted. • Effects on users and residents could impact their enjoyment of the ISDRA and could have minor to	**Solar** • No solar impacts.	**Solar** • Same as Alternative 3. •	**Solar** • Long-term adverse effects could occur and could conflict with the management goals of the CDCA and WECO Plans. • There could be conflicts with recreational users and impacts would be similar to those described in Alternative 3. • Routes of travel could be adversely affected and there could be spill-over effects. • Same as geothermal.	• Regarding cumulative environmental contamination impacts, a proposed project's contribution to a cumulative impact would only be considered significant if it combined with other projects to result in substantial volumes of contaminated soil that required off-site treatment and that, as a combined volume, exceeded the capacity of available treatment facilities or resulted in substantial exposure of hazardous materials to the public. For the reasons discussed below, projects under the West Chocolate Mountains REEA EIS would not contribute to cumulative impacts.

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
moderate long-term aesthetic impacts to the natural scenic setting. **Indirect Impacts:** • Amount of development could have spill-over effects into the ISDRA or Niland Marine Park and the level of their use could rise. Long-term effects could be adverse within county and state parks within Imperial County. • Same as geothermal.				**Hazardous Materials, Spills, and Potential Exposures** • Construction and operational activities associated with the West Chocolate Mountains REEA EIS could result in releases of hazardous materials in localized areas in the REEA. Applicants would implement a number programs and measures to reduce the potential for a spill and to address spills that occur. In addition to the SWPPP and the SPCC Plan that would be required, the applicant would prepare a Waste Management Plan, a Health and Safety Plan, an Emergency Response Plan, and a Weed Management Plan. Additionally, developers would implement a Hazardous Materials Management Program, which would outline procedures for storage and transport of hazardous materials and would restrict the refueling of construction equipment on site. Given the small quantities of materials to be used during construction and operations, any spill would be small and would be readily cleaned up using the applicant's plans. The measures described above would reduce the potential for spills of hazardous materials and ensure cleanup measures would be implemented if a spill were to occur. Since any spills would be small, localized, and cleaned up, there would be no potential for project impacts to combine with impacts of other projects, and there would not be a significant cumulative impact. • There is currently no evidence to suggest that on-site soils or groundwater are contaminated, but they have not been sampled and characterized and mining activity has been reported within the site boundaries. The West Chocolate Mountains REEA is currently undeveloped and vacant, and there is no evidence of previous commercial or agricultural activity. Several construction activities could involve disturbance of soils and exposure of groundwater as a result of excavation, drilling, or surface disturbance including site preparation (clearing and grading), water wells and water storage pond construction, O&M building construction, substation below-grade equipment installation, and foundations for the transmission line structures and the solar tracking system foundations. • Fire Hazards: Wildfire risks from construction and

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
				operations would be associated with combustion of native materials due to smoking, refueling, sparks from welding, and operating vehicles and other equipment off roadways. Brushing activities for vegetation control and removal during construction could result in fire. These risks would be associated with construction and large foreseeable projects. Applicants would develop and implement a Fire Management Plan that would establish standards and practices to minimize the risk of fire danger and, in case of fire, provide for immediate suppression and notification. Concurrent construction of the foreseeable construction could increase the fire risks; however, each project would implement its own fire management program to reduce the potential risk of fires. Therefore, there would not be a significant cumulative impact.
Wind **Direct Impacts:** • Construction: Impacts on access to recreation could be short-term and intermittent. Since the project would use a small amount of land, it could be sited away from recreation areas and have no effect. Unless the project is sited adjacent to areas like the ISDRA, there would be no effect or displacement into other recreation areas. **Indirect Impacts:** • Hunters, fishers, and birdwatchers may be affected, but the project could be sited away from recreational areas and thus have no effect. Given the low recreational draw to the area, effects could be low anyway. • Same as solar.	**Wind** • No wind impacts.	**Wind** • No wind impacts.	**Wind** • No wind impacts.	
Special Management Areas (Section 4.16)				
Geothermal **Direct Impacts:** • Construction: Construction could have adverse, short-term effects on feeding and reproduction of wildlife within SMAs. Invasive and noxious weeds due to deposition of dust in nearby SMAs also could occur. • Operations: Noxious fumes could cause air pollution, and these changes could cause long-term impacts to recreation users in the nearby	**Geothermal** • Same as Alternative 3.	**Geothermal** • Direct and indirect impacts would be similar to Alternative 3, but the total impact area would be reduced. No indirect impacts to SMAs would be expected. This would conform to ISDRA and surrounding SMAs management goals.	**Geothermal** • Same as Alternative 3. • The lands west of the Coachella Canal would be identified as an SEZ, a designation that 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 geothermal energy development. The lands east of the Coachella Canal would not be considered for an	

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
SMAs. • The ISDRA is the only SMA adjacent to the REEA, so if the siting was away from it, there would be no effects. • The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). **Indirect Impacts:** • Indirect effects would only occur if three power plants were all constructed adjacent to the ISDRA or one of the other SMAs within a 10-mile radius.			SEZ.	
Solar **Direct Impacts:** • Construction: Same as described above for geothermal. Also, dust settling on vegetation may alter their ability to photosynthesize. • Operations: The visual impact of the presence of the facilities could have long-term adverse effects to users of recreation areas in nearby SMAs and facility lighting could adversely impact SMA wildlife. • Effects from solar on the ISDRA could only occur if it is built adjacent to it. If PV is developed to the maximum extent, it is unlikely that the nearby SMA could be avoided, which would conflict with ISDRA management goals. **Indirect Impacts:** • Impacts would be similar to those described above, but could be limited to noise, air, and visual effects from operations and construction. For the ISDRA, there could be erosion effects. CSP projects may be sited away from the ISDRA, while it would be harder to do the same with PV. • Same as geothermal.	**Solar** • No solar impacts.	**Solar** • Same as Alternative 3.	**Solar** • Only CSP dish technology would be implemented and could result in a smaller impact area. Direct and indirect impacts would be similar to Alternative 3. • Same as geothermal.	• No direct or indirect impacts to energy and minerals were identified, and no cumulative impacts were identified.
Wind **Direct Impacts:** • Construction and operations: Same as solar. Also, operations could have long-term adverse effects to birds and bats. • Wind development could be sited away from the nearby recreational SMA, so there would be no effects.	**Wind** • No wind impacts.	**Wind** • No wind impacts.	**Wind** • No wind impacts.	

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
Indirect Impacts: • Same as solar. Also, there could be bat and avian species mortality in the West Chocolate Mountains REEA SMAs.				
Social and Economic Conditions (Section 4.17)				
Geothermal **Direct Impacts:** • Costs: No actual costs have been identified yet; industry averages have been used for estimations. • Construction and exploration: Total costs could be between $225 and $382.5 million. 465 jobs in Imperial County could be generated. Impacts could be significant, short-term, and beneficial. • Operations: Impacts to the regional economy could be long-term and positive. Costs could be between $4.7 and $8.3 million. 111 full-time jobs could be lost upon decommissioning. • The ISDRA would only be affected if the project is sited adjacent to it and construction vehicles could be parked off-trail. • Traffic impacts in the short term would not be significant, but long-term impacts on the quality of local roads could be adverse. Lane closures may be necessary. **Indirect Impacts:** • Increased	**Geothermal** • Direct impacts for the Geothermal RFD would be the same as Alternative 3. **Indirect Impacts:** • Economic: The 465 jobs from construction could support an additional 123 jobs in the community. Construction could generate an additional $5.6 million in employee earnings and regional economic output by $16.7 million. Operations could support an additional 55 jobs, indirectly increasing labor income by $2.3 million and economic output by $7.2 million. • Public Revenue: The total state and local taxes from construction could be a one-time $3.12 million and $12.41 million annually from operations. The federal tax from construction could be a one-time $6.79 million and $6.63 million annually from operations. • Population: During peak construction, there could be 300 workers per day for 36 months and less than a 0.1 percent increase in population. The vast majority of the construction and operation workers could come from existing local workforce. • Housing: Impacts to community housing are anticipated to be beneficial in the long term. • Social: Similar to Alternative 3, but aesthetic concerns could decrease. • Recreation: Similar to Alternative 3, but recreational experiences would not be altered. • Other: There would be no significant socioeconomic impact on public infrastructure. • Environmental Justice: Same as Alternative 3.	**Geothermal** • Construction costs could be between $75 million and $127.5 million and 155 jobs could be generated. Operation costs could be between $1.6 million and $2.8 million and 37 jobs could be created.	**Geothermal** Same as Alternative 3.	

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
Solar **Direct Impacts:** • Construction: Estimated costs could be $340.4 million for PV and $2.066 billion for solar trough. There could be a total of 649 full-time jobs for PV and 2,949 for solar trough. • Operations: Annual operation costs are estimated at $0.6 million and $19.5 million for PV and solar trough, respectively. PV could require five full-time jobs and solar trough could require 91. • Earnings: Employee earnings in the region could increase by $455.2 million during construction and by $8.5 million during operations. Jobs could be lost upon decommissioning.	**Solar** • No solar impacts.	**Solar** • Same as Alternative 3.	**Solar** • Direct and indirect impacts would be the same as Alternative 4 and CSP solar dish technology implementation would not have significant changes.	• Up to about 50,000 acres of land could ultimately be developed for renewable energy at the West Chocolate Mountains REEA. In addition, tens of thousands of acres of other BLM and non-BLM land could be developed in the foreseeable future. If all of these projects are developed, they would cause a cumulative impact to recreational use in the region. None of these areas, however, are specifically managed for recreation (that is, they are not Special Recreation Management Areas), but rather are managed for extensive recreation.
Wind **Direct Impacts:** • Construction: Estimated costs could be $91.3 million. Total full-time construction jobs could be 53. • Operations: Annual costs could be $0.9 million. Four full-time jobs could be required. • Earnings: Total employee earnings in the region could increase by $3.9 million during construction and by $290,000 during operations. Jobs could be lost upon decommissioning. **Geothermal, Solar, and Wind** **Direct and Indirect Impacts:** • The development cap would limit geothermal, solar, and wind energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). • Regional economic impact: There could be a positive multiplier effect from new construction workers to local merchants. The multiplier effects (both direct and indirect) were modeled with an IMPLAN model. • Construction: Total impacts (both direct and indirect) could result in 5,205 jobs, $313 million in labor income, $401 million in value added and $900 million in economic output. These impacts could be short-term over a four-year period. • Operations: Total impacts would be 315 jobs, $37.67 million in labor income, $129.04 million in value added, and $177.57 million in economic	**Wind** • No wind impacts.	**Wind** • No wind impacts. **Total Direct Impacts:** • Economic: Total construction jobs could be 3,753 and total operation jobs could be 133. The total construction costs could reach $2.5 billion and total operation costs could reach $22.9 million. **Total Indirect Impacts:** • A portion of the $2.4 billion could be spent in the local economy. Construction jobs could support an additional 992 jobs, an additional $43.9 million in employee earnings could be added and economic output could increase by $178.9 million. The 211 full-time, permanent operations workers could support an additional 104 jobs in the region and increase labor income by $3.5 million and total economic output by $11.0 million. • Public revenue: The total state and local taxes from construction could be a one-time $25.20 million and $14.90 million annually from operations. The federal tax from construction could be a one-time $54.82 million and $7.96 million annually from operations. • Population: Peak workforce could be 990 workers a day for 36 months, 106 workers could be employed during operations and the long-term effect could add 347 people to the population, representing less than a 0.25 percent increase. High unemployment rates could temper the need	**Wind** • No wind impacts.	

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
output. • Public Revenue: The impact could be positive and revenues would be generated through sales, property taxes, and royalty payments for geothermal, and from rental rates for solar and wind. The total state and local taxes from construction would be a one-time $27.64 million and $23.61 million annually from operations. The federal tax from construction would be a one-time $60.12 million and $12.61 million annually from operations. • Population: Impacts could range from regionally beneficial to locally adverse in the short term. The project likely would not induce substantial growth in the region, although localized growth is feasible. Total in-migration from specialized workers could be 386 people, representing a 0.25-percent increase in population to Imperial Valley communities. In an extreme and unlikely case, if all new workers relocated to Niland, the community could grow by 27 percent resulting in long-term adverse impacts. • Housing: It is expected that workers could commute up to two hours and their temporary stay could be accommodated by 2,700 guest rooms among 50 hotels in additional housing or permanent housing. Vacancy rates are high in the Riverside County portion of the REEA and availability of housing is more than adequate. Long-term housing impacts are not anticipated to be adverse. • Short-term Social Impacts: The construction force likely would be comprised of existing residents; however, some may be temporary workers. If hundreds of new, temporary residents came into the area, slightly adverse social impacts could occur. • Demographics: Rural communities have higher rates of senior citizens who could feel threatened by an influx of younger, single males. Workers may also experience physical and social isolation. • Families: Construction-related families are not expected to move to the area, but there is a possibility for an increase in the cost of area rents		for outside workers. • Housing: Impacts are anticipated to be beneficial in the long term with few, if any, workers choosing to relocate and others staying temporarily. • Social impacts: Similar to Alternative 3. Also, aesthetic concerns could decrease with the absence of wind. • Recreation: Activities would only be disrupted for a short time and the impact would not be enough to alter the recreational experience. • Other: No impact on public infrastructure in the socioeconomic impact area would occur. • Environmental Justice: Same as that described for Alternative 3 given that more analysis is needed.		

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
in the short-term. • Values: Social impacts may be incompatible if rapid economic growth resulted in the erosion of small-town values and a rural atmosphere with which people identify. • Recreation and OHV: There could be beneficial economic benefits, but aesthetic impacts could be adverse as perceived by the communities in Niland whose identities could be threatened and local economies adversely affected. If Slab City is affected by the project, social impacts could be adverse to community cohesion. • Environment and military: There is theoretical support from NGOs and environmental groups. In spite of the economic benefits, impacts could be regarded as threats to military readiness and national security. • Agriculture: If the project results in substantial water use, there may not be wide support since it could threaten agriculture, the main economic driver of the region • Long-Term Social Impacts: There could be a slight increase in permanent employment in the region and long-term environmental impacts including noise and aesthetic impacts; widespread social impacts are not anticipated. Growth of alternative energy is seen as a key goal and is socially valued although there could be long-term adverse impacts to water availability. Overall, the long-term economic and social benefits are in agreement with the generalized expressed attitudes and are anticipated to be beneficial and modest. • Recreation: Disruptions would be short in time and any impacts could be transitory and very limited. • Other Socioeconomic Impacts: Needs from relocation could be readily met by existing infrastructure and given the transient nature of construction jobs, impact to schools could be marginal. • Environmental Justice: Hispanic population in the REEA exceeds 50% in Imperial County and 20.8% of the population of Imperial County has income below the poverty level. Depending on project siting, identified minority or low-income populations could suffer disproportionately high beneficial and adverse human health and environmental effects.				

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
Further analysis is required once siting is finalized.				
Transportation and Traffic (Section 4.18)				
Geothermal **Direct Impacts:** • Exploration: Each well could require 30 tractor trailer trips and 10 passenger vehicle trips per day for up to 180 days. • Construction: There could be 300 passenger vehicle and light truck trips per day. • Operations: There could be 22 worker trips daily in addition to visitor and contractor trips • The ISDRA would only be affected if the project is sited adjacent to it and construction vehicles could be parked off-trail. • Traffic impacts in the short term would not be significant, but could cause long-term adverse impacts on the quality of local roads. Lane closures may be necessary. **Indirect Impacts:** • The development cap, which would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres), would minimize the impact to lands and realty east of the Canal.	**Geothermal** • Same as Alternative 3.	**Geothermal** • Direct and indirect impacts would be similar to Alternatives 3 and 4, but total trips should be reduced and impacts would not have a significant adverse impact to transportation. There would be no indirect impacts.	**Geothermal** • Same as Alternative 3.	
Solar **Direct Impacts:** • Construction: For a 500-MW solar trough project, there could be a maximum of 2,100 worker trips a day (to and from the site) and up to 9,300 delivery truck trips over three years depending on the amount of cut and fill required for the solar trough project, resulting in adverse effects. Solar PV could require up to 400 worker trips per day (to and from the site) and there could be up to 1,000 truck trips throughout the 14-month construction period. • CSP project construction could degrade the LOS (but not down to LOS D) or could limit access to recreational areas. • PV projects could degrade the LOS during construction. Mitigation measures would be implemented. • Operations: No significant impacts anticipated.	**Solar** • No solar impacts.	**Solar** • Same as Alternative 3.	**Solar** • Impacts would be similar to Alternative 3 except that the total number of trips would be reduced for CSP; PV and indirect impacts would remain the same.	• With the exception of a small portion of the ISDRA, there are no SMAs within the West Chocolate Mountains REEA; therefore, no cumulative impacts would occur.

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
• Lane closure may be necessary for equipment delivery. **Indirect Impacts:** • Traffic could have adverse and short-term effects during construction. • Same as geothermal.				
Wind **Direct Impacts:** • Construction: There could be up to 100 trips per day for workers and 100 per day for equipment delivery. The LOS effect could be short-term and not adverse. Oversized loads could impact local road quality. • Operations: Low volumes of heavy and medium-duty pickup trucks could be used and increases in the use of local roads during decommissioning could be short-term. **Indirect Impacts:** • Same as wind.	**Wind** • No wind impacts.	**Wind** • No wind impacts.	**Wind** • No wind impacts.	
				• The potential impact of the proposed plan, when added to other past, present, and reasonably foreseeable future actions, would constitute the cumulative effects from renewable energy development. During construction of the potential projects, local spending would increase in Imperial and Riverside Counties. This would benefit the local and regional economy through expenditures on goods and services. • While all of the projects considered in the cumulative impacts analysis would be expected to have some influence on socioeconomic resources, a number of major renewable energy construction projects are planned which would be expected to have a particular influence on socioeconomic conditions. Collectively, these foreseeable projects would require large numbers of laborers during construction, but would have a smaller labor force for operations. • The addition of the foreseeable projects could draw on the unemployed work force, but also could draw workers from other regions, especially for scarce technical skills. Local construction workers for projects or any of the foreseeable projects would receive additional income for the duration of their

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
				employment. These local workers as well as non-local workers would likely spend locally. Construction crews would use local accommodations for lodging, which would have a beneficial impact on the service industry in the area. Projects would also draw on locally procured materials, goods, and services and some regional suppliers would be stimulated by these purchases. As more clean energy projects are permitted over time to meet renewable portfolio standard mandates, key regional suppliers to providers could benefit in the future from retooling and inventory replenishment related to the clean energy infrastructure transformation in the area. The concurrent construction of the foreseeable projects could result in a beneficial cumulative impact on the local and regional economy and tourism, and could decrease unemployment for the periods of construction. • The cumulative socioeconomic impacts would take place within a setting characterized by trade-offs between desert habitat/ecological resources and alternative land uses in addition to energy development. The main theme would be managing how renewable energy generation comes on line within a fragile desert community ecosystem in a sustainable manner. Cumulative socioeconomic impacts can arise from the increased competition for remaining land (following build-out to reach renewable portfolio standards targets) and desert scarcity that may arise from the cumulative effects of permitting multiple projects and their related mitigation and of purchased land offset requirements to preserve habitats elsewhere. Competing against these mitigation and conservation uses will be other commercial, industrial, and residential developments proposed by municipalities. The competing pressures from collective energy developments could contribute to social conflicts and dissension related to differing views concerning the highest and best use of remaining lands within municipal borders. • Some forms of tourism involving the natural appreciation of the desert and OHV use of this open space area could be impacted by the Development alternatives, but mitigation would address this potential small effect. Collectively, however, cumulative effects from multiple

Table 4-1. Comparison of Effects, Residual Impacts, and Cumulative Effects

Alternative 3 Effects (Full Geothermal, Solar, and Wind)	Alternative 4 Effects (Full Geothermal, No Solar or Wind)	Alternative 5 Effects (Partial Geothermal and Full Solar, No Wind)	Alternative 6 Effects (Full Geothermal, Partial Solar, No Wind)	Cumulative Effects
				renewable projects to recreation may adversely affect economic conditions and the sense of social well-being of historical recreational users of the area. • Further, given that many people live in the area due to its rural character, projects approved under the West Chocolate Mountains REEA EIS combined with other changes in the landscape may permanently alter the rural feel of the community. **Environmental Justice** • Cumulative impacts to environmental justice are not analyzed for the West Chocolate Mountains REEA EIS because it would not result in disproportionately high or adverse effects on minority or low-income populations and, therefore, would not contribute to cumulative impacts to environmental justice. • Up to 1,000 personally operated vehicles, supply vehicles, and large trucks with construction equipment and materials could use the local road network to access renewable energy projects in the West Chocolate Mountains REEA. About four other foreseeable projects could also be built during the same timeframe, with an additional traffic load. Together, these activities would not cause a permanent cumulative impact to the transportation network, but could cause intermittent traffic disruptions during peak construction periods if all projects are built concurrently. Traffic increases during operations would be significantly lower and would, therefore, not exceed LOS for SR 111.

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Effects

Effects may refer to ecological, aesthetic, historical, cultural, economic, social, or health related phenomena that may be caused by activities associated with a proposed plan or alternatives. Effects may be direct, indirect, or cumulative.

Direct Effects

A direct effect is caused by the action and occurs at the same time and place as the action. Direct and indirect effects are discussed in combination under each affected resource.

Indirect Effects

Indirect effects are caused by the action, but occur later in time or are separated by some distance from the action, yet are still reasonably foreseeable. Direct and indirect effects are discussed in combination under each affected resource.

Cumulative Effects

Effects on a resource are cumulative when added to the effects (or anticipated effects) from other past, present, or future projects in the cumulative effects area for the project. The cumulative effects area may be larger than the direct effects area.

Residual Impacts

Effects are considered residual when the effect cannot be completely avoided or minimized and remain after or despite mitigation.

Duration

When describing the duration of effects, “temporary” refers to those effects that could occur primarily during construction. “Short-term” refers to effects lasting three years or less. “Long-term” refers to effects lasting more than three years. The duration of a land use plan is typically 20 years.

Impact Indicators

Impact indicators are the consistent measures used to determine the quality, intensity, and duration of change in a resource. Working from an established existing condition (i.e., the baseline conditions described in Chapter 3, Affected Environment), this indicator would be used to predict or detect changes in a resource related to causal effects of a proposed plan.

Mitigation

Where applicable, mitigation measures have been proposed in Chapter 2 of this document. Mitigation measures are solutions to environmental impacts that are applied in the impact analysis to reduce intensity or eliminate the impacts. An agency may adopt such mitigation measures in its decision document. Under CEQ regulations, (40 CFR 1508.20) mitigation includes:

- Avoiding the impact, altogether, by not taking a certain action or parts of an action;
- Minimizing impacts by limiting the degree or magnitude of the action and its implementation;
- Rectifying the impact by repairing, rehabilitating, or restoring the affected environment;
- Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; or
- Compensating for the impact by replacing or providing substitute resources or environments.

Best Management Practices Included in the Analysis

For impacts identified in the following resource sections, a suite of possible BMPs that may be adopted by a decision maker, assuming the environmental issue warrants this, has been developed that would be implemented during all appropriate phases of a project from initial ground breaking, to operations, and through closure and decommissioning. The BMPs are provided in Appendices I-A and I-B and include a combination of the following:

- Mitigation measures and BMPs from the Geothermal PEIS, the Solar PEIS, and the Wind PEIS;
- BMPs proposed as part of the Desert Renewable Energy Conservation Plan (DRECP)
- Regulatory requirements of other federal, state, and local agencies;
- USFWS terms and conditions identified in the BO; and
- Additional BLM-proposed standard ROW grant terms and conditions, and standard or special stipulations.

As discussed in Section 1.6.1.3 and Section 2.3, the REAT agencies (CEC, CDFG, BLM, and USFWS) jointly prepared the *Best Management Practices and Guidance Manual: Desert Renewable Energy Projects.* The BMPs proposed in the manual have been adopted for all of the development alternatives in this proposed plan amendment and are analyzed in this EIS. All the BMPs presented in the Solar PEIS, as well as those presented in the Geothermal PEIS and the Wind PEIS, have been adopted for this planning initiative as described below and listed in Appendix I.

Although the West Chocolate Mountains EIS will be finished prior to the DRECP, the EIS will not be superseded by the DRECP, and new leases will not have to wait until the DRECP is final. This is due to careful coordination taking place now and as the DRECP is developed.

Many of the other BMPS are required by agencies other than the BLM and their implementation will be enforced by those other agencies with the project applicant. For instance, mitigation land may be required by the CDFG. A project applicant will be required by the ROD and the lease agreement or ROW grant to comply with the requirements of those other agencies (e.g., 43 CFR 2805.12(a)), federal and state laws and regulations, and more stringent state standards for public health and safety, environmental protection and siting for constructing, operating, and maintaining any facilities and improvements on the ROW. Any non-compliance with implementation of these other federal or state requirements may impact the approval status of the ROD and ROW grant.

As noted above, the BLM recognizes that other agencies' requirements are not generally within the enforcement authority of the BLM since the other agencies' requirements originate in state law and regulation. While the project applicant must comply with these measures, they are not directly enforceable by the BLM except in the general sense referred to above. For those requirements that are also within the enforcement authority of the BLM due to overlapping authorities, the BLM incorporates those requirements into its ROW grant or lease as its own terms and conditions subject to its enforcement authority.

Appendix I represents a suite of possible BMPs that an Authorized Officer can choose from according to their applicability. The impact analysis of the efficacy of the mitigation measures can be done on a project-specific basis.

Monitoring

Monitoring can provide important information, including whether decisions were implemented as designed, their effectiveness in achieving desired outcomes and the effectiveness of mitigation measures. Monitoring can also determine whether the impact analysis was accurate. In certain instances, monitoring is required.

Terms and Conditions Found in the Geothermal Steam Act, Federal Land Policy and Management Act, and Bureau of Land Management Right-of-Way Regulations

The BLM considers competitive geothermal energy leases under the Geothermal Steam Act of 1970, as amended (30 U.S.C. 1001-1025) and the Energy Policy Act of 2005 (Pub. L. 109-58). Wind and solar energy exploration and development under ROW grants are considered under the FLPMA of 1976 (43 U.S.C. 1701 et seq.). Lands for geothermal energy development, which are nominated for leasing by geothermal developers, and solar and wind energy ROWs must first be identified as suitable for these purposes in a land-use plan prepared according to Section 302 of the FLPMA.

The environmental consequences analysis in this EIS identifies impacts and mitigation measures to reduce/eliminate impacts. The mitigation measures identified by the BLM and incorporated as a term and condition of the ROW grant or other authorizing document provide those actions necessary to prevent unnecessary or undue degradation of the public lands as required by Section 302 of the FLPMA. The BMPs that are identified and described in Appendix I of this EIS and that will be enforced by the other agencies, as noted above, provide additional protection to public land resources. Specifically, this EIS identifies BMPs that would:

- Require compliance with Air Quality Management District state regulations, reduce carbon emissions, and minimize dust;
- Require planning and compliance with federal, state, and local agency requirements for drainage, erosion, and sediment control, wastewater management, groundwater use and monitoring, streambed alteration, and stormwater control and monitoring;
- Require measures to protect public health and safety including traffic control, transmission line standards, and worker safety plans; and
- Require biological resource mitigation and cultural resources mitigation to protect sensitive environmental resources and cause the least damage to the environment and protect the public interest, while allowing the project to be constructed.

The BLM will monitor conditions and review geothermal, solar, or wind authorization issued for a project to evaluate if future changes to the authorization terms and conditions are necessary or justified under this provision of the regulations to further minimize or reduce impacts resulting from the project.

If approved, the solar and wind energy authorizations will include development terms and conditions, consistent with the requirements of 43 CFR 2805.12(i)(5). Failure of the holder to comply with the development terms and conditions provides the BLM authorized officer the authority to suspend or terminate the authorization (43 CFR 2807.17). Solar and wind energy authorizations will include a required “Performance and Reclamation” bond to ensure compliance with the terms and conditions of the authorization, consistent with the requirements of 43 CFR 2805.12(g). The Performance and Reclamation bond will consist of three components. The first component will be hazardous materials; the second component will be the decommissioning and removal of improvements and facilities; and the third component will address reclamation, revegetation, restoration, and soil stabilization.

If approved, the geothermal authorizations will include lease stipulations as well as subsequent development terms and conditions consistent with the requirements of 43 CFR 3214. Specifically, geothermal exploration operations will be consistent with 43 CFR 3251.15, drilling operations will be consistent with 43 CFR 3261.18, and utilization operations will be consistent with 43 CFR 3271.12 and 3273.19.

4.1 Air Quality and Climate

This section discusses the effects on air quality and climate that could occur with implementation of the alternatives. First, the management goals are provided; second, the impact indicators used to identify and analyze effects are presented; third, typical impacts are discussed for geothermal, solar, and wind energy; and last, impacts are analyzed by alternative.

4.1.1 Management Goals

The CDCA Plan provides management direction for air quality protection in the region. Under this plan, areas will be managed to protect their air quality and visibility in accordance with Class II objectives of Part C of the Clean Air Act (CAA) Amendments, unless otherwise designated another class by the State of California as a result of recommendations developed by any BLM air quality management plan.

4.1.2 Impact Criteria

The potential risk of direct impacts on air quality and climate is assessed with respect to the following criteria. Potential impacts could occur if the any of the following were to take place:

- Causes or contributes to any new violation of the National Ambient Air Quality Standards (NAAQS);
- Increases the frequency or severity of any existing violation of any NAAQS;
- Delays timely attainment of any standard or any required interim emission reduction or other milestones;
- Results in non-conformance of an action with an applicable State Implementation Plan (SIP);
- Exceeds significance thresholds established by the local air pollution control authority (Imperial County Air Pollution Control District [ICAPCD]);
- Helps or hinders attainment of the state's goals of reducing GHG emissions to 1990 levels by the year 2020;
- Increases the consumption of energy resources, especially fossil fuels;
- Results in decreased energy efficiency of and an increase in overall GHG emissions from an existing facility;
- Generates GHG emissions, either directly or indirectly, that could have a significant impact on the environment;
- Conflicts with any applicable plan, policy, or regulation of an agency adopted for the purpose of reducing the emissions of GHGs; or
- Impacts forest resources.

General Conformity Review

The General Conformity Rule is a statutory obligation under Section 176(c)(4) of the 1990 CAA Amendments as set forth by Congress. Section 176 authorizes the EPA and the states to regulate federal activities to a greater extent than they regulate private activities. All private, state, and federal activities must comply with specific SIP requirements and obtain pre-construction permits, if applicable. Pursuant to Section 176, only federal agencies are required, as an additional matter, to determine, prior to taking that action, whether such action will conform to the SIP. The SIP identifies sources of emissions and control measures to reduce emissions. Federal actions within this area are subject to conformity determinations under 40 CFR 93.

Applicability of the General Conformity Rule is generally reviewed on a project specific, case-by-case basis. At the programmatic level, emissions from potential development scenarios can be evaluated for General Conformity applicability. This gives a sense of how development related emissions could affect the goals of the applicable SIP; however, as projects are proposed, a detailed analysis of emission would be performed to determine applicability of General Conformity and any need for a full determination and mitigation.

EPA sets *de minimis* conformity thresholds, which refer to the maximum allowable increase in direct and indirect emissions between each projected year and the baseline year for each criteria pollutant in nonattainment and maintenance areas. Emissions below these levels are presumed to conform to the SIP within the meaning of the General Conformity Rule. Since the West Chocolate Mountains REEA is located in an area designated as nonattainment for both ozone (O_3) and particulate matter less than 10 microns in diameter (PM_{10}), a conformity applicability review would be required for nitrogen oxides (NO_X), volatile organic compounds (VOCs), and PM_{10} at the project-by-project implementation. Table 4.1-1 presents the applicable *de minimis* levels for exemption from General Conformity.

Table 4.1-1 *De Minimis* Levels for Exemption from General Conformity Rule Requirements

Pollutant	Tons per Year
O_3 (VOCs or NO_X)	
Moderate non-attainment and ozone maintenance areas	
VOCs	100
NO_X	100
PM_{10}	
Serious non-attainment areas	70

Source: 40 CFR Parts 51 and 93, as amended March 24, 2010.

If an action is in a nonattainment area and the total emissions for each year of the action are below *de minimis* levels, a determination of whether the project is regionally significant is still needed.

In addition, proposed actions (or portions of the actions) could be exempted from the Conformity Determination if they involve the development of major new or modified stationary sources that require a permit under the new source review (NSR) program or the prevention of significant deterioration (PSD) program, or direct emissions from hazardous waste remedial and removal actions carried out under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The General Conformity Rule was recently amended to also exclude minor stationary sources permits from the conformity emissions analysis (75 FR, April 5, 2010, pages 17254-17279).

Additional exemptions to the General Conformity Rule would also be applicable to the authorizations to be provided under the West Chocolate Mountains RFD Scenario. If, after the authorization, the federal agency retains no control over the land, then there is the potential for some of the emissions to be exempt from the General Conformity Rule.

Imperial County Air Pollution Control District Thresholds of Significance

The ICAPCD has developed guidelines for evaluating air quality impacts for proposed plans undergoing environmental review. Approximately 60 percent of the REEA would be developed in private or state land; therefore, on a case-by-case basis and in addition to the general conformity applicability review, projects to be developed within the West Chocolate Mountains REEA would be also required to be evaluated in terms of the applicable local air quality impact significance thresholds. These emissions threshold levels are shown in Table 4.1-2.

Table 4.1-2 Imperial County Air Pollution Control District Impact Significance Criteria

Criteria Pollutant	Construction Emissions (lbs/day)	Operational Emissions (lbs/day)
NO_X	100	55
ROG (VOC)	75	55
PM10	150	150
CO	550	550
SO_X	n/a	150

Source: ICAPCD 2007.

Significance Criteria in Adjacent Areas to West Chocolate Mountains REEA – Coachella Valley

Coachella Valley is located in Riverside County within the Salton Sea Air Basin (SSAB), under the jurisdiction of the South Coast Air Quality Management District (SCAQMD). The SCAQMD adopted its CEQA Air Quality Handbook to assist other public agencies with the preparation of air quality analyses. As part of this handbook, SCAQMD has developed both regional and localized thresholds of significance. SCAQMD air quality significance thresholds are summarized in Table 4.1-3. In addition, SCAQMD has developed a localized significance

threshold methodology used for analyzing localized impacts associated with project-specific activities near potential sensitive land uses.

Table 4.1-3 South Coast Air Quality Management District Air Quality Significance Thresholds

Threshold Category	Pollutant	Construction	Operations
Mass Daily Thresholds	NO_X	100 lbs/day	55 lbs/day
	VOC	75 lbs/day	55 lbs/day
	CO	550 lbs/day	550 lbs/day
	PM_{10}	150 lbs/day	150 lbs/day
	$PM_{2.5}$	55 lbs/day	55 lbs/day
	Lead	3 lbs/day	3 lbs/day
	SO_X	150 lbs/day	150 lbs/day
TAC and Odor Thresholds	TACs (including carcinogens and non-carcinogens)	Maximum Incremental Cancer Risk ≥ 10 in 1 million; Cancer Burden > 0.5 excess cancer cases (in areas ≥ 1 in 1 million); Hazard Index ≥ 1.0 (project increment)	
	Odor	Project creates an odor nuisance pursuant to SCAQMD Rule 402	
Ambient Air Quality Standards	NO_2[1]	0.18 ppm (1-hour average) 0.03 ppm (annual average)	
	PM_{10}	10.4 µg/m^3 (24-hour average) 1 µg/m^3 (annual average)	2.5 µg/m^3 (24-hour average) 1 µg/m^3 (annual average)
	$PM_{2.5}$	10.4 µg/m^3 (24-hour average)	2.5 µg/m^3 (24-hour average)
	Sulfate	1 µg/m^3 (24-hour average)	
	CO[1]	20 ppm (1-hour average) 9.0 ppm (8-hour average)	

Source: SCAQMD Air Quality Significance Thresholds (SCAQMD 2009).
Note:
[1] SCAQMD is in attainment for NO_2 and CO. Project impacts would be significant if they cause or contribute to an exceedance of attainment standards.

For the purposes of determining whether or not GHG emissions from projects are significant, SCAQMD recommends calculation of project GHG emissions including direct, indirect, and to the extent information is available, life-cycle emissions during construction and operation. The project would be analyzed under Tier 3 of the SCAQMD guidelines, which state that construction emissions would be amortized over the life of the project (defined as 30 years) added to the yearly operational emissions, and then compared to the interim GHG significance "screening level" (i.e., threshold) of 10,000 metric tons of carbon dioxide equivalent (CO_2e) per year.

Significance Criteria in Adjacent Areas to the West Chocolate Mountains REEA – San Diego County

The air quality cumulative effects area would cover adjacent lands of San Diego County located within a 40-mile buffer from the West Chocolate Mountains REEA. The San Diego County Air Pollution Control District (SDAPCD) has established thresholds for the preparation of Air Quality Impact Assessments and/or Air Quality Conformity Assessments. Applicable thresholds of significance for stationary source emissions within SDAPCD are summarized in Table 4.1-4.

Table 4.1-4 San Diego County Air Pollution Control District Air Quality Significance Thresholds

Pollutant	Thresholds of Significance (lbs/day)
Carbon Monoxide (CO)	550
Oxides of Nitrogen (NO_X)	250
Oxides of Sulfur (SO_X)	250
Particulate Matter (PM_{10})	100
Particulate Matter ($PM_{2.5}$)	55
Volatile/Reactive Organic Compounds and Gases (VOC/ROG)	75

Source: SDAPCD Rule 1501, 20.2(d)(2).
Notes:
Thresholds for VOCs are based on the threshold of significance for reactive organic gases (ROG) from Chapter 6 of the CEQA Air Quality Handbook of the South Coast Air Quality Management District.
Thresholds for ROG corresponds to the eastern portion of San Diego County based on the threshold of significance reported on Chapter 6 of the CEQA Air Quality Handbook of the Southeast Desert Air Basin.
Thresholds are applicable for either construction or operation phases of a proposed plan.

4.1.3 Typical Air Quality Impacts from Energy Development

4.1.3.1 Typical Air Quality Impacts from Geothermal Energy Development

The Geothermal PEIS identified typical impacts on air quality associated with geothermal energy development. The impacts are incorporated by reference and summarized in Table 4.1-5.

Table 4.1-5 Typical Sources of Impacts on Air Quality and Climate from Geothermal Energy Development

Project Phase	Activity	Criteria Pollutant [1, 2, 3]	Factors
All	Exhaust from vehicular traffic.	CO, CO_2, NO_X VOC, particulates, SO_2, toxic air contaminants.	Vehicle-miles traveled (VMT)[4].
All	Fugitive dust from vehicle traffic on paved and unpaved roads.	Particulates.	VMT, road conditions.

Table 4.1-5 Typical Sources of Impacts on Air Quality and Climate from Geothermal Energy Development

Project Phase	Activity	Criteria Pollutant [1, 2, 3]	Factors
All	Fugitive dust from earthmoving activities.	Particulates.	Acres disturbed, soil conditions.
All	Exhaust from construction equipment.	CO, CO_2, NO_X VOC, particulates, SO_2, toxic air contaminants.	Volume of fuel used, engine/abatement technology.
Exploration, drilling operations, utilization	Release of geothermal fluid vapor.	CO, H_2S, mercury, arsenic, boron.	Chemical composition of geothermal resource, duration and volume of flow testing, frequency, duration, and volume of well blow-outs, type of power plant.

Source: BLM 2008.
Notes:
1 California standards for ozone, carbon monoxide (except for Lake Tahoe), sulfur dioxide (1- and 24-hour), nitrogen dioxide, suspended particulate matter- PM_{10}, $PM_{2.5}$, and visibility reducing particles are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in §70200 Title 17 CCR.
2 National standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest eight-hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 $\mu g/m^3$ or less than one. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact EPA for further clarification and current federal policies.
3 GHGs include: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6), and other fluorinated gases. Emissions of GHGs are typically expressed in terms of CO_2 equivalents (CO_2e), where the potential of each gas to increase heating in the atmosphere is expressed as a multiple of the heating potential of CO_2.
4 VMT on a road is the product of the number of vehicles traveling the road and the miles traveled by each vehicle.

4.1.3.2 Typical Air Quality Impacts from Solar Energy Development

Based on a review of environmental documentation for other solar energy projects, typical impacts for solar energy projects have been developed. The impacts are summarized in Table 4.1-6. It should be noted that, depending on the solar power generation technology selected, different emissions sources would be involved during both the construction and operational phases of a solar energy development. For example, a CSP operation could involve additional emissions sources as compared to a solar PV plant, including boilers, heaters, pumps, and emergency generators.

Table 4.1-6 Typical Sources of Impacts on Air Quality and Climate from Solar Energy Development

Project Phase	Activity	Criteria Pollutant [1, 2, 3]	Factors
All	Exhaust from vehicular traffic.	CO, CO_2, NO_X VOC, particulates, SO_2, toxic air contaminants.	Vehicle-miles traveled (VMT)[4].
All	Fugitive dust from vehicle traffic on paved and unpaved roads.	Particulates.	VMT, road conditions.
Construction	Fugitive dust from earthmoving activities.	Particulates.	Acres disturbed, soil conditions.
Construction	Exhaust from construction equipment.	CO, CO_2, NO_X VOC, particulates, SO_2, toxic air contaminants.	Volume of fuel used, engine/abatement technology.
Construction	Concrete batch plant[5].	Particulates.	Volume of concrete produced.
Operations and Maintenance	Emergency generator[2]. Stationary Combustion equipment (e.g., boilers, pumps).	CO, CO_2, NO_X VOC, particulates, SO_2, toxic air contaminants.	Volume of fuel used or hours of operation.

Sources: BLM 2010a,b.
Notes:
1 California standards for ozone, carbon monoxide (except for Lake Tahoe), sulfur dioxide (1- and 24-hour), nitrogen dioxide, suspended particulate matter- PM_{10}, $PM_{2.5}$, and visibility reducing particles are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in §70200 Title 17 CCR.
2 National standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest eight-hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m^3 or less than one. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact EPA for further clarification and current federal policies.
3 GHGs include: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6), and other fluorinated gases. Emissions of GHGs are typically expressed in terms of CO2 equivalents (CO_2e), where the potential of each gas to increase heating in the atmosphere is expressed as a multiple of the heating potential of CO_2.
4 VMT on a road is the product of the number of vehicles traveling the road and the miles traveled by each vehicle.
5 May not be present at all sites.

Diesel engine exhaust, dust from trucks, and dust generated during construction grading are the primary short-term direct and indirect impacts to air quality from the construction of solar energy projects. Exhaust emissions can only be controlled by approved emission control devices on each vehicle, and dust emissions can be mitigated by periodic watering of roads. Dust during grading can be minimized by watering the surface prior to grading. Commercially available bonding agents can be applied after grading is complete to prevent dust. Mitigation measures would reduce these effects to residual, short-term, direct and indirect air quality impacts.

4.1.3.3 Typical Air Quality Impacts from Wind Energy Development

The Wind Energy PEIS identified typical impacts on air quality associated with wind energy development. The impacts are incorporated by reference and summarized in Table 4.1-7.

Table 4.1-7 Typical Sources of Impacts on Air Quality and Climate from Wind Energy Development

Project Phase	Activity	Pollutants [1, 2, 3]	Factors
All	Vehicular traffic.	CO, CO_2, NO_X VOC, particulates, SO_2, toxic air contaminants.	Vehicle-miles traveled (VMT)[4].
All	Vehicle fugitive dust from paved and unpaved roads.	Particulates.	VMT, road conditions (e.g., silt loading, silt content, moisture content, and vehicle weight).
Construction	Construction fugitive dust from earthmoving activities.	Particulates.	Acres disturbed.
Construction	Construction equipment exhaust.	CO, CO_2, NO_X VOC, particulates, SO_2, toxic air contaminants.	Volume of fuel used.
Construction	Concrete batch plant[5].	Particulates.	Volume of concrete produced.
Operations and Maintenance	Emergency generator[5].	CO, CO_2, NO_X VOC, particulates, SO_2, toxic air contaminants.	Volume of fuel used or hours of operation.

Source: BLM 2005.
Notes:
1 California standards for ozone, carbon monoxide (except for Lake Tahoe), sulfur dioxide (1- and 24-hour), nitrogen dioxide, suspended particulate matter- PM_{10}, $PM_{2.5}$, and visibility reducing particles are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in §70200 Title 17 CCR.
2 National standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest eight-hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 $\mu g/m^3$ or less than one. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact EPA for further clarification and current federal policies.
3 GHGs include: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6), and other fluorinated gases. Emissions of GHGs are typically expressed in terms of CO_2 equivalents (CO_2e), where the potential of each gas to increase heating in the atmosphere is expressed as a multiple of the heating potential of CO_2.
4 VMT on a road is the product of the number of vehicles traveling the road and the miles traveled by each vehicle.
5 May not be present at all sites.

4.1.4 Air Quality Impacts by Alternative

Given that the analyses for the development alternatives in this EIS assume impacts associated with full achievement of levels of development consistent with the reasonable foreseeable scenario for each renewable energy resource, rather than project-level information, these analyses rely on similar geothermal, solar, and wind energy development projects to estimate impacts on air quality and climate. Construction and operational emissions from similar

project development are presented in the following sections as reference for discussing potential effects for typical plants to be developed under each scenario under analysis; however, project-level analyses would be undertaken to determine potential direct and indirect impacts in detail.

Based on the evaluation criteria described in Section 4.1.2, this analysis discusses the potential effects of the overall development scenarios with respect to the General Conformity Rule. The analysis presented below for each alternative is a preliminary applicability review for General Conformity; any determination and mitigation would be done for specific projects as they are proposed. Actions are exempt where the total net increase of all reasonably foreseeable direct and indirect emissions would be less than specified emission rate thresholds, (*de minimis* limits). In addition, projected emissions levels have been evaluated in terms of the thresholds of significance presented in the ICAPCD CEQA Air Quality Handbook (ICAPCD 2007). Appendix D contains a detailed description of the emissions assumptions and calculations.

Consideration of the effects of future actions that might occur under the alternatives also takes into account the phenomena of GHG emissions, carbon sequestration, and climate change, generally. The tools necessary to quantify climatic impacts are presently unavailable (BLM 2008). As a consequence, impact assessment of specific effects of anthropogenic activities and specific levels of significance cannot be determined. Therefore, climate change analysis for the purpose of this document is limited to accounting for and disclosing GHG emissions (and other factors that contribute to climate change) that could result from future activities that could be taken to implement the plan amendments proposed and analyzed in this document. Qualitative and quantitative evaluations of potential factors that could result from the future actions that could be taken to implement each alternative within the West Chocolate Mountains REEA are included, where appropriate and practicable.

4.1.4.1 Alternative 1: No Action/No CDCA Plan Amendment

Because geothermal, solar, and wind development could still occur under the No Action/No CDCA Plan Amendment alternative, air quality and climate impacts would be expected to be similar to those detailed in Section 4.1.4.3 for Alternative 3. However, development under the No Action/No CDCA Plan Amendment alternative may occur at a slower rate because an individual plan amendment process would be necessary for each geothermal and solar or wind authorization; thus, impacts may occur at a slower rate, as well.

No renewable energy development cap or other protective stipulations/measures pertaining to the east side of the Coachella Canal would be adopted under this alternative. Thus, there would be no restrictions on development east of the Coachella Canal, and air quality impacts that would not occur under Alternative 3 east of the Coachella Canal could occur under Alternative 1.

4.1.4.2 Alternative 2: No Development/CDCA Plan Amendment to Identify Areas as Closed to and Unsuitable for Geothermal, Solar, and Wind Energy Development

There would be no new construction or operation of geothermal power plants, or solar or wind energy projects, except those which are currently approved or operating. Air quality would not be affected by new geothermal, wind, or solar projects; however, the closure of these lands

for renewable energy development would represent an opportunity cost. The energy that could have been supplied by development of this area for geothermal, solar, and/or wind energy would have to be filled by other fossil fuel or renewable energy generating facilities constructed elsewhere.

No renewable energy development cap or other protective stipulations/measures pertaining to the east side of the Coachella Canal would be adopted under this alternative. Thus, there would be no restrictions on development east of the Coachella Canal, and air quality impacts that would not occur under Alternative 3 east of the Coachella Canal could occur under Alternative 2.

4.1.4.3 Alternative 3: Renewable Energy Development Emphasis

Under this alternative, geothermal, solar, and wind could be developed to the maximum extent as defined in the geothermal, solar, and wind RFD scenarios. Up to 1,026 acres of land could be disturbed for development of geothermal power plants; up to 29,758 acres of land could be disturbed for development of solar PV projects; up to 6,637 acres could be disturbed for development of CSP projects; and up to 76 acres of land could be disturbed for wind energy projects. Solar development could occur through the development of a 50-MW solar PV power plant and 500-MW CSP power plant.

Air Quality Emissions Estimates under the Geothermal RFD Scenario

Development under the geothermal RFD scenario would involve both temporary and permanent air pollutant emission sources. Exploration activities would be undertaken during a short-term period in an early development phase. Full development of the geothermal RFD scenario would take several weeks per well, with an estimated total duration of four years to develop all wells. Construction of the 50-MW geothermal power plants (three in total) would be a short-term activity with an estimated duration of four to six months per plant. Drilling and power plant construction would generate combustion and fugitive dust emissions. Major combustion emissions could result from drilling rigs, off-road construction equipment, and vehicles. Fugitive emissions could result from activities such as site preparation, on-site construction, and vehicle traffic. After construction, operation of the full-diameter (FD) wells along with the geothermal power plants could occur on a long-term basis.

Assumptions

For the purposes of this analysis, the following assumptions have been made:

- Duration of the RFD scenario development would have a total duration of 4 four years, on the following sequence:
  - Year 1: Exploratory drilling;
  - Year 2: FD wells drilling and construction of one 50-MW power plant (including access roads and transmission lines);
  - Year 3: FD wells drilling and construction of a second 50-MW power plant (including access roads and transmission lines);

  - Year 4: Final well development and third 50-MW power plant construction (including access roads and transmission lines).
- Exploration drilling would occur during the first year, with a total duration between 6 to 12 months;
- Drilling would last up to 4 weeks per well, with a total estimated duration of 3 years to drill all wells;
- Construction of single 50-MW power plant would last 4 to 6 months;
- Power plants would be developed in increments of 50 MW of plant capacity per year; and
- Power plants would use binary conversion technology, with no release of geothermal fluid to the atmosphere.

Air Quality Emissions Estimates for Year 1: Geothermal Exploratory Drilling and Road and Pipeline Construction

During Year 1 of the RFD scenario, exploratory surveys and drilling would occur. Simultaneously, emissions from road and pipeline construction and on-road vehicle use could also occur. Appendix D provides a detailed breakdown and assumptions related to the assessment of air emissions from the construction of these facilities. Table 4.1-8 summarizes emissions estimates during Year 1.

Table 4.1-8 Year 1 Geothermal Emissions Estimates in Tons for the West Chocolate Mountains REEA

Activity	VOCs	NO_X	SO_2	CO	PM_{10}	CO_2e[(1)]
Well Development – Fugitive Dust	n/a	n/a	n/a	n/a	0.02	n/a
Well Development – Combustion Equipment	2.97	17.55	2.77	24.30	0.47	1,553
Construction	4.22	52.39	3.48	11.34	31.76	1,278
On-Road Vehicles	0.01	0.09	0.00	0.10	5.08	19
Total Emissions from Construction	7.21	70.04	6.25	35.74	37.33	2,850

Note:
[1] CO_2 equivalent (CO_2e) emission rates are provided in metric tons per year (MTCO2e/year).

Air Quality Emissions Estimates for Year 2: Geothermal Drilling and Power Plant Construction

During Year 2 of the RFD scenario, it is estimated that the remaining exploratory wells would be drilled and FD well drillings and construction of one 50-MW geothermal power plant would commence. Construction of the power plant is expected to take a total of four months to complete. It has been estimated that 69.9 acres could be disturbed during construction of a single power plant. On-road vehicle emissions were also estimated. Appendix D provides a detailed breakdown and assumptions related to the assessment of air emissions from the construction of these facilities. Table 4.1-9 summarizes emissions estimates for Year 2.

Table 4.1-9 Year 2 Geothermal Emissions Estimates in Tons for the West Chocolate Mountains REEA

Activity	VOCs	NO_X	SO_2	CO	PM_{10}	$CO_2e^{(1)}$
Well Development – Fugitive Dust	n/a	n/a	n/a	n/a	0.03	n/a
Well Development – Combustion Equipment	3.96	23.40	3.69	32.40	0.63	2,070
Construction	18.24	226.28	15.05	48.97	113.4	931
On-Road Vehicles	0.15	1.12	0.00	0.95	15.3	211
Total Emissions from Construction	22.34	250.80	18.74	82.32	129.36	3,212

Note:
[1] CO_2 equivalent (CO_2e) emission rates are provided in metric tons per year (MTCO2e/year).

Air Quality Emission Estimates for Year 3: Geothermal Drilling and Power Plant Construction

During Year 3, additional wells would be drilled and construction of a second 50-MW power plant would be completed. The emissions estimate assumes that an additional 69.9 acres could be disturbed during plant construction. On-road vehicle emissions were also estimated. Appendix D provides a detailed breakdown and assumptions related to the assessment of air emissions from the construction of these facilities. Table 4.1-10 summarizes emissions totals for Year 3.

Table 4.1-10 Year 3 Geothermal Emissions Estimates in Tons for the West Chocolate Mountains REEA

Activity	VOCs	NO_X	SO_2	CO	PM_{10}	$CO_2e^{(1)}$
Well Development – Fugitive Dust	n/a	n/a	n/a	n/a	0.03	n/a
Well Development – Combustion Equipment	3.96	23.40	3.69	32.40	0.63	2,070
Road and Pipeline Construction	18.24	226.28	15.05	48.97	113.41	931
On-Road Vehicles	0.13	1.00	0.00	0.87	15.29	211
Total Emissions from Construction	22.33	250.68	18.74	82.24	129.36	3,212

Note:
[1] CO_2 equivalent (CO_2e) emission rates are provided in metric tons per year ($MTCO_2e$/year).

Air Quality Emissions Estimates for Year 4: Final Geothermal Well Development and Power Plant Construction

On Year 4, the full well development would be completed and construction of an additional 50-MW power plant would occur. The emissions estimate assumes that an additional 69.9 acres could be disturbed during the power plant construction. On-road vehicle emissions were also estimated. Appendix D provides a detailed breakdown and assumptions related to the assessment of air emissions from the construction of these facilities. Table 4.1-11 summarizes emissions totals for Year 4.

Table 4.1-11 Year 4 Geothermal Emissions Estimates in Tons for the West Chocolate Mountains REEA

Activity	VOCs	NO_X	SO_2	CO	PM_{10}	$CO_2e^{(1)}$
Well Development – Fugitive Dust	n/a	n/a	n/a	n/a	0.03	n/a
Well Development – Combustion Equipment	3.96	23.40	3.69	32.40	0.63	2,070
Road and Pipeline Construction	18.24	226.28	15.05	48.97	113.41	931
On-Road Vehicles	0.12	0.89	0.00	0.80	15.29	211
Total Emissions from Construction	22.32	250.57	18.74	82.17	129.35	3,212

Note:
[1] CO_2 equivalent (CO_2e) emission rates are provided in metric tons per year ($MTCO_2e$/year).

Air Quality Emissions Estimates for Geothermal Power Plant Operations

Once construction is completed and the three power plants are operational, sources of air pollutant and GHG emissions could include on-road vehicle emissions from worker commute and routine maintenance activities. It is assumed that generation turbines and condensers would be electrically-driven, reducing the potential for combustion stationary sources. Additionally, connected actions related to the geothermal RFD scenario could include facilities that would use sulfur hexafluoride (SF_6) gas-insulated equipment (e.g., switchyards and substations), resulting in additional sources of GHG emissions that should be evaluated on a project-level basis. It is assumed that all geothermal power plants would operate using binary technology, with no release of geothermal fluid to the atmosphere. Table 4.1-12 summarizes these emissions. Emissions from each plant would be accounted for in the construction/operating permit application that would be reviewed by the ICAPCD. In addition, geothermal power generation units with nominal capacities equal or above 1 MW and annual GHG emissions equal or exceeding 2,500 metric tonnes of carbon dioxide (CO_2) are required to report GHG emissions to the State of California.

Table 4.1-12 Geothermal Operational Emissions Estimates in Tons for the West Chocolate Mountains REEA

Activity	VOCs	NO_X	SO_2	CO	PM_{10}	$CO_2e^{(1)}$
On-Road Vehicles – Combustion Emissions	0.02	0.02	0.00	0.22	0.003	35.74
On-Road Vehicles – Fugitive Emissions	n/a	n/a	n/a	n/a	4.27	n/a
Total Emissions from Construction	0.02	0.02	0.00	0.22	4.27	35.74

Note:
[1] CO_2e emission rates are provided in metric tons/year ($MTCO^2e$/year).

Conformity Review Determination and Conclusions

A preliminary comparison of the estimated emissions for the full geothermal RFD scenario (assumed to be developed in a total period of four years) against the General Conformity thresholds shows that there is the potential for exceedances of NO_X and PM_{10} annual emissions as a result of construction of each 50-MW power plant and associated wellfield

development (Table 4.1-13). Emissions could exceed the *de minimis* levels from the second to fourth year of development. 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 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). 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 conformity is typically done at the project level, a conformity determination would not be required at the planning stage.

Table 4.1-13 General Conformity Review for the Full Geothermal RFD Scenario

Criteria Pollutant	Annual Emissions (tons)				
	Emissions Year 1	Emissions Year 2	Emissions Year 3	Emissions Year 4	*de minimis* Threshold (tons/year)
VOC	7.2	22.3	22.3	22.3	100
Exceeds *de minimis* threshold?	No	No	No	No	
NO_X	70.0	250.8	250.7	250.7	100
Exceeds *de minims* threshold?	No	Yes	Yes	Yes	
PM_{10}	37.3	129.4	129.4	129.4	70
Exceeds *de minims* threshold?	No	Yes	Yes	Yes	

Air Quality Emissions Estimates under Solar RFD Scenario

It is assumed that either CSP or solar PV projects could be developed. Due to the wide range of solar development that could occur in the West Chocolate Mountains REEA, the activities that could occur during solar energy development have been based on the development of a 50-MW solar PV project and a 500-MW CSP project. These sizes were selected based on the availability of data related to development of these types of projects. PV and CSP are the two technologies that have been fielded most widely in the United States and throughout the world.

500-Megawatt Concentrated Solar Power Project

Construction of a 500-MW CSP facility would take up to 39 months (BLM 2010a). During construction, emissions would be similar to any large industrial construction project. Construction activities could be phased to provide an efficient strategy for project construction. Construction related air emissions could include exhaust and fugitive dust from vehicle and construction equipment, windblown fugitive dust from grading, and other land disturbance activities. In addition, this project could directly generate GHG emissions (CO2 and methane [CH4]) from on-road vehicles and non-road equipment during construction. Under the solar RFD scenario, it is estimated that a single CSP project could disturb a total of 2,500 acres. Tables 4.1-14 through 4.1-16 summarize the maximum daily and annual emissions (including GHG) for construction of a typical 500-MW solar trough power generation facility.

Table 4.1-14 Maximum Daily Construction Emissions for a 500-Megawatt CSP Project

Phase	NO_X (lbs/day)	VOC (lbs/day)	CO (lbs/day)	SO_2 (lbs/day)	PM_{10} (lbs/day)	$PM_{2.5}$ (lbs/day)
On-Site Construction	826	89	475	1.81	312	93
Off-Site Construction	327	76	815	1.32	143	35
Roadwork	72.8	6.7	36.1	0.1	11.7	4.6
Total Maximum Daily Construction Emissions	1,225.8	171.7	1,326.1	3.23	466.7	132.6

Source: BLM 2010a
Notes:
Data presented for PM_{10} and $PM_{2.5}$ is projected for a worst-case scenario based on a land disturbance of 2,500 acres. Under the solar RFD scenario, the projected CSP project size would be approximately 2,500 acres, resulting in less fugitive dust emissions.
Exhaust emissions factors used for the calculations of CO, ROG, NO_X, SO_2 and PM_{10} are derived from the CARB OFFROAD2007 Model (version 2.0.1.2) for 2010.

Table 4.1-15 Maximum Annual Construction Emissions for a 500-Megawatt CSP Project

Phase	NO_X (tpy)	VOC (tpy)	CO (tpy)	SO_2 (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
On-Site Construction	102	11.0	58	0.22	38.4	11.4
Off-Site Construction	36.4	8.6	91	0.15	16.1	4.0
Total Maximum Annual Construction Emissions	138.4	19.6	149	0.37	54.5	15.4

Source: BLM 2010a
Notes:
Data presented for PM_{10} and $PM_{2.5}$ is projected for a worst-case scenario based on a land disturbance of 2,500 acres. Under the solar RFD scenario, the projected CSP project size would be approximately 2,500 acres, resulting in less fugitive dust emissions.
Exhaust emissions factors used for the calculations of CO, ROG, NO_X, SO2 and PM_{10} are derived from the CARB OFFROAD2007 Model (version 2.0.1.2) for 2010.

Table 4.1-16 Estimated Construction GHG Emissions for a 500-Megawatt CSP Project

Construction Phase	CO_2e (metric tons/year)
On-Site Construction Equipment	35,350
On-Site Vehicles	900
Off-Site Vehicles	15,700
Total Construction GHG Emissions	51,950

Source: CEC 2010
Notes:
GHG emissions were extrapolated from reported emissions for the Blythe Solar Power Project.
The vast majority of the CO_2e emissions, over 99 percent, is CO_2 from the reported emissions sources.

Operational emissions from a typical 500-MW CSP plant in normal conditions could be generated from two power block units, which would consist of the following emissions sources per unit:

- One 35-million British thermal units per hour (MM BTU/hr) liquefied petroleum gas (LPG) fired auxiliary boiler used for start-up;
- One LPG-fired heat transfer fluid (HTF) heater used for freeze protection for the HTF;
- One 300-horsepower (Hp) diesel-fired emergency fire water pump and engine;
- One diesel-fired emergency generator engine;
- One two-cell wet cooling tower;
- One HTF expansion tank; and
- Maintenance and off-site delivery vehicles.

The auxiliary boilers, HTF heater, and diesel-fired emergency engines would emit exhaust combustion emissions. Additionally, cooling towers—if used as part of the project—would emit PM_{10} and $PM_{2.5}$ as a result of the direct contact between the cooling water and the air passing through the tower. VOC emissions would also be generated as a result of the HTF expansion/ullage tank vents, fugitive components in the HTF piping throughout the solar field, and HTF-contaminated on-site remediation (if considered as part of the project design).

Operation and maintenance (O&M) activities at a typical 500-MW CSP plant would also require periodic vehicle travel on unpaved roads along the solar field to conduct routine maintenance tasks, such as mirror washing, maintenance inspections, and repairs of the piping network, weed abatement, and dust suppressant application (water trucks). Additionally, deliveries of supplies, materials, and services would occur on a regular basis on both paved and unpaved roads. Engine exhaust, brake and tire wear, and travel on paved roads with entrained dust could result in generation of particulate emissions. Emissions estimates (including GHG) for operational sources are presented in Tables 4.1-17 to 4.1-19.

Table 4.1-17 Operational Daily Emissions for a 500-Megawatt CSP Project

	Maximum Daily Emissions (lbs/day)					
Emission Source	**NO_X**	**VOC**	**CO**	**SO_X**	**PM_{10}**	**$PM_{2.5}$**
Auxiliary Boiler	4.48	2.02	15.12	4.54	4.02	4.02
HTF Heater	7.78	3.5	26.3	7.92	7	7
Emergency Generator	3.76	0.2	3.44	0.006	0.2	0.2
Fire pump engine	3.76	0.2	3.44	0.006	0.2	0.2
Cooling Tower	---	---	---	---	0.96	0.96
HTF Expansion Tank Vent	---	3	---	---	---	---
HTF Fugitive Emissions	---	8.76	---	---	---	---

Table 4.1-17 Operational Daily Emissions for a 500-Megawatt CSP Project

Emission Source	Maximum Daily Emissions (lbs/day)					
	NO_X	VOC	CO	SO_X	PM_{10}	$PM_{2.5}$
Maintenance vehicles	8.176	8.176	8.176	8.176	8.534	8.508
Off-site delivery vehicles	58.74	58.74	58.74	58.74	60.56	59.08
Total Operational Daily Emissions	86.69	22.79	72.73	12.54	191.29	52.33

Source: BLM 2010a
Notes:
Emissions are presented as controlled.
On-road vehicle PM_{10} and $PM_{2.5}$ emissions are presented as the addition of exhaust and fugitive emissions.
Off-site delivery vehicle emissions have been estimated based on a total of 10 miscellaneous deliveries per month (120 trips per year).

Table 4.1-18 Operational Annual Emissions for a 500-Megawatt CSP Project

Emission Source	Annual Average Emissions (tons/year)					
	NO_X	VOC	CO	SO_X	PM_{10}	$PM_{2.5}$
Auxiliary Boiler	2.79	1.25	9.42	1.25	2.51	2.51
HTF Heater	0.86	0.39	2.90	0.87	0.77	0.77
Emergency Generator	0.42	0.02	0.38	0.00	0.02	0.02
Fire pump engine	0.42	0.02	0.38	0.00	0.02	0.02
Cooling Tower	0.00	0.49	0.00	0.00	0.00	0.00
HTF Expansion Tank Vent	0.00	1.32	0.00	0.00	0.00	0.00
HTF Fugitive Emissions	0.00	7.05	0.00	0.00	0.00	0.00
Maintenance vehicles	1.00	0.20	2.23	0.00	57.38	12.20
Off-site delivery vehicles	13.95	1.03	3.90	0.02	1.03	0.63
Total Annual Operational Emissions	19.42	11.78	19.21	2.14	62.22	16.29

Source: BLM 2010a
Notes:
Emissions are presented as controlled.
On-road vehicle PM_{10} and $PM_{2.5}$ emissions are presented as the addition of exhaust and fugitive emissions.
Off-site delivery vehicle emissions have been estimated based on a total of 10 miscellaneous deliveries per month (120 trips per year).

Table 4.1-19 Estimated Operational Greenhouse Gas Emissions from a 500-Megawatt Concentrated Solar Power Project

Operational Source	CO_2e (metric tons/year)
Auxiliary boilers	6,423.5
Emergency generations	144.5
Fire pumps	15.5
Maintenance vehicles	113.0
Delivery vehicles	82.0
Employee vehicles	604.0
Equipment leakage (SF_6)	12.0
Total Project GHG Emissions	7,394.5

Source: California Energy Commission (CEC) 2010
Notes:
GHG emissions were extrapolated from reported emissions for the Blythe Solar Power Project.
The vast majority of the CO_2e emissions, over 99 percent, is CO_2 from the reported emissions sources.

50-Megawatt Photovoltaic Project

Construction of a typical 50-MW solar PV project could occur in an average period of 720 days, in increments of 20 to 25 MW per year. Construction phases would generally include: site clearing and preparation (including access roads), assembly and installation of solar arrays and facilities, and cleanup and reclamation of temporary areas (BLM 2010b). Each of these phases could generate air pollutant emissions, such as equipment and vehicle exhaust and fugitive dust. These emissions could include criteria pollutants (VOCs, NO_X, CO, SO_2, PM_{10}, and $PM_{2.5}$) and hazardous air pollutants, such as diesel particulate matter (PM). In addition, this type of project could directly generate GHG emissions. CO_2 and CH_4 could be emitted from on-road vehicles and non-road equipment during construction.

During construction, emissions would be generated within the boundaries of the site. Combustion products could be emitted from diesel- and gasoline-powered construction equipment. Fugitive dust could be generated from equipment movement, drilling and trenching, clearing, grading, and backfilling activities. Beyond the boundaries of the project, air pollutant emissions could also be generated by delivery trucks and worker vehicles on local roads. Combustion products could be emitted from on-road vehicles, and fugitive dust could be released from paved and unpaved roads. Maximum daily emissions were calculated for each construction phase and are presented in Table 4.1-20.

Table 4.1-20 50-Megawatt PV Construction Emissions

Emission Type	Source	Emissions (lbs/day)						
		ROG	CO	NO_X	SO_2	PM_{10}	$PM_{2.5}$	CO_2e
Year 1: 25 MW								
Exhaust Emissions	Non-Road Equipment	7.8	30.2	63.0	0.1	3.5	3.5	6,886
	On Road Vehicles	0.8	3.0	9.7	0.01	0.5	0.4	1,070
Fugitive Dust Emissions	Construction Activities	--	--	--	--	43	6	--
	Roads (On-Site and Off-Site)	--	--	--	--	48	5	--
Total Emissions Year 1		9	33	73	0.1	95	15	7,957
Year 2: 25 MW								
Exhaust Emissions	Non-Road Equipment	7.8	30.2	63.0	0.1	3.5	3.5	6,886
	On Road Vehicles	0.8	3.0	9.7	0.01	0.5	0.4	1,070
Fugitive Dust Emissions	Construction Activities	--	--	--	--	58	8	--
	Roads (On-Site and Off-Site)	--	--	--	--	48	5	--
Total Emissions Year 2		9	33	73	0.1	110	17	7,957

Source: BLM 2010b
Note:
Results displayed on this table may not add up exactly due to rounding. These are unmitigated emissions, and BMPs would likely reduce PM_{10} emissions.

It is expected that potential emission sources resulting from O&M activities would be mainly related to vehicle traffic on roads, including all-terrain vehicles (ATVs) and water trucks for panel washing. Permanent staff would consist of up to three persons, including the security officer, and additional staff would be involved only during routine maintenance activities. The projected increase in annual emissions for inspection and maintenance is presented in Table 4.1-21.

Table 4.1-21 50-Megawatt PV Operation and Maintenance Emissions

Emission Type	Source	Emissions (tons per year)						
		ROG	CO	NO_X	SO_2	PM_{10}	$PM_{2.5}$	CO_2e
Exhaust emissions	Heavy-duty diesel truck	0.000	0.001	0.001	0.005	0.000	0.000	0.5
	ATVs	17	371	3.312	0.387	0.533	0.533	0.9
Fugitive dust emissions	Vehicles on roads	--	--	--	--	0.136	0.014	--
Operational emissions		16.9	371.3	3.3	0.4	0.7	0.5	1.3

Source: BLM 2010b
Notes: Results displayed on this table may not add up exactly due to rounding.

Conformity Review Determination Conclusion

A preliminary comparison of the estimated emissions for the full solar RFD scenario (assumed to be developed in a total period of four years) against the General Conformity thresholds shows that there is the potential for exceedances of NOX annual emissions as a result of concurrent construction of a 500-MW CSP plant and a 50-MW PV plant (Table 4.1-22). It should be noted that this conclusion corresponds to a general assessment, since the specifics of each solar energy project are not known. Mitigation measures and BMPs discussed in Appendices I-A and I-B are just a few examples of the types of 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). 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 conformity is typically done at the project level, a conformity determination would not be required at the planning stage.

Table 4.1-22 General Conformity Review for the Full Solar RFD Scenario

Criteria Pollutant	Annual Emissions (tons)				
	Emissions Year 1	Emissions Year 2	Emissions Year 3	Emissions Year 4	*de minimis* threshold (tons/year)
VOC Emissions 500-MW Plant	19.6	19.6	19.6	11.8	100
VOC Emissions 50-MW Plant	0.7	0.66	16.9	16.9	
VOC Emissions Solar RFD Scenario	20.3	20.3	36.5	28.7	
Exceeds *de minimis* threshold?	No	No	No	No	
NOx Emissions 500-MW Plant	138.4	138.4	138.4	19.42	100
NOx Emissions 50-MW Plant	6.1	6.1	3.3	3.3	
NOx Emissions Solar RFD Scenario	144.5	144.5	141.7	22.7	

Table 4.1-22 General Conformity Review for the Full Solar RFD Scenario

Criteria Pollutant	Annual Emissions (tons)				
	Emissions Year 1	Emissions Year 2	Emissions Year 3	Emissions Year 4	*de minimis* threshold (tons/year)
Exceeds *de minims* threshold?	Yes	Yes	Yes	No	
PM_{10} Emissions 500-MW Plant	54.5	54.5	54.5	62.22	70
PM_{10} Emissions 50-MW Plant	6.6	6.6	0.7	0.7	
PM_{10} Emissions Solar RFD Scenario	61.1	61.1	55.2	62.9	
Exceeds *de minims* threshold?	No	No	No	No	

Notes:
Assumptions considered for this analysis are:
Year 1: Starts construction of one 500-MW solar trough plant and a first phase of 25-MW solar PV plant.
Year 2: Continue construction of 500-MW solar trough plant and 25-MW solar PV plant.
Year 3: Continue construction of 500-MW solar trough plant and operations of 50-MW solar PV plant.
Year 4: Operations of 500-MW solar trough and solar PV plant.

Air Quality Emissions Estimates under Wind RFD Scenario

Under the wind RFD scenario, it is assumed that one 45-MW wind energy project could be developed. Construction of the wind scenario would take approximately 6 to 9 months. No phasing is anticipated. Construction activities would include site preparation, foundation construction and trenching of underground electrical lines, turbine delivery and placement, electrical line installation, and cleanup and reclamation. These activities could occur either simultaneously or at different times. Air pollutant emissions could be generated during various activities associated with these construction activities. Air pollutants could be emitted from engine exhaust of diesel and gasoline-fueled on-site construction equipment and on-road vehicles (i.e., delivery trucks and worker vehicles). On-site earthmoving activities and vehicle travel on local/access roads would also generate fugitive dust. A summary of estimated daily and total construction emissions is provided in Tables 4.1-23 and 4.1-24.

Table 4.1-23 Estimated Daily Construction Emissions for a 45-Megawatt Wind Project

Pollutant	Daily Emissions (lb/day)					
	Site Preparation	Foundation Construction/ Electrical	Turbine Installation and Delivery	Electrical Trenching	On-Site Fugitive Dust (All Activities)	Total
ROG	8.5	13.2	18.2	5.6	--	45.4
CO	39.2	108.0	107.0	37.7	--	291.9
NO_X	54.9	36.4	104.0	25.6	--	220.9
SO_2	0.1	0.1	0.2	0.1	--	0.5
PM_{10} (exhaust)	2.4	1.5	4.3	1.2	--	9.3
$PM_{2.5}$ (exhaust)	2.4	1.5	4.3	1.2	--	9.3

Table 4.1-23 Estimated Daily Construction Emissions for a 45-Megawatt Wind Project

Pollutant	Daily Emissions (lb/day)					
	Site Preparation	Foundation Construction/ Electrical	Turbine Installation and Delivery	Electrical Trenching	On-Site Fugitive Dust (All Activities)	Total
PM_{10} (fugitive dust)	12.6	56.1	45.7	18.8	75.0	208.2
$PM_{2.5}$ (fugitive dust)	1.3	5.7	4.6	1.9	10.5	24
PM_{10} (total)	15.0	57.6	50.0	20.1	75.0	217.7
$PM_{2.5}$ (total)	3.7	7.2	8.9	3.1	10.5	33.3
CO_2e	5,541.3	5,736.6	11,387.9	3,101.4	--	25,767.2

Source: Solano County 2010

Table 4.1-24 Estimated Total Construction Emissions for a 45-Megawatt Wind Project

Pollutant	Total Emissions (tons)					
	Site Preparation	Foundation Construction/ Electrical	Turbine Installation and Delivery	Electrical Trenching	On-Site Fugitive Dust (All Activities)	Total
ROG	0.07	0.58	0.36	0.20	--	1.20
CO	0.33	5.00	2.60	1.40	--	9.30
NO_X	0.45	1.30	1.50	0.90	--	4.20
SO_2	0.00	0.01	0.00	0.00	--	0.01
PM_{10} (exhaust)	0.02	0.05	0.06	0.04	--	0.17
$PM_{2.5}$ (exhaust)	0.02	0.05	0.06	0.04	--	0.17
PM_{10} (fugitive dust)	0.11	2.70	1.40	0.70	6.8	11.7
$PM_{2.5}$ (fugitive dust)	0.01	0.27	0.14	0.07	0.9	1.4
PM_{10} (total)	0.13	2.75	1.46	0.74	6.8	11.9
$PM_{2.5}$ (total)	0.03	0.32	0.20	0.11	0.9	1.6
CO_2	45.0	238.0	197.0	111.0	--	592.0
CO_2e	41.0	216.0	178.0	101.0	--	537.0

Source: Solano County 2010
Note: GHG emissions are provided in metric tons of CO_2-equivalent ($MTCO_2e$).

Although the total area to be disturbed during construction, including construction of foundations, access roads, underground electrical trenches, substation, and other facilities, could be approximately 76 acres, it is anticipated that only about a maximum of 5 acres could be disturbed on any given day. GHG emissions could be generated during construction and operation. During construction, GHG could be generated from the combustion of fossil fuels in construction equipment and vehicles.

Operation of the wind RFD scenario would not generate significant emissions of criteria pollutants, fugitive dust, or GHGs from mobile sources such as vehicle and equipment operation due to the limited nature and extent of O&M activities. It is not expected that the wind project would involve stockpiling dirt or other materials that would emit dust during operation or require the use of generators or other equipment with greater than 50-horsepower engines. Combustion products could be emitted from vehicles used during routine inspection and maintenance.

Potential additional GHG emissions could occur from the wind project operation if additional gas-insulated electrical equipment using SF_6, such as gas-insulated circuit breakers, are installed as part of the development. However, the current wind RFD scenario site plan (as described in Chapter 2) does not include this type of equipment. A project-level analysis should account for any additional sources of GHG emissions.

Conformity Review Determination and Conclusions

A preliminary comparison of the estimated emissions for the wind RFD scenario (assumed to be developed in a one year) against the General Conformity thresholds shows that there is no potential for exceedances of NO_X and PM_{10} annual emissions as a result of construction of a 45-MW wind energy farm during a one-year period (Table 4.1-25). It should be noted that this conclusion corresponds to a general assessment, since the specifics of each wind energy project are not known. BMPs discussed in Appendices I-A and I-B are just a few examples of the types of 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). A more detailed analysis would be conducted on a project-level basis to determine the detailed emissions, mitigation and cumulative issues. Depending on each project location, conformity *de minimis* thresholds may vary. For example, if a proposed project would be located within Coachella Valley (SCAQMD jurisdiction), the applicable *de minimis* threshold for NOx would be more restrictive than the one corresponding to the Salton Sea area, presented in Table 4.1-25. Since this is a programmatic document and conformity is typically done at the project level, a conformity determination would not be required at the planning stage.

Table 4.1-25 General Conformity Review for the Wind RFD Scenario

Criteria Pollutant	Annual Emissions (tons)	
	Emissions Year 1	*de minimis* Threshold (tons/year) (*)
VOC	1.2	100
Exceeds *de minimis* threshold?	No	
NO_X	4.20	100
Exceeds *de minimis* threshold?	No	
PM_{10}	12	70
Exceeds *de minimis* threshold?	No	

Table 4.1-25 General Conformity Review for the Wind RFD Scenario

Criteria Pollutant	Annual Emissions (tons)	
	Emissions Year 1	*de minimis* Threshold (tons/year) (*)

Notes:
(*) Depending on project-specific location and air quality management jurisdiction, general conformity de minimis thresholds may vary.

Conformity Determination Review and Conclusion for the Alternative 3 RFD Scenario

Since the full 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 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 scenario (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 NO_X) and PM_{10} 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 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 conformity is typically done at the project level, a conformity determination would not be required at the planning stage.

Table 4.1-26 Preliminary Conformity Determination Review for Alternative 3

Criteria Pollutant	Annual Emissions (tons)			
	Emissions Year 1	Emissions Year 2	Emissions Year 3	Emissions Year 4
VOC Emissions - Geothermal	7.2	22.3	22.3	22.3
VOC Emissions - Solar	20.3	20.3	36.5	28.7
VOC Emissions - Wind	1.2	1.2	1.2	1.2
VOC Emissions Alternative 3	28.7	43.8	60.0	52.2
Exceeds *de minimis* threshold?	No	No	Yes	Yes
NOx Emissions - Geothermal	70	250.8	250.7	250.7
NOx Emissions - Solar	144.5	144.5	141.7	22.7
NOx Emissions - Wind	4.2	4.2	4.2	4.2
NOx Emissions Alternative 3	218.7	399.5	396.6	277.6

Table 4.1-26 Preliminary Conformity Determination Review for Alternative 3

Criteria Pollutant	Annual Emissions (tons)			
	Emissions Year 1	Emissions Year 2	Emissions Year 3	Emissions Year 4
Exceeds *de minimis* threshold?	Yes	Yes	Yes	Yes
PM_{10} Emissions - Geothermal	37.3	129.4	129.4	129.4
PM_{10} Emissions - Solar	61.1	61.1	55.2	62.9
PM_{10} Emissions - Wind	6.2	6.2	6.2	6.2
PM_{10} Emissions Alternative 3	99.4	191.5	185.6	193.3
Exceeds *de minims* threshold?	Yes	Yes	Yes	Yes

Direct Air Quality Impacts from Geothermal Energy Development

Under this alternative, 33 percent of the lands in the West Chocolate Mountains REEA could be leased for geothermal energy development, although lands acquired by BLM with LWCF funds would be managed as avoidance areas. Up to three geothermal power plants could be constructed and could generate air emissions, and up to 1,026 acres of land could be disturbed, but this could replace up to 150 MW of energy supplied by fossil fuel power facilities. See Tables 4.1-6 through 4.1-10 for estimated emissions from all activities.

Impacts from well drilling activities could result from exhaust emissions from construction emissions and fugitive dust from land disturbance during site preparation, roadwork, and earthmoving. Particulates would also be generated from the use of unpaved access roads. These direct impacts could be localized and short-term within the leasing areas, but they would be mitigated through the use of BMPs such as those presented in Appendices I-A and I-B and compliance with fugitive dust rules, such as ICAPCD's Regulation VIII (Rules 800 to 806). Among the proposed BMPs that would be incorporated into each project would be a dust abatement plan for project construction and operations, prepared and implemented in cooperation with the ICAPCD, incorporating practices and protocols established by the California Air Resource Board (CARB). These include frequent dust suppressant applications on unpaved roads and construction areas, limits on traffic speeds, and covering trucks hauling soils, among others. In addition, wind erosion control techniques would be applied during construction. Emissions estimates provided for each scenario assume the implementation of watering as fugitive dust control during earthwork and travel on unpaved roads; however, they do not account for all BMPs and regulatory requirements described above, as they would be project-specific. After implementation of these BMPs and County requirements, the emissions numbers would be further reduced.

Diesel engine exhaust, well testing, and dust would be the primary impacts to air quality from well drilling. Steam vented during a well test can contain significant amounts of fugitive dust, hydrogen sulfide, and other non-condensable gases. Hydrogen sulfide emissions would be abated through injection of hydrogen peroxide and sodium hydroxide into the test line; therefore,

emissions would be negligible. Dust emissions from well testing would be reduced by injecting water to the test line. Dust emissions from roads would be reduced by periodic watering.

Because the power plant would use binary cycle technology, which uses a closed loop process, geothermal fluid would not be exposed or released to the atmosphere, and significant sources of air pollution during operations would not be expected.

Some of the GHGs associated with geothermal exploration and development would be naturally sequestered, while the balance of those emissions could accumulate with GHG concentrations in the atmosphere. This, in turn, is believed to contribute to further manifestations of climate change. However, since geothermal energy is a renewable energy with low carbon output compared with nonrenewable sources that currently dominate the U.S. energy supply, the development of geothermal energy projects could result in a net decrease in GHG emissions if the energy supplied to the grid allows fossil fuel-based power production, and its related GHG emissions, to be reduced. Projects developed under Alternative 3 are expected to result in 150-MW of renewable, low carbon energy coming online and potential reductions in GHGs, since potential fossil fuel power plants could be built and operated at other locations. It is expected that the approach reflected in Alternative 3 could have the greatest beneficial impact on climate change.

Long-term, operational emissions associated with a 50-MW geothermal could be minor and localized. Emissions would mainly occur from vehicles used to transport staff (20 full-time equivalent positions) and to support routine maintenance activities.

Under this alternative, the existing noncompetitive geothermal lease application would be approved. Geothermal exploration would begin which would result in the air emissions for geothermal exploration discussed earlier in this section. Currently, the size of the power plant is unknown since exploration has not begun; however, other power plants in the region are less than 50 MW, so it would be anticipated that exploration would be consistent with that of a geothermal power plant as discussed in the geothermal RFD scenario.

Indirect Air Quality Impacts from Geothermal Energy Development

Overall, by generating energy from geothermal resources in lieu of construction of a 150-MW fossil fuel power plant to meet increased energy needs, the achievement of levels of geothermal energy development consistent with the full geothermal RFD scenario could contribute to reducing dependency on fossil fuels that have significantly greater operational emissions; therefore, operation of the geothermal facility could cumulatively benefit air quality in ICAPCD, SDAPCD, and SCAQMD jurisdictional areas, with respect to long-term emissions.

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 geothermal energy development, which could lead to an increase in air emissions from geothermal energy projects.

The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). Thus, intensive renewable energy development would be allowed.

Construction and operation of the geothermal power plants could result in related effects on air quality on a regional basis, especially in terms of particulates and ozone precursors' emissions in the ICPACD area, as well as in adjacent areas such as Coachella Valley (under SCAQMD jurisdiction) and eastern San Diego County (under SDAPCD jurisdiction). Potential effects could also occur as a result of vehicle traffic, contributing to areas adjacent to the Salton Sea. However, air pollution control BMPs to be required for each project design are expected to reduce contributions of the geothermal RFD scenario into the regional emissions budgets for PM_{10}, ROG (or VOC), and NO_X.

Direct Air Quality Impacts from Solar Energy Development

Under this alternative, up to 6,637 acres of CSP or up to 29,758 acres of PV power could be developed, although lands acquired by BLM with LWCF funds would be managed as avoidance areas. Tables 4.1-12 to 4.1-19 present estimated emissions from all activities for typical plants of each type of technology. Potential impacts on ambient air quality associated with a solar project would be of most concern during the construction phase. Impacts on ambient air quality from fugitive dust emissions resulting from soil disturbances are anticipated, but they would be of short duration. During the operations phase, only a few sources with generally low-level emissions would exist for any of the four types of solar technologies evaluated. A solar facility either would not burn fossil fuels or would burn only small amounts during operation. (For facilities using HTFs, fuel could be used to maintain the temperature of the HTFs for more efficient daily start-up.) Conversely, solar facilities would displace air emissions that would otherwise be released from fossil fuel power plants.

The West Chocolate Mountains REEA has a relatively flat terrain; thus, only a minimum number of site preparation activities, perhaps with no large-scale earthmoving operations, would be required. However, fugitive dust emissions from soil disturbances during the entire construction phase would be a major concern because of the large areas that would be disturbed in a region that experiences windblown dust problems. Fugitive dusts, which are released near ground level, typically have more localized impacts than similar emissions from an elevated stack with additional plume rise induced by buoyancy and momentum effects.

It is anticipated that there could be primarily short-term impacts to air quality due to emissions associated with each solar project construction. Long-term impacts to air quality would be minimal due to the lack of emissions during operations. Major pollutants of concern that could be emitted during the solar RFD scenario development include ozone precursors (NO_X and VOC) and particulate matter (PM_{10}), since the RFD scenario could be located in a non-attainment area for both criteria pollutants. Control measure requirements, such as compliance with the ICAPCD fugitive dust regulations and the SIP for ozone and PM_{10} (currently under review by EPA), as well as the proposed BMPs to be incorporated as part each project design, would be in place to manage major sources of air pollutant emissions.

Construction related emissions are transient in nature and could cause unavoidable, localized, short-term impacts in local air quality for each single solar project. It is expected that a similar scale of air emissions could occur during decommissioning. The temporary air quality impacts associated with construction and decommissioning would end immediately after completion. Although a single project could result in localized impacts, concurrent construction

(and decommissioning) of multiple projects under the solar RFD scenario could result in area-wide impacts on local air quality.

Air emissions associated with construction of CSP and solar PV plants to be developed under the solar RFD scenario would be primarily associated with engine exhaust due to combustion of fossil fuel in construction equipment and fugitive dust emissions generated as a result of land disturbance activities. At any construction period, impacts due to fugitive dust emissions from site preparation (i.e., clearing, grading, earthwork, and roadwork) are anticipated to be greater for CSP facilities as compared to solar PV due to the greater area to be disturbed for each type of plant (2,500 acres for CSP compared to 450 acres for PV). Relatively less significant contributions to air emissions could be generated due to on-road travel of vehicles for worker commutes and delivery materials and equipment to the construction sites.

During construction of a solar project, GHGs could be emitted from combustion equipment and worker vehicle commute vehicles. During operation, fugitive emissions of SF_6 would be emitted from the switchyard and solar PV power block equipment. The use of electricity to drive operational equipment on site could also generate an indirect increase of GHG emissions at power generating stations linked to local electrical grids. Although the relative scale of these emissions would be small when compared with the state or national GHG emissions levels, the cumulative effects from multiple renewable projects in the West Chocolate Mountains REEA as proposed for Alternative 3 could contribute to an increase in emissions of GHGs. Alternative 3 would not be developed within a forested area, resulting in no effects on forest resources.

Emission sources associated with the operation of a solar facility would include auxiliary boilers, vehicle (commuter, visitor, support, and delivery) traffic, maintenance (e.g., mirror cleaning and repair and replacement of damaged mirrors), and drift from cooling towers for the parabolic trough or power tower technology if wet cooling were implemented (drift comprises low-level PM emissions).

Long-term, operational emissions associated with a 50-MW solar PV site could be minor and localized. Emissions would mainly occur from vehicles used to transport staff (five full-time equivalent positions) and to support routine maintenance activities (panel washing, inverter inspection, vegetation control, and other routine inspections). There would be no large combustion sources at any solar PV site.

O&M of a 500-MW CSP plant could involve a greater number of vehicle trips (90 employees per plant and up to 120 off-site trips per year) and on-site combustion and fugitive emission sources. Equipment used during operations would include boilers, heaters, pumps, heavy-duty vehicles, and standard pick-up trucks. Despite the contribution of combustion-engine equipment and process emission sources, a major proportion of the estimated long-term operational emissions for a CSP plant could result from maintenance vehicles.

Long-term operational GHG emissions for either type of solar plant could be substantially lower than during construction and, thus, are not considered to adversely affect emission levels of GHG or hinder federal or state attempts to reduce GHG emission levels.

Indirect Air Quality Impacts from Solar Energy Development

Construction and operation associated with solar energy development could result in related effects on air quality on a regional basis, especially in terms of particulates and ozone precursors' emissions in the ICPACD area, as well as in those adjacent areas such as Coachella Valley (under SCAQMD jurisdiction) and eastern San Diego County (under SDAPCD jurisdiction). Potential effects could also occur as a result of vehicle traffic, contributing to adjacent areas to the Salton Sea. Long-term generation of renewable energy could have long-term air quality benefits, including potential avoidance of emissions associated with fossil-fueled energy production. Because the burning of fossil fuels is linked to both human-induced climate change and air pollution, the solar RFD scenario could contribute to reducing emissions of GHGs and criteria air pollutants.

Direct Air Quality Impacts from Wind Energy Development

Under this alternative, one 45-MW wind farm could be constructed and up to 76 acres of land could be disturbed, although lands acquired by BLM with LWCF funds would be managed as avoidance areas. However this could replace up to 45 MW of energy supplied by fossil fuel power facilities. See Tables 4.1-21 and 4.1-22 for estimated emissions from construction activities.

Construction of a 45-MW wind energy project within the West Chocolate Mountains REEA could result in short-term localized effects on air quality. Air pollutant emissions could originate from mobile and stationary construction equipment exhaust, vehicle exhaust, and fugitive dust emissions from roadwork, construction of temporary use areas, excavation, and trenching.

The relatively small amount of GHG emissions related to construction and operation of the wind RFD scenario is not expected to directly or indirectly result in a cumulatively substantial contribution of GHG emissions. Additionally, the achievement of levels of wind energy development consistent with the wind RFD scenario would not conflict with and, in fact, would support state and national policies regarding climate change. Specifically, operation of a wind energy project would help achieve the objective of reducing long-term GHG emissions by facilitating renewable energy generation within Imperial County.

Indirect Air Quality Impacts from Wind Energy Development

Construction and operation associated with wind energy development could result in related effects on air quality on a regional basis, especially in terms of emissions from particulates and ozone precursors in the ICPACD area, as well as in those adjacent areas such as Coachella Valley (under SCAQMD jurisdiction) and eastern San Diego County (under SDAPCD jurisdiction). Potential effects could also occur as a result of vehicle traffic, contributing to adjacent areas to the Salton Sea. Overall, by generating energy from development consistent with the wind RFD scenario in lieu of construction of a 45-MW fossil fuel power plant to meet increased energy needs, wind development could contribute to reducing dependency on fossil fuels that have significantly greater operational emissions. Therefore, operation of the wind turbines could cumulatively benefit air quality in the ICAPCD jurisdictional area, as well as in those adjacent areas such as Coachella Valley (under SCAQMD jurisdiction) and eastern San Diego County (under SDAPCD jurisdiction), with respect to long-term emissions.

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 air emissions from construction of wind energy projects although the development cap would limit wind energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

4.1.4.4 Alternative 4: Geothermal Development Only

Under this alternative, geothermal energy could be developed to the achievement of levels of geothermal energy development consistent with the full geothermal RFD scenario; there would be no solar or wind energy development. Under this alternative, the following impacts would be the same as Alternative 3:

- Direct and indirect air quality impacts from geothermal energy development;
- Acquired lands; and
- Existing noncompetitive lease application.

Under this alternative, the West Chocolate Mountains REEA would not be designated as an SEZ and solar or wind energy development would not be allowed. Additionally, the development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Emission levels from geothermal energy development would be consistent with those found in Alternative 3. 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 conformity is typically done at the project level, a conformity determination would not be required at the planning stage.

Since there would be no solar and wind development under this alternative, there would be no impacts from these energy sources. This alternative would not conform to the CDCA goal to identify potential sites for wind energy development.

4.1.4.5 Alternative 5: Solar Energy Development Emphasis with Moderate Geothermal Development and No Wind Development

Under this alternative, solar energy could be developed to the achievement of levels of development consistent with the maximum extent as defined in the solar RFD scenario. Geothermal energy could be developed to the achievement of levels of geothermal energy development consistent with a moderate level (50 MW) as defined in geothermal RFD scenario.

Under this alternative, the following would be the same as Alternative 3:

- Acquired lands;

- Existing noncompetitive lease application; and
- Direct and indirect air quality impacts from solar development.

Under this alternative, all lands within the West Chocolate Mountains REEA would be designated as an SEZ, which would allow other compatible renewable energy developments to occur. An SEZ also would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments, including geothermal energy, to occur within the West Chocolate Mountains SEZ.

Emission levels from solar energy development would be consistent with those found in Alternative 3. 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 conformity is typically done at the project level, a conformity determination would not be required at the planning stage.

Direct Air Quality Impacts from Geothermal Energy Development

Under this alternative, only one geothermal power plant could be constructed and generate air emissions. However, this could replace up to 50 MW of energy supplied by fossil fuel power facilities. The geothermal facilities are expected to be less intensive in terms of equipment use and land disturbance as compared to Alternative 3; therefore, potential effects on air quality are expected to be reduced. Estimated construction emissions for the partial geothermal RFD scenarios are shown in Tables 4.1-8 through 4.1-11. Since only one power plant could be developed, less fugitive emissions would be generated from land disturbance activities, as compared with Alternative 3, because on-road vehicle traffic and earthmoving activities are expected to be less intensive.

Additionally, as part of the BMPs presented in Appendices I-A and I-B and compliance with fugitive dust rules, such as ICAPCD's Regulation VIII (Rules 800 to 806) that would be incorporated into each project design, a dust abatement plant for project construction and operations would be prepared and implemented in cooperation with the local air quality management district. This dust abatement plan would incorporate practices such as frequent dust suppressant applications on unpaved roads and construction areas, limits on traffic speeds, and covering trucks hauling soils, among others. In addition, wind erosion control techniques would be applied during construction. Thus, it is anticipated that operational emissions under this Alternative would be approximately one-third of those estimated for Alternative 3.

Because a geothermal power plant would operate under a binary cycle technology, no release or exposure to geothermal fluids would occur, reducing the risk for potential impacts on air pollution.

Although the relative scale of these emissions are expected to be small when compared with the state or national GHG emissions levels, the cumulative effects from multiple renewable projects as proposed for Alternative 5 could contribute to an increase in emissions of GHGs.

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 conformity is typically done at the project level, a conformity determination would not be required at the planning stage.

Indirect Air Quality Impacts from Geothermal Energy Development

Construction and operation associated with geothermal energy development could result in related effects on air quality on a regional basis, especially in terms of particulates and ozone precursors' emissions in the ICPACD area, as well as in those adjacent areas such as Coachella Valley (under SCAQMD jurisdiction) and eastern San Diego County (under SDAPCD jurisdiction). Potential effects could also occur as a result of vehicle traffic, contributing to adjacent areas to the Salton Sea. Overall, by generating energy from geothermal resources in lieu of construction of a 50-MW fossil fuel power plant to meet increased energy needs, the achievement of levels of development consistent with the partial RFD scenario could contribute to reducing dependency on fossil fuels that have significantly greater operational emissions. Therefore, operation of the geothermal facility could cumulatively benefit air quality in ICAPCD, SDAPCD, and SCAQMD jurisdictional areas, with respect to long-term emissions.

The designation as an SEZ would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments, including geothermal energy development, to occur within the West Chocolate Mountains SEZ, which could result in impacts to air quality from the construction and O&M of geothermal power plants, although the development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Direct and Indirect Air Quality Impacts from Wind Energy Development

There would be no wind energy development; therefore, there would be no direct or indirect impacts from wind energy sources.

4.1.4.6 Alternative 6: Geothermal Development Emphasis with Moderate Solar Development and No Wind Development

Under this alternative, it is assumed that achievement of levels of development consistent with the maximum development defined in the geothermal RFD scenario would take place (the same as discussed for Alternative 3) and that the level of achievement consistent with partial development of the solar RFD scenario would be realized. Lands within the West Chocolate Mountains REEA that lie east of the Coachella Canal would not be considered for an SEZ, modified or otherwise. Lands west of the canal would be identified as an SEZ, allowing other compatible renewable energy developments to occur.

Under this alternative, the following would be the same as Alternative 3:

- Acquired lands;
- Existing noncompetitive lease application;
- Direct and indirect air quality impacts from geothermal development; and
- Direct and indirect air quality impacts from CSP (dish engine only) and PV solar development.

Direct and Indirect Air Quality Impacts from Geothermal Energy Development

Under this alternative, the lands west of the Coachella Canal would be identified as an SEZ, a designation that would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments, including geothermal energy development, to occur within the West Chocolate Mountains SEZ. The lands east of the Coachella Canal would not be considered for an SEZ. In addition, all lands east of the Coachella Canal would have a development cap that would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Emission levels from geothermal energy development would be consistent with those found in Alternative 3. 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 conformity is typically done at the project level, a conformity determination would not be required at the planning stage.

Direct Air Quality Impacts from Solar Energy Development

The foreseeable development described here could occur on any land within the West Chocolate Mountains REEA. Under the moderate solar development envisioned, in which the solar RFD would only be developed in part, direct effects to the air quality could occur if up to 6,637 acres of CSP (dish engine technology only) or up to 29,758 acres of solar PV power were developed.

Moderate solar development would involve the construction of dish engine technology CSP or PV plants. Although dish engine technology would use less water as compared to solar trough (due to the use of dry cooling instead of water cooling), impacts in terms of emissions for a single 500-MW CSP plant would be equivalent to those described for Alternative 3. The avoidance of water cooling operations could reduce particulate emissions generated from the contact of water with air, but these emissions are generally minimal as compared with other major emission sources that are common for both dish and solar trough technologies (i.e., earthwork, combustion equipment exhaust, and on-road vehicles). However, since only a maximum of three CSP projects could be developed, it is estimated that cumulative air quality impacts resulting from the overall land disturbance from CSP under Alternative 6— primarily PM_{10} emissions—could be reduced in the same proportion.

Emission levels from solar energy development would be consistent with those found in Alternative 3 for dish engine CSP and PV plants. 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 conformity is typically done at the project level, a conformity determination would not be required at the planning stage.

Although the relative scale of these emissions would be small when compared with the state or national GHG emissions levels, the cumulative effects from multiple renewable projects as proposed for Alternative 6 could contribute to an increase in emissions of GHGs. Alternative 6 would not be developed within a forested area, resulting in no effects on forest resources.

Indirect Air Quality Impacts from Solar Energy Development

Construction and operation associated with solar energy development could result in related effects on air quality on a regional basis, especially in terms of particulates and ozone precursors' emissions in the ICPACD area, as well as in those adjacent areas such as Coachella Valley (under SCAQMD jurisdiction) and eastern San Diego County (under SDAPCD jurisdiction). Potential effects could also occur as a result of vehicle traffic, contributing to adjacent areas to the Salton Sea. Overall, by generating energy from solar resources in lieu of construction of fossil fuel power plants to meet increased energy needs, the development that would consist of only partial realization of the RFD scenario could still contribute to reducing dependency on fossil fuels that have significantly greater operational emissions; therefore, operation of the solar facility could cumulatively benefit air quality in the SSAB with respect to long-term emissions.

In addition, the development cap would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Direct and Indirect Air Quality Impacts from Wind Energy Development

There would be no wind energy development; therefore, there would be no direct or indirect impacts from wind energy sources.

4.2 Noise

This section discusses the effects on the ambient sound and vibration levels that could occur with implementation of the alternatives. First, the management goals are provided; second, the impact indicators used to identify and analyze effects are presented; third, typical impacts are discussed for geothermal, solar, and wind energy; and last, impacts are analyzed by alternative.

4.2.1 Management Goals

The CDCA Plan does not have any formal management goals for noise; however, the CDCA Plan's Wildlife Element and Motorized Vehicle Element consider vehicle noise control practices as part of the actions planned, as well as the implementation to avoid potential effects on wildlife, recreational uses, and neighboring public lands. Similarly, the Western Colorado Desert (WECO) Plan Amendment takes into account noise control as a factor in key designation criteria to minimize conflicts among the various users of public lands.

4.2.2 Impact Criteria

The potential risks of impacts to ambient sound conditions are assessed with respect to the following criteria. Potential impacts on the ambient sound conditions could occur if the any of the following were to take place:

- Exposure of persons to or generation of noise levels in excess of standards established in local general plans or noise ordinances;
- Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels (vibration of 75 VdB [vibration velocity level in decibels] is generally considered intrusive for residential state uses); or
- A substantial, temporary, periodic, or permanent increase in ambient sound levels in the West Chocolate Mountains REEA.

4.2.3 Typical Noise Impacts from Energy Development

4.2.3.1 Typical Noise Impacts from Geothermal Energy Development

The Geothermal PEIS identified typical impacts on ambient sound associated with geothermal energy development. The impacts are incorporated by reference and summarized in Table 4.2-1.

Table 4.2-1 Typical Impacts to Ambient Sound from Geothermal Energy Development

Project Phase	Activity	Impact	Time Frame
Site Evaluation/ Exploration	– Surveying and well drilling. – Access road and well pad construction. – Staging equipment. – Vehicular traffic.	– 80 to 115 dBA at site fence boundary.	Temporary.

Table 4.2-1 Typical Impacts to Ambient Sound from Geothermal Energy Development

Project Phase	Activity	Impact	Time Frame
Construction	– Drilling. – Construction of injection wells and sump pits.	– 80 to 115 dBA at site fence boundary.	Temporary.
Operation and Maintenance	– Transformer, power house, and cooling tower.	– 71 to 83 dBA at 0.5 mile.	2 to 20 years.
Decommissioning	– Vehicular traffic. – Staging equipment. – Facility removal. – Breaking up concrete pads and foundations. – Removal of access roads that are not maintained for other uses. – Recontouring the surface. – Revegetation.	– Similar to construction noise levels.	Less than one year.

Source: BLM 2008

4.2.3.2 Typical Noise Impacts from Solar Energy Development

Based on a review of environmental documentation for other solar energy projects, typical impacts for solar energy projects have been developed. The typical impacts on ambient sound associated with solar energy development are summarized in Table 4.2-2.

Table 4.2-2 Typical Impacts to Ambient Sound from Solar Energy Development

Project Phase	Activity	Impact	Effects
Site Evaluation/ Exploration	– Installation of solar meters.	– 74 to 115 dBA at 50 feet from source.	Temporary.
Construction	– Surveying, stacking, and flagging. – Fencing and access roads. – Construction equipment vehicular traffic. Construction workers' commute. – Site preparation, grading, excavation, and road work. – Installation of piers and solar piers preparation. – Assembly of solar collection elements. – Solar power block installation. – Buildings and evaporation ponds. – Transmission line and switchyard.	– 74 to 115 dBA at 50 feet from source.	Temporary.
Operation and Maintenance	– Transformers, inverters, turbine generators, condensers, and pumps.	– 71 to 83 dBA at 50 feet from source.	2 to 20 years.
Decommissioning	– Vehicular traffic. – Staging of workers and equipment. – Facility removal. – Breaking up concrete pads and foundations.	– Similar to construction noise levels.	Less than one year.

Table 4.2-2 Typical Impacts to Ambient Sound from Solar Energy Development

Project Phase	Activity	Impact	Effects
	– Removal of access roads that are not maintained for other uses. – Recontouring the surface. – Revegetation.		

Sources: BLM 2010a,b

4.2.3.3 Typical Noise Impacts from Wind Energy Development

The Wind PEIS identified typical impacts on ambient sound associated with wind energy development. The impacts are incorporated by reference and summarized in Table 4.2-3.

Table 4.2-3 Typical Impacts to Ambient Sound from Wind Energy Development

Project Phase	Activity	Impact	Effects
Site Evaluation/ Exploration	– MET installation.	– 80 to 115 dBA at 50 feet from the source.	Temporary.
Construction	– Surveying and staking. – Access roads and temporary use areas construction. – Construction worker vehicular traffic. – Construction equipment vehicular traffic. – Foundation development and trenching for underground electrical lines. – Tower and turbine delivery and placement. – Electrical line installation. – Cleanup and reclamation.	– 80 to 115 dBA at 50 feet from the source.	Temporary.
Operation and Maintenance	– Wind turbine generators, transformers.	– 71 to 83 dBA at 50 feet from the source.	2 to 20 years.
Decommissioning	– Vehicular traffic. – Staging of workers and equipment. – Tower removal. – Breaking up concrete pads and foundations. – Removal of access roads that are not maintained for other uses. – Recontouring the surface. – Revegetation.	– Similar to construction noise levels.	Less than one year.

Sources: Dagget Ridge Wind Energy POD 2009; Solano County 2010

4.2.4 Noise Impacts by Alternative

This section describes the effects under each alternative using the respective methodology prescribed under NEPA. To compare effects, this analysis defines the temporal scale (time), spatial extent (area), and intensity of effects for each alternative. All effects

discussed in this section are direct. No indirect effects were identified for this resource area, except for the potential power generation from fossil-fuel sources in the event the No Action Alternative is carried forward.

Effects on the existing ambient sound and vibration levels could arise from project construction, O&M, and decommissioning equipment and vehicles, as well as from the introduction of construction or O&M related traffic on local roads near the West Chocolate Mountains REEA. The following discussion analyzes the environmental consequences or impacts expected to occur as a result of anticipated future actions consistent with implementing the alternatives described in Chapter 2.

4.2.4.1 Alternative 1: No Action/No CDCA Plan Amendment

Because geothermal, solar, and wind development could still occur under the No Action/No CDCA Plan Amendment alternative, noise impacts would be expected to be similar to those detailed in Section 4.2.4.3 for Alternative 3. However, development under the No Action/No CDCA Plan Amendment alternative may occur at a slower rate because an individual plan amendment process would be necessary for each geothermal and solar or wind authorization; thus, impacts may occur at a slower rate, as well.

No renewable energy development cap or other protective stipulations/measures pertaining to the east side of the Coachella Canal would be adopted under this alternative. Thus, there would be no restrictions on development east of the Coachella Canal, and noise impacts that would not occur under Alternative 3 east of the Coachella Canal could occur under Alternative 1.

4.2.4.2 Alternative 2: No Development/CDCA Plan Amendment to Identify Areas as Closed to and Unsuitable for Geothermal, Solar, and Wind Energy Development

There would be no new construction or operation of geothermal power plants, or solar or wind energy projects, except those which are currently approved or operating. Noise would not be affected by new geothermal, wind, or solar projects; however, the closure of these lands for renewable energy development would represent an opportunity cost. The energy that could have been supplied by development of this area for geothermal, solar, and/or wind energy would have to be filled by other fossil fuel or renewable energy generating facilities constructed elsewhere.

No renewable energy development cap or other protective stipulations/measures pertaining to the east side of the Coachella Canal would be adopted under this alternative. Thus, there would be no restrictions on development east of the Coachella Canal, and noise impacts that would not occur under Alternative 3 east of the Coachella Canal could occur under Alternative 2.

4.2.4.3 Alternative 3: Renewable Energy Development Emphasis

Under this alternative, geothermal, solar, and wind could be developed to the maximum extent as defined in the geothermal, solar, and wind RFD scenarios. Up to 1,026 acres of land could be disturbed for development of geothermal power plants; up to 29,785 acres of land could be disturbed for development of solar PV projects; up to 6,637 acres could be disturbed for

development of CSP projects; and up to 76 acres of land could be disturbed for wind energy projects. Solar development could occur through the development of a 50-MW solar PV power plant and 500-MW CSP power plant.

Under this alternative the REEA would be designated as an SEZ. 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 geothermal and wind energy development.

Noise Emissions Estimates under the Geothermal RFD Scenario

Geothermal exploration, drilling, and construction and operation of power plants would generate noise emissions. Principal sources of noise from geothermal activities could include the operation of drilling rigs, heavy machinery, and heavy-duty vehicle traffic. Table 4.2-4 summarizes the major pieces of equipment described for construction of the geothermal RFD scenario and the individual reported peak noise levels for the equipment. The analysis presented below is based on reported noise levels for similar geothermal energy facilities discussed in the geothermal RFD scenario. The estimation of specific peak noise composite levels for construction of the projects mentioned in the geothermal RFD scenario would depend on project-specific lists of equipment and usage factors (i.e., fraction of time the equipment would be operating at full load). Noise during exploration activities would be temporary in nature and related to surveying and temperature gradient (TG) well drilling. During exploration and TG drilling activities, major noise sources could include drill rigs and graders, the with peak noise levels ranging from about 80 to 90 dBA (A-weighted decibels) within 50 feet (BLM 2007; Federal Transit Administration [FTA] 2006). Additionally, seismic surveys could involve the use of a thumper truck or minor detonation charges at specific locations during a short period of time, with expected negligible effects over distances greater than 100 feet. Peak composite noise levels reported for similar geothermal well drilling and seismic testing phases of exploration range from about 80 to 115 dBA at the site fence boundary (BLM 2007). Additional temporary noise could also be related to access roads and construction of temporary staging areas.

Table 4.2-4 List of Major Equipment and Noise Levels for Geothermal Drilling and Power Plant Construction

Major Equipment per Phase	Noise Level per Piece of Equipment at 50 Feet (dBA, Lmax)
Exploration	
Light-duty truck	75
Thumper truck/Detonation	74/94
Backhoe	78
Drilling	
Drilling rig	84
Backhoe	78
Water trucks	74
Heavy-duty truck	76

Table 4.2-4 List of Major Equipment and Noise Levels for Geothermal Drilling and Power Plant Construction

Major Equipment per Phase	Noise Level per Piece of Equipment at 50 Feet (dBA, Lmax)
Light-duty truck	75
Generator	81
Compressor	78
Mud pump	81
Power Plant Construction	
Loader	79
Grader	85
Crane	81
Compressor (air)	78
Generator	81
Concrete mixer truck	80

Source: Federal Highway Administration (FHWA) 2006

Noise generated during FD well drilling operations would be similar to noise occurring during exploration, although longer durations and greater size of equipment would be expected, resulting in potential impacts at a larger scale. In addition, construction of injection wells, sump pits, and wellfield equipment could increase local noise in the short term. Studies conducted for similar geothermal projects have reported noise levels in the range of approximately 75 to 79 dBA sound equivalent level (Leq) at 100 feet from the center of the activity for drill site preparation, well drilling, well flow testing, and well cleanout (BLM 2007; California Energy Commission [CEC] 2009).

Construction of the geothermal power plants could involve the use of major noise sources, such as heavy construction equipment used for earthmoving and equipment installation activities (e.g., mobile cranes, air compressors, other), as well as heavy duty vehicle traffic. Construction noise levels would vary depending on the construction phase and number and location of operating construction equipment; however, based on information available from similar binary geothermal power plants construction, peak noise levels would be in the range between 75 to 90 dBA at a distance of 50 feet from the source (BLM 2007; FTA 2006). Construction equipment noise is usually considered to be a point source, with attenuation over linear distance at a rate of 6 dBA per doubling the distance.

It is likely that the geothermal power plants could be developed in increments of 50-MW plant capacity, with separations of one mile or more between facilities. Construction of power plants (three plants, 150 MW in total) under development that takes place at levels up to those assumed under the geothermal RFD scenario could occur concurrently or in sequence. For the purposes of this analysis, it is assumed that most impact-producing incarnation of the geothermal

RFD scenarios (i.e., concurrent construction of the three plants) would occur under Alternative 3; however, since these facilities would be located approximately one mile or more from each other, it is anticipated that noise from each of the drilling and construction sites would not be perceived as identical point sources at any receptor. At the closest sensitive receptor, noise could potentially be dominated by the closest construction area.

Once construction is completed, noise from commissioning a new geothermal plant typically involves two basic noise sources: steam venting during start-up and high-pressure steam purging. During power plant commissioning, piping would be cleaned by high-pressure steam (steam blows) during daytime hours over an approximately 72-hour period. Steam blows produce noise levels up to 118 dBA at a distance of 100 feet. A noise silencer can attenuate the steam blow by approximately 44 dBA (CEC 2009).

Normal operations of geothermal power plants typically generate noise levels in the 71 to 83 decibel (dB) range at a distance of 0.5 mile (BLM 2007). Individual noise-generating components of operation include pumps, fluids moving through pipes, turbine generators, transformers, power blocks, and cooling equipment. Cooling towers are relatively tall and have noise-generating fans at the top, frequently making them the main source of noise during operation (BLM 2007). Operations of a geothermal power plant could also involve an intermittent source of noise from occasional venting. Discharges from the steam vents occur infrequently and tend to be for relatively short periods until either the plant is restarted or production wells can be safely shut in. In addition to the steam vents, there would be safety valves or similar devices for emergency fail-safe back-up to the steam pressure control. The discharge from occasional steam venting and safety devices could exceed 100 dBA; however, it is also expected to be infrequent, typically occurring perhaps two to three times per year, and for only a few minutes.

Decommissioning of the production wells, wellfield equipment, and power plants would include vehicle traffic and structure removal, which could cause noise at similar levels as those estimated for drilling and power plant construction activities, but to a lesser extent and for a shorter period of time.

Conclusion

Potential effects on ambient sound conditions from the exploration, testing, power plant construction, and reclamation activities could be short-term, while well production activities and plant operations could introduce long-term noise sources into ambient conditions; however, considering that the project would comply with applicable regulations and noise control BMPs, it is anticipated that such effects could be minor and localized at individual residential receptors located within 0.5 mile of the lease boundary line, and negligible at any receptor located beyond this distance. They would not be a concern to the public. Thus, this alternative would comply with the Noise Element of the CDCA Plan.

Direct Noise Impacts from Geothermal Energy Development

Under this alternative, 33 percent of geothermal energy development could occur on BLM lands in the West Chocolate Mountains REEA, although lands acquired by BLM with LWCF funds would be managed as avoidance areas. Up to three geothermal power plants could be constructed and would generate air emissions, and up to 1,026 acres of land could be disturbed, but this could replace up to 150 MW of energy supplied by fossil fuel power facilities.

Geothermal leasing and development for direct use across the West Chocolate Mountains REEA would introduce new noise sources into the existing ambient conditions. Ambient sound levels in the REEA and vicinity generally are assumed to be low and typical of remote desert areas (i.e., 35 to 55 dBA), in which changes in ambient sound levels are usually more noticeable than urban areas. However, the geothermal energy development would be located in an undeveloped rural area with scattered residential use, resulting in potential minor to negligible localized effects on human receptors in the West Chocolate Mountains REEA. The closest areas with sensitive receptors in the proximity of the REEA are the small town of Bombay Beach, which abuts the Salton Sea and REEA, the town of Niland, located approximately 0.6 mile south of the REEA, and the users of the Bashford's Hot Mineral Spa, Pacific Aquafarms (fish farm), and Fountain Youth Spa which are located less than one mile from the northeastern boundary of the REEA. The Fish Partners fish farm is located within the southwest portion of the REEA and approximately 2.2 miles southeast of Niland, California. Another sensitive land use in the REEA is the ISDRA, located adjacent to the southeastern edge of the REEA; however, at this distance, it is unlikely that geothermal energy development could impair the recreational resource.

As part of the development design, the BLM in 43 CFR 3200.4[b]) has established that developers involved in geothermal resource exploration, testing, and production activities may not exceed a noise level of 65 dBA at the lease boundary line or 0.5 mile from the source, whichever is greater (BLM 2010c). However, this permissible noise level would be exceeded under emergency conditions or with regulatory approval and written approval of receptors located within the 0.5-mile buffer area. In addition, projects to be undertaken as authorized by the BLM would be required to reduce the number of drilling sites and locate them as far from residences as possible to dampen drilling rig noise at affected receptors and to install adequate noise abatement equipment used during construction and operation.

Moreover, projects would be required to meet state-specific regulations, reducing any impacts on off-lease areas with sensitive receptors or residential areas. Approximately 71 percent of the West Chocolate Mountains REEA is non BLM-managed public land and would be subject to the requirements of the County of Imperial regulations. The Imperial County Noise Ordinance limits the hours of construction and the level of noise emitted by temporary and permanent sources. Construction noise should not exceed 75 dBA Leq, averaged over an eight-hour period, at the nearest sensitive receptor. For construction times with extended lengths, construction may not exceed 75 dBA Leq averaged over a one-hour period. It is anticipated that the maximum noise level predicted during construction (90 dBA Leq) would attenuate to 75 dBA over a distance of 300 feet. In addition, the project would be designed to ensure construction equipment includes proper noise control features and be located as far as practicable from sensitive receptors. Additionally, as part of the project design, the developer would be required to limit the louder construction activities to the least noise-sensitive times of the day (i.e., weekdays only

between 7:00 a.m. and 7:00 p.m.) near residential or recreational areas (BLM 2010c). This practice would comply with the Imperial County Noise Ordinance.

Operations of the geothermal power plants could generate noise levels in the range of 71 to 83 dBA within 0.5 mile from the source; however, given the size of the REEA (64,058 acres) and the relatively small footprint of a geothermal power plant (approximately 30 acres), it is estimated that each approved geothermal power plant would have a buffer distance between the actual operational sites and the lease boundary line, and then another separation from this line to the overall REEA boundary. Additionally, the project could be designed to employ engineering controls to reduce the average noise level in work areas and equip all emergency pressure relief valves and steam blow-down lines with silencers to limit noise levels during infrequent testing or emergency procedures. With the use of noise control practices, along with the existence of additional buffer areas between the sources areas and the residential areas, it is likely that permanent operational noise, as perceived from the closest receptors, could have a minor to negligible effect on ambient sound conditions.

Under this alternative, the existing noncompetitive geothermal lease application (640 acres) would be approved. Geothermal exploration would begin which would result in the noise emissions for geothermal exploration discussed earlier in this section. Currently, the size of the power plant is unknown since exploration has not begun; however, other power plants in the region are less than 50 MW so it would be anticipated that exploration would be consistent with that of a geothermal power plant as discussed in the geothermal RFD scenario.

Indirect Noise Impacts from Geothermal Energy Development

No indirect effects were identified for this resource area as a result of the development that might take place consistent with the geothermal 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 State Route (SR) 111 during construction and operations could generate direct localized impacts on existing ambient sound conditions, but these effects would not be expected to induce indirect impacts.

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 geothermal energy development, which could lead to an increase in noise emissions from geothermal energy projects.

Noise Emissions Estimates under Solar RFD Scenario

Under the solar RFD scenario, up to 6,637 acres of CSP or up to 29,758 acres of solar PV power could be developed. Due to the wide range of solar development that could occur under full development consistent with the solar RFD scenario, noise emissions estimates from the activities that could occur during construction and operation have been based on available information from similar projects related to the development of a 50-MW solar PV project and a 500-MW CSP project.

Potential noise impacts associated with solar projects in the West Chocolate Mountains REEA would occur during all phases of the projects. During the construction phase, potential noise impacts associated with operation of heavy equipment and vehicular traffic on nearby residences (within 500 feet) would be anticipated, although of short duration. During the operations phase, potential impacts on nearby residences would be anticipated, depending on the solar technologies employed.

The West Chocolate Mountains REEA has a relatively flat terrain; thus, minimal site preparation activities would be required, and associated noise levels would be lower than those during general construction (e.g., erecting building structures and installing equipment, piping, and electrical). Solar array construction would also generate noise, but it would be spread over a wide area.

Construction noise and vibration levels related to a solar power generation project would vary during the construction period, depending on the construction phase and number and location of operating construction equipment. The site preparation phase could involve noise-generating activities such as clearing (expected to be minor within the West Chocolate Mountains REEA), earthwork, and grading. Further, other major noise sources for a solar power generation development could involve roadway access, project structural foundations, installation of major mechanical and electrical equipment (e.g., solar panels or mirrors and collectors, turbines, transformers inverters), installation of power distribution and telecommunication lines, and construction of ancillary buildings. Additionally, in the case of solar PV power plants, installation of solar panel arrays and lines would include the use of percussive or vibration equipment in a manner similar to installing freeway guardrails (BLM 2010b).

For either type of solar power generation facility, individual pieces of construction equipment could generate noise levels in a range from 74 to 89 dBA at 50 feet from the source. Tables 4.2-5 and 4.2-6 show examples of major construction equipment for a 50-MW solar PV project and a 500-MW CSP project, respectively. Typically, the power block area is located in the center of the solar facility at a distance of more than 0.5 mile to the facility boundary. For a typical solar PV project (450-acre footprint), the composite construction noise could result in a worst-case maximum level of 97 dBA at 50 feet from the equipment, located within temporary construction areas. At 100 feet, the estimated minimum distance between a solar array working area and the perimeter fence, this peak noise level would be 91 dBA.

For a 500-MW CSP project, it is expected that distances between construction areas and the property line would be greater, resulting in an estimated peak composite noise level of 74 dBA at 300 feet (BLM 2010a).

Table 4.2-5 Construction Equipment Noise Levels for a 50-Megawatt PV Project

Equipment List	Sound Pressure Level at 50 Feet from Source (dBA)
Vibratory post driver	85
Crawler tractors/dozer	85
Dump, concrete, and tender trucks	88
Excavators	80
Forklifts/aerial lifts/booms	83
Generator/compressor	81
Graders	85
Rollers/compactors	74
Scrapers	89
Tractors/loaders/backhoes	85
Vibratory plate (handheld)	82
Highway tractor	83
Flatbed truck	88
Water truck	88
Estimated worst-case composite noise at 50 feet from source	97

Sources: FTA 2006; BLM 2010b

Table 4.2-6 Construction Equipment Noise Levels for a 500-Megawatt CSP Project

Equipment	Quantity	Usage Factor (%)	Sound Pressure Level at 50 Feet from Source (dBA)
Site Grading			
Generator	2	66	82
Backhoe	2	66	80
Loader	2	66	80
Dump truck	2	66	84
Excavator	1	66	85
Water truck	1	66	84
Bulldozer	2	66	85
Estimated Worst-Case Composite Noise Level at 50 Feet from the Source			**87.1**
Roadway Access Paving and Structural Foundations			
Generator	2	66	82
Compactor	2	66	80
Concrete truck	2	66	85
Concrete pump	2	66	82
Asphalt paver	2	66	85
Roller	2	66	85
Vibratory roller	2	66	85
Grader	2	66	85
Estimated Worst-Case Composite Noise Level at 50 Feet from the Source			**89.5**
Mechanical Equipment Installation			
Generator	2	66	82
Crane	4	66	85
Forklift	4	66	85
Estimated Worst-Case Composite Noise Level at 50 feet From the Source			**91.2**

Source: BLM 2010a

Percussive or vibratory equipment could be used during the installation of solar PV arrays, producing a short-term, groundborne vibration (above 75 VdB) and groundborne noise levels. It is estimated that these vibration levels would attenuate over distance and reach background levels at approximately 0.1 mile from any temporary construction site. During construction of a CSP plant, major groundborne vibration sources could be heavy machinery and heavy-duty trucks.

In addition, a temporary increase in traffic noise on local and access roads could occur as a result of equipment delivery and workers commuting to the site. Although real composite noise levels from construction activities would depend on the duration of each task and the exact number and usage factor of each piece of equipment and vehicle, it is estimated that construction activities could produce a short-term, adverse increase over the existing ambient sound levels at the site boundary of the project (50 feet from the source).

O&M of a PV plant would involve three major noise sources: electrical equipment, corona noise from transmission (gen-tie) lines, and vehicle traffic during routine O&M. Similarly, a CSP plant would involve increased vehicle traffic, electric equipment, and transmission components; however, it would also involve major mechanical equipment in continuous operations, such as pumps, generators, condensers, boilers, and steam turbines. The primary noise sources of a typical CSP plant would be located at the power block area, where the steam turbine generator, air-cooled condenser, and pump equipment would be located. Noise levels from these mechanical pieces of equipment typically range between 85 to 112 dBA at 1 meter, resulting in maximum levels of 80.5 dBA near the power block and 54.7 dBA at the property line (Solar Millennium 2010).

At a PV facility, electric transformers and inverters would be expected to contribute the most to the composite noise at the site. Noise from this type of electrical equipment is characterized as a discrete, low-frequency hum (Bell and Bell 1994). The relative loudness of transformers depends on the construction design and techniques, as well as the ambient sound levels at a site. The noise from transformers is produced by alternating current flux in the core that causes it to vibrate (an effect also known as magnetostriction). The National Electrical Manufacturers Association standard sound levels for 2,000-kilovolt ampere (kVA) commercial transformers (e.g., vent-dry type) at a distance of one foot from the source is 66 dBA for self-cooled and 71 dBA for fan-cooled units (General Electric 1999). It is expected that a PV facility would use multiple electrical transformers and inverters. Noise from multiple identical sources is estimated as a 3-dBA increase per piece of equipment; however, it is also anticipated that these pieces of electrical equipment would be enclosed and properly isolated or shielded, providing a noise attenuation barrier of at least 10 dBA (FHWA 2006).

Corona effect is the ionization of the air that occurs at the surface of an energized conductor or on electrical equipment to very high electric field strength at the surface of the metal during certain conditions. Commonly, corona generates audible noise during operation of transmission lines. The noise is generally characterized as a crackling, hissing, or humming sound. The amount of corona produced by a transmission line is a function of the voltage of the line, the diameter of the conductor, the elevation of the line above sea level, the condition of the conductor and hardware, and the local weather conditions. Since the gen-tie lines for solar

facilities are generally of medium or lower voltage, it is anticipated that corona noise from this line would be inaudible at more than 100 feet from the centerline.

Other maintenance activities, such as inspections, vegetation mowing, and parts replacement, would be expected to be long-term over the life of either type of solar power generation facility. Potential effects from these activities on the existing ambient noise levels could be detectable for a short duration at the site and on local roads (a minor increase in traffic), but given the relative location of the site with respect to sensitive receptors, any potential increases in the noise levels on-site are unlikely to be detectable or of concern to the general public.

The expected life of a solar project is 30 years. In the event that any of the solar project sites should be removed from power generation service, it would be made suitable for reclamation. All equipment, buildings, concrete foundations, and other components would be removed from the site, generating a temporary and localized increase in ambient sound levels during decommissioning. It is expected that noise levels during decommissioning activities would be similar to those estimated during construction, although they could occur during a shorter period of time.

Conclusion

Potential effects on ambient sound conditions from power plant construction, and reclamation activities could be short-term, while plant operations could introduce long-term noise sources into ambient conditions; however, considering that the project would comply with applicable regulations and noise control BMPs, it is anticipated that such effects could be minor and localized at individual residential receptors located within 0.5 mile of the lease boundary line, and negligible at any receptor located beyond this distance. They would not be a concern to the public. Thus, this alternative would comply with the Noise Element of the CDCA Plan.

Direct Noise Impacts from Solar Energy Development

Under this alternative, up to 6,637 acres of CSP or 29,758 acres of PV solar could be developed. Due to the wide range of solar development that could occur in the West Chocolate Mountains REEA, the activities that could occur during solar energy development have been based on the development of a 50-MW solar PV project and a 500-MW CSP project. These sizes were selected based on the availability of data related to development of these types of projects. PV and CSP are the two technologies that have been fielded most widely in the United States and throughout the world.

Construction of either type of solar plant could temporarily increase ambient noise levels at each lease boundary line, with additional increments if construction activities are conducted concurrently within the West Chocolate Mountains REEA. An increase in vibration levels due to the use of either impact driving equipment or heavy machinery could create highly localized effects on existing conditions, which would not be noticeable at the closest sensitive receptors. Noise and vibration from construction activities would attenuate over distance from the temporary working areas along buffer areas within each lease property line and the overall West Chocolate Mountains REEA boundary, reaching background noise levels at distances over 0.5

mile. In addition, projects would be required to comply with county and local regulations that limit noise levels to 75 dBA Leq at any potentially affected receptor.

Moreover, noise and vibration abatement BMPs would be required as part of the project design, including the use of noise barriers at plant property lines, working hour limits, effective enclosures for stationary noise sources, the use of sound-control devices, and proper maintenance on all project equipment and vehicles. Considering all features to be included in the project design and the estimated distances from construction areas to the closest sensitive receptors, it is anticipated that sensitive receptors that abut the West Chocolate Mountains REEA boundary line could experience minor (slight, but detectable) noise impacts on a short-term and localized basis from concurrent construction of several solar projects.

Long-term noise from multiple PV solar generation facilities could be perceived as a minor to negligible localized effect. Higher noise levels could be detectable during routine maintenance activities at these sites. In contrast, noise effects could be perceived as minor to moderate for those facilities operating with CSP technology, due to the combined effect of noise from multiple pieces of mechanical equipment. In general, any solar project design would require the use of noise attenuation features, such as enclosures, barriers (i.e., berms, vegetation), sound-control devices, and engineering controls to reduce average noise levels generated by the facility operation. It is expected that, by incorporating noise abatement features into each solar project design, and considering that this development could occur in a very undeveloped, scattered, and rural area, effects from operations of multiple power generation plants consistent with the solar RFD scenario could result in potentially minor to negligible localized effects on human receptors in the vicinity of the West Chocolate Mountains REEA.

Conclusion

Potential effects on ambient sound conditions from power plant construction and reclamation activities could be short-term and negligible as they attenuate over distance from the source of the sound and vibration. Plant operations could introduce long-term noise sources into ambient conditions; however, considering that the project would comply with applicable regulations and noise control BMPs, it is anticipated that such effects could be minor and localized at individual residential receptors located within 0.5 mile of the lease boundary line, and negligible at any receptor located beyond this distance. They would not be a concern to the public. Thus, this alternative would comply with the Noise Element of the CDCA Plan.

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 development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres), which would also minimize the amount of noise that could be generated.

Noise Emissions Estimates under Wind RFD Scenario

Construction of the wind RFD scenario could temporarily increase noise levels at any selected project location within the West Chocolate Mountains REEA. Construction noise for a 45-MW wind power generation facility could occur from heavy-duty construction equipment (e.g., graders, bulldozers, backhoes, and drill rigs). Typical noise emission levels for construction equipment likely to be used during the wind RFD scenario construction are presented in Table 4.2-7. As shown in Table 4.2-7, the worst-case noise level of any one piece of construction equipment would be 85 dBA Leq at 50 feet; however, composite noise levels would be higher when several pieces of equipment are used during construction.

Table 4.2-7 Typical Construction Equipment Noise Levels at 50 Feet from a Sound Source

Equipment	Noise Level (L_{eq}) (50 Feet from Noise Source)
Backhoe	80
Bulldozer	85
Concrete mixer	85
Crane	85
Excavator	85
Generator	80
Pneumatic tools	85
Scraper	85
Truck (concrete and supplies delivery)	84
Vibratory compactor	85

Source: EPA 1971

Noise levels from multiple pieces of construction equipment would vary with the various stages of the wind RFD scenario's construction. Table 4.2-8 shows estimated peak noise levels for each major wind generation construction activity and the estimated distances where construction activities could reach estimated background levels (60 dbA) and the County of Imperial noise criteria for residential receptors (50 dBA Leq). It is anticipated that noise levels would be the greatest during the construction of temporary use areas (e.g., grading, crane pad development), excavation for the wind turbine foundation, trenching for installing underground electrical lines, and cranes lifting the turbines into place. As discussed above, noise attenuates over distance resulting in a reduction of sound pressure level of 6 dBA per doubling the distance from the source. Sound is further reduced with distance when factors such as atmospheric absorption, ground attenuation, and shielding from topographic features cause attenuation of noise.

Table 4.2-8 Typical Construction Phase Noise Levels at 50 Feet from a Sound Source and Distances at which Noise Reductions Would Occur

Construction Phase	Noise Level at 50 Feet (L_{eq})[1]	Approximate Distance (feet) to Reduce Noise to Given L_{eq}	
		60 dBA	50 dBA
Ground clearing (grading)	84 dBA	793	2,510
Excavation	89 dBA	1,410	4,460
Foundations	78 dBA	397	1,260
Erection (installation)	87 dBA	1,120	3,540
Finishing (clean-up)	89 dBA	1,410	4,460

Source: EPA 1971
Note:
[1] Noise value levels used correspond to typical ranges of noise levels at an office building, hotel, hospital, school, or public works construction site.

Under the development consistent with the wind RFD scenario, approximately 6 miles of new roads could be constructed. Road construction could also include using heavy equipment with noise levels similar to excavation and grading (84 to 89 dBA at 50 feet from the source).

Wind turbine operational noise originates from the mechanical components and the sound produced by the rotation of the turbine blade through the air, also known as aerodynamic sound. Aerodynamic sound is considered the dominant noise source during wind turbine operations and it varies with wind speed and meteorological conditions. It generally occurs over the frequency spectrum, including low frequencies (i.e., less than 20 hertz [Hz]), but especially within the mid-frequency range (500 to 1,000 Hz). Noise within this range of frequency fluctuates as the turbine blade rotates, and this change can be perceived by a human receptor (this phenomenon is also known as “amplitude modulation”). It has been suggested that, under certain weather conditions (e.g., wind shear[1]), this fluctuation can be heard some distance away and, because it is a noise that frequently changes, it would be more noticeable for the receptor (Shell Wind Energy 2010).

Prediction and assessment of wind turbine generated (WTG) noise require a case-specific study which evaluates the noise performance of the selected turbine model in different configurations (i.e., upwind and downwind turbine design). As part of the assessment, a steady noise level analysis should be conducted to determine the highest possible noise levels at several distances, based on operating wind turbines at wind speeds producing the maximum sound power output. For the purposes of this EIS, publicly available information regarding maximum sound power levels and common effects has been reviewed and presented as reference for average operational noise levels. Actual predictions of operational noise from full development of the wind RFD scenario would depend on the turbine model selection, project location, and layout.

[1] Wind shear is a measure of how much wind speed increases with height.

Noise performance studies conducted for wind turbine models ranging from 1.8 MW to 2.3 MW have reported maximum sound power levels ranging from 102 to 107 dBA at a primary speed of 18 miles per hour (mph) (Shasta County Department of Resource Management 2007). At the same speed, another recent study reported that a 3-MW wind turbine (Vestas V90 model) would generate a maximum sound power level of 109.3 dBA and a predicted average noise level of 51 dBA Leq at a receptor located 1,500 feet from the source (Shell Wind Energy 2010). The cumulative impact of 15 turbines would be calculated based on the project layout, maximum turbine sound power, and distances to nearest receptors. Cumulative noise estimations for wind farm operations with a greater capacity and number of turbines as compared to the wind RFD scenario have been predicted as producing levels below 55 dBA Leq at distances between 800 and 1,000 feet (Shell Wind Energy 2010; Solano County 2010; Shasta County 2007).

For remote areas with background noise levels below 60 dBA, such as the vicinity of the West Chocolate Mountains REEA, the sounds of wind turbine noise and wind-induced background noise are expected to be quite similar in the absence of tones, particularly when several wind turbines are heard in combination. Accordingly, if the wind turbine noise is equal to or less than the background noise level, the combined increase in noise level would be 3 dB or less and is expected to be, at most, barely detectable.

Regarding vibration from wind turbine operations, a comprehensive study conducted by the Department of Trade and Industry in 1997 in the vicinity of a modern wind farm found that vibration levels 328 feet from the nearest turbine were a factor of 10 less than those recommended for human exposure in sensitive buildings, such as hospitals or laboratories housing precision measurement instruments (Shell Wind Energy 2010).

Conclusion

Construction noise from the wind farm could be short-term and perceived on a localized basis, with a potential reduction to the existing background conditions (55 dBA or below) over a distance of 0.5 mile from the source. It is expected that, effects from noise construction (increase over existing ambient conditions) could be of a minor to negligible intensity as perceived at the closest receptors. It is expected that effects from cumulative aerodynamic sound produced from 15 wind turbines operating concurrently could be perceived as a minor and localized effect at the closest receptor (assuming it would be located within 0.5 mile from the wind farm location). They would not be a concern to the public. Thus, this alternative would comply with the Noise Element of the CDCA Plan.

Direct Noise Impacts from Wind Energy Development

Under this alternative, one 45-MW wind farm could be constructed, and up to 76 acres of land could be disturbed. This could generate both temporary and permanent noise emissions. However, the achievement of levels of wind energy development consistent with the wind RFD scenario could involve less intensive effects as compared to the geothermal and solar facilities.

Construction noise from the wind farm could be short-term and perceived on a localized basis, with a potential reduction to the existing background conditions (55 dBA or below) over a distance of 0.5 mile from the source (Table 4.2-8). It is expected that, due to the location of the wind farm in an open rural area and the use of construction noise abatement features as part of

the project design (i.e., working hour limits, use of sound-control devices and proper maintenance in equipment and vehicles, etc.), effects from noise construction (increase over existing ambient conditions) could be of a minor to negligible intensity as perceived at the closest receptors. Construction activities would also comply with applicable local, state, and federal regulations, including the working hour limits and an acceptable maximum noise level of 75 dBA Leq during the projected construction timeframe. Regulatory compliance would ensure that potential effects to residential receptors, in the event they would be located within a 0.5-mile distance from the wind farm location, would be negligible.

Once a wind project design has been sufficiently developed, noise generated from wind turbine operations would be projected by project-specific modeling based on the turbine model selected, the turbine layout design, meteorological conditions, and the selected location within the West Chocolate Mountains REEA. However, since the wind farm would be located in an open rural area with scattered sensitive receptors, and based on available information on similar projects of a greater capacity, it is expected that effects from cumulative aerodynamic sound produced from 15 wind turbines operating concurrently could be perceived as a minor and localized effect at the closest receptor (assuming it would be located within 0.5 mile from the wind farm location).

Indirect Noise Impacts from Wind Energy Development

No indirect effects were identified for this resource area as a result of development consistent with the wind 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.

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 noise emissions from construction and O&M of wind energy projects although the development cap would limit wind energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Conclusion

Since the full geothermal, solar, and wind RFD scenario could occur in the same geographic area, cumulative impact issues could result from concurrent construction and operation of all 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 scenario shows that there is the potential for exceedances of noise standards. It should be noted that this conclusion corresponds to a general assessment, since the specifics of each energy project are not known. BMPs discussed in Appendices I-A and I-B are just a few examples of the types of solutions available to minimize noise impacts. The BLM would not approve construction or operation of a facility unless noise conditions and approvals are obtained by a project applicant from the Imperial County Department of Planning and Development. Thus, this alternative would comply with the Noise Element of the CDCA Plan. A more detailed

analysis would be conducted on a project-level basis to determine the detailed noise emissions, mitigation, and cumulative issues.

4.2.4.4 Alternative 4: Geothermal Development Only

Under this alternative, geothermal energy could be developed to the achievement of levels of geothermal energy development consistent with the geothermal RFD scenario; there would be no solar or wind energy development. Under this alternative, the following impacts would be the same as Alternative 3:

- Direct and indirect noise impacts from geothermal energy development;
- Acquired lands; and
- Existing noncompetitive lease application.

Under this alternative, the West Chocolate Mountains REEA would not be designated as an SEZ and solar or wind energy development would not be allowed. Additionally, the development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). Noise emission levels from geothermal energy development would be consistent with those found in Alternative 3. The BLM would not approve construction or operation of a facility unless noise permit conditions and approvals are obtained by a project applicant. They would not be a concern to the public. Thus, this alternative would comply with the Noise 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 there would be no solar and wind development under this alternative, there would be no impacts from these energy sources. This alternative would not conform to the CDCA goal to identify potential sites for wind energy development.

4.2.4.5 Alternative 5: Solar Energy Development Emphasis with Moderate Geothermal Development and No Wind Development

Under this alternative, solar energy could be developed to the achievement of levels of development consistent with the maximum extent as defined in the solar RFD scenario. Geothermal energy could be developed to the achievement of levels of geothermal energy development consistent with a moderate level (50 MW) as defined in geothermal RFD scenario.

Under this alternative, the following would be the same as Alternative 3:

- Acquired lands;
- Existing noncompetitive lease application; and
- Direct and indirect noise impacts from solar development.

The designation as an SEZ would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments, including geothermal energy development, not wind, to occur within the West Chocolate Mountains SEZ, which could lead to an increase in noise emissions although the development cap would limit solar and geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Noise emission levels from solar energy development would be consistent with those found in Alternative 3. The BLM would not approve construction or operation of a facility unless noise permit conditions and approvals are obtained by a project applicant from Imperial County. They would not be a concern to the public. Thus, this alternative would comply with the Noise Element of the CDCA Plan. A more detailed analysis would be conducted on a project-level basis to determine the detailed noise emissions, mitigation, and cumulative issues.

Direct Noise Impacts from Geothermal Energy Development

Under this alternative, only one geothermal power plant could be constructed and 359 acres of land could be disturbed. Impacts resulting from the anticipated development would be of lesser intensity as impacts analyzed under Alternative 3, since less geothermal wells would be drilled, less equipment would be in operation, and an overall smaller land disturbance would occur; however, the predicted impacts during construction and operations for a single geothermal power plant development could be similar in nature and temporal and spatial extent, resulting in potential minor to negligible effects on the ambient sound levels.

The BLM would not approve construction or operation of a facility unless noise permit conditions and approvals are obtained by a project applicant from Imperial County. They would not be a concern to the public. Thus, this alternative would comply with the Noise 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.

Indirect Noise Impacts from Geothermal Energy Development

No indirect effects were identified for ambient sound as a result of the partial geothermal 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.

Direct and Indirect Noise Impacts from Wind Energy Development

Under this alternative, there would be no wind development in the West Chocolate Mountains REEA; therefore, there would be no direct or indirect impacts from wind energy sources.

4.2.4.6 Alternative 6: Geothermal Development Emphasis with Moderate Solar Development and No Wind Development

Under this alternative, it is assumed that achievement of levels of development consistent with the maximum development defined in the geothermal RFD scenario would take place (the same as discussed for Alternative 3) and that the level of achievement consistent with partial development of the solar RFD scenario would be realized. Lands within the West Chocolate Mountains REEA that lie east of the Coachella Canal would not be considered for an SEZ, modified or otherwise. Lands west of the canal would be identified as an SEZ, allowing other compatible renewable energy developments to occur.

Under this alternative, the following would be the same as Alternative 3:

- Acquired lands;
- Existing noncompetitive lease application;
- Direct and indirect noise impacts from geothermal development; and
- Direct and indirect noise impacts from CSP (dish engine only) and PV solar development.

Direct and Indirect Noise Impacts from Geothermal Energy Development

Under this alternative, the lands west of the Coachella Canal would be identified as an SEZ, a designation that would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments, including geothermal energy development, to occur within the West Chocolate Mountains SEZ. The lands east of the Coachella Canal would not be considered for an SEZ. In addition, all lands east of the Coachella Canal would have a development cap that would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Noise emission levels from geothermal energy development would be consistent with those found in Alternative 3. 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 Imperial County. They would not be a concern to the public. Thus, this alternative would comply with the Noise 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.

Direct Noise Impacts from Solar Energy Development

Under this alternative, direct effects from noise could occur if up to 6,637 acres of CSP (dish engine technology only) or 29,758 acres of solar PV power were developed. Noise impacts from construction and operations of dish solar technology would be similar to those described for solar trough plant design and power block design. Dish engine CSP technologies could involve the use of heavy machinery during construction and are expected to be built in similar timeframes. In addition, operational noise sources for all three types of technology could involve electrical and mechanical equipment, with a higher contribution from pumping and compression equipment (e.g., equipment used in wet cooling designs). However, since no power tower or trough technology would be constructed under this scenario, operational noise levels would be expected to be lower at sites operating exclusively under dish engine technology since only a maximum of three 500-MW CSP projects could be developed. It is expected that maximum composite noise levels would be equivalent to those discussed under Alternative 3; therefore, effects from concurrent development of multiple solar plants would be equivalent.

Noise emission levels from solar energy development would be consistent with those found in Alternative 3 for CSP dish engine and PV projects. The BLM would not approve construction or operation of a facility unless noise permit conditions and approvals are obtained by a project applicant from Imperial County. They would not be a concern to the public. Thus, this alternative would comply with the Noise 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.

Indirect Noise Impacts from Solar Energy Development

No indirect effects were identified for this resource area that might result from 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 noise conditions, but these effects are not expected to induce indirect impacts.

In addition, the development cap which would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Direct and Indirect Noise Impacts from Wind Energy Development

Under this alternative, there would be no wind development in the West Chocolate Mountains REEA; therefore, there would be no direct or indirect impacts from wind energy sources.

4.3 Topography, Geology, and Geologic Hazards

This section discusses the topographic and geologic effects from geologic hazards that could occur from the implementation of the alternatives. This section contains a discussion of management goals; impact indicators used to identify and analyze effects; typical impacts from geothermal, solar, and wind energy; and impacts by alternative.

4.3.1 Management Goals

The CDCA Plan did not establish specific goals for topography, geology, or geologic hazards.

4.3.2 Impact Criteria

The potential risks of impacts to topography and geology from geologic hazards are assessed with respect to the following criteria. Potential impacts to topography and geology from geologic hazards could occur if the any of the following were to take place:

- Construction activities or the siting of facilities worsen existing unfavorable geologic conditions;
- Project construction or operation preclude or disrupt the development of mineral resources;
- Subsidence or seismic activity (earthquakes) resulting in property damage; or
- Geologic hazards cause a rupture or failure of geothermal pipeline or cause damage to energy related facilities, or that present a significant threat to public safety.

4.3.3 Typical Geologic Impacts from Energy Development

4.3.3.1 Typical Geologic Impacts from Geothermal Energy Development

Faulting and Seismicity

Potential geologic hazards in the West Chocolate Mountains REEA associated with earthquakes include ground shaking, ground rupture, landslides, liquefaction, and seiches. Based on the Alquist-Priolo maps, recent fault rupture has not been mapped on BLM-administered land within the REEA. The closest recent fault rupture mapped is located on the San Andreas Fault Zone that intersects the northwest portion of the evaluation area and runs parallel to the REEA (California Department of Conservation [CDC] 1974a,b) as seen on Figure 3.3-2. Substantial shaking due to earthquakes could be expected due to the nature of the faulting in this seismically active area. Ground shaking is the earthquake effect that results in the vast majority of damage to human-made structures. Geothermal power plant structures would need to be designed to withstand these ground motions. Since standard construction design measures would be implemented in all geothermal infrastructure, the risk associated with these impacts would be low.

Induced seismic activity from geothermal energy development is also theoretically possible (National Park Service [NPS] 2003). The literature indicates that small, imperceptible earthquakes (2 to 3 on the Richter scale) are possible as a result of reinjection of fluids into the earth. These types of earthquakes are not generally felt at the surface, but are recordable. There is a greater concern for larger earthquakes in areas where enhanced geothermal systems (EGS) are being tested. EGS requires increasing permeability by stimulating, fracturing and shearing of fractures through fluid/propane injection. Fluid is circulated between injection and production wells to capture and extract heat from the geothermal system. The U.S. Department of Energy (DOE) has been studying geothermal induced seismicity since the 1970s. Both natural and artificial (induced permeability) geothermal systems experience induced seismicity (DOE 2010). The seismic events are generally small; however, induced seismic events can lead to surficial damages. Developing a geothermal field in Basel Switzerland produced an earthquake with an initial magnitude of 3.4M on December 8, 2006. Over 60 more earthquakes greater than magnitude 2M were felt after the initial earthquake, although these events did not result in significant property damage, the Basel geothermal project has since been suspended. There is significant potential for the development of conventional hydrothermal projects in the West Chocolate Mountains REEA. However, it is possible that an EGS project could also be proposed by a developer and, therefore, this possibility is discussed. In EGS projects, fluid injection is used to enhance rock permeability and recover heat from the rock. During the process of creating an underground heat exchanger by injection or the subsequent circulation of the system, stress patterns in the rock could change, resulting in seismic events.

In almost all cases, these events have been of relatively small magnitude, and by the time the released energy reaches the surface, the vast majority are rarely felt (Majer 2007). The impacts of a seismic event created by fluid injection can be significantly different from those associated with a natural earthquake—the former generally falls into the category of an annoyance, as with the passing of a rail transit vehicle or large truck, whereas the latter could cause damage in a moderate to large event. To date, there is no recorded instance of a significant

danger or damage associated with induced seismicity related to geothermal energy production, including the event associated with the EGS project in Basel. Events that result in structural damage are usually those with a magnitude of at least 5 to 6 magnitude measured at the surface location where the impacts are felt, however the introduction of EGS technology in populated areas would be regarded by some as an intrusion on the peace and tranquility of populated areas due to its potential "annoyance factor." Ultimately, the likelihood of a damaging event would be negligible, however, if an EGS project was proposed in the West Chocolate Mountains REEA, induced seismicity would be one of the issues to be covered by the project EIS.

A Probabilistic Seismic Hazard Analysis should be completed in the West Chocolate Mountains REEA geothermal areas to estimate the largest seismic events possible that could be caused by EGS applications or other geothermal development activities. Such an analysis would also take into account geologic setting, fault location, proximity to population centers, and other resources of concern.

Landslides

Most of the topography in the West Chocolate Mountains REEA is very gently sloped to the west toward the Salton Sea at an average between 0 to 3 percent. Landslides would not be expected.

Liquefaction

Liquefaction is the phenomenon in which saturated fine-grained sediments temporarily lose their shear strength during periods of ground shaking. Measurements of groundwater levels, which range between 20 to 48 feet below ground surface (bgs), made between 1963 and 2000, indicate that a steady drop in the water table occurred over that period (California Department of Water Resources [DWR] 2003). The California Geologic Survey (CGS) has not mapped areas within the West Chocolate Mountains REEA having potential for liquefaction or landslides as part of the Seismic Hazard Zones Program. The state's Seismic Hazards Mapping Act requires that site-specific geotechnical investigations be conducted for developments designed for human occupancy. Appropriate geotechnical studies would be required prior to exploration and development.

Seiche

Seiche is defined as oscillations of enclosed and semi-enclosed bodies of water, such as bays, lakes, or reservoirs, due to strong ground motion from seismic events, wind stress, volcanic eruptions, and local basin reflections of tsunami. The Salton Sea is proximal to the San Andreas and San Jacinto faults and would be subject to significant seismic ground shaking that would generate a seiche (County of Imperial 2007).

Subsidence and Settlement

Subsidence and settlement can be induced by both natural and human phenomena. Natural phenomena include subsidence from tectonic deformations and seismically induced settlements, and soil subsidence due to consolidation, hydrocompaction, or rapid sedimentation or oxidation of organic-rich (peat) soils. Subsidence and settlement due to human activities include conditions caused by a decrease in pore pressure due to withdrawal of groundwater or

hydrocarbons from the ground. Subsidence related to deep groundwater production associated with geothermal energy production has been documented in the East Mesa (e.g., Massonnet et al. 1997). Subsidence due to groundwater or hydrocarbon withdrawal is not expected due to limited water supply of the Salton Sea subbasin and lack of oil wells in the West Chocolate Mountains REEA. Appropriate geotechnical studies would be required prior to exploration and development.

Volcanic Hazards

According to the U.S. Geological Survey (USGS), the area of the Brawley Spreading Center, located at the southeast end of the Salton Sea, has the potential for future volcanic activity. Five small rhyolite domes exist in this area and have been dated as erupting about 16,000 years ago (Miller 1989). The closest of these is Obsidian Butte located about 8 miles west of the West Chocolate Mountains REEA. Earthquakes and ground shaking could be associated with volcanic activity. It is judged to be very unlikely for a lava flow to impact the BLM lands in the REEA; however, an eruption would send ash into the air that could cause some minor effects to geothermal operations and electrical transmission.

The potential impacts on geologic resources such as fossil beds from geothermal energy development mainly concern physical disturbance (e.g., movement, removal or destruction). These impacts are considered long-term, as they cannot be reclaimed. In most BLM resource management plans and in FS policy, leasing and associated roads and other physical disturbance must avoid sensitive geologic resources in order to be approved.

Due to the inability to predict future development scenarios, including types of development, timing, and location, the following impact analysis provides a general description of typical impacts on geologic resources from geothermal resource development.

The Geothermal PEIS identified typical impacts to topography, geology, and from geologic hazards associated with geothermal energy development. Those impacts are incorporated by project stage and summarized in Table 4.3-1.

Table 4.3-1 Typical Impacts to Topography, Geology, and Geologic Hazards from Geothermal Energy Development

Project Phase	Activity	Impact	Time Frame
Exploration and Drilling	– Surveying and drilling temperature gradient wells. – New roads or routes. – Vehicular traffic. – Several wells could be drilled per lease, and each drill site could disturb approximately 0.9 acre.	– Disturbance at seismic survey pulse sites. – Detonation of explosives could greatly disturb a small area around each detonation. – Disturbance to delicate geologic resources within blast area. – Minor impacts to geologic resources from drilling temperature gradient wells. – Impacts to geologic resources within the ROW. – Impacts could occur on lands	– Short-term. – Minor long-term impacts.

Table 4.3-1 Typical Impacts to Topography, Geology, and Geologic Hazards from Geothermal Energy Development

Project Phase	Activity	Impact	Time Frame
		directly under the well sites. – Inducement of seismic events.	
Construction	– Construction of additional roads, wells, and structures to support full build out of a direct use or indirect use facility. – Power plant requires approximately 15 to 25 acres to accommodate all the needed equipment.	– Disturbance of any geologic resources within the footprint of the facility. – Installing electrical transmission lines from the power plant could disturb approximately one acre per mile of transmission line for lengths from 5 to 50 miles.	– Short-term. – Long-term.
Operation and Maintenance	– Vehicles used for maneuvering construction and maintenance equipment.	– Minimal impacts.	– Short-term.
Decommissioning	– Abandoning of wells. – Reclaiming disturbed areas.	– Minimal impacts.	– Short-term.

4.3.3.2 Typical Geologic Impacts from Solar Energy Development

Based on a review of environmental documentation for other solar energy projects, typical impacts for solar energy projects have been developed. The typical impacts to topography and geology from geologic hazards associated with solar energy development are summarized in Table 4.3-2.

Table 4.3-2 Typical Impacts to Topography, Geology, and Geologic Hazards from Solar Energy Development

Project Phase	Activity	Impact	Time Frame
Exploration	– Monitoring and site characterization. – Site evaluation activities, such as drilling to characterize subsurface conditions (e.g., soils, depth to groundwater).	– Surface disturbance and use of geologic materials are minimal during the site evaluation phase, and soils and geologic resources are unlikely to be affected. – Site characterization activities would be unlikely to activate geological hazards or increase soil erosion. – Surface effects from pedestrian and vehicular traffic could occur in areas that contain special (e.g., cryptobiotic) soils.	Short-term. Long-term.
Construction	– Vehicular traffic. – Excavation and blasting. – Altering drainage patterns.	– Surface effects from vehicular traffic could occur in areas that contain special (e.g.,	Short-term. Long-term.

Table 4.3-2 Typical Impacts to Topography, Geology, and Geologic Hazards from Solar Energy Development

Project Phase	Activity	Impact	Time Frame
		cryptobiotic) soils. – Possible geological hazards (earthquakes, landslides) could be activated by excavation and blasting for raw materials, increasing slopes during site grading and construction of access roads, altering natural drainage patterns, and toe-cutting bases of slopes. – Altering drainage patterns could also accelerate erosion and create slope instability. – Surface disturbance, heavy equipment traffic, and changes to surface runoff patterns could cause soil erosion and impacts to special soils (e.g., cryptobiotic soils). – Impacts of soil erosion could include soil nutrient loss and reduced water quality in nearby surface water bodies.	
Operation and Maintenance	– Operation of the solar energy facility, power generation, and associated maintenance activities that would require vehicular access and heavy equipment operation when components are being replaced.	– During operation, the soil and geologic conditions could stabilize with time. Soil erosion and soil compaction are both likely to continue to occur along access roads. – Within the project footprint, soil erosion, surface runoff, and sedimentation of nearby water bodies would continue to occur during operation, but to a lesser degree than during the construction phase, and the impact is expected to be small once equilibrium is achieved.	Short-term.
Decommissioning	– Facility removal. – Breaking up concrete pads and foundations. – Removal of access and on-site roads, buildings, and other structures. – Heavy vehicular traffic. – Recontouring the surface. – Revegetation.	– Removal of access and on-site roads, buildings, and other structures; and heavy vehicle traffic. – Surface disturbance, heavy equipment traffic, and changes to surface runoff patterns can cause soil erosion. – Impacts of soil erosion include soil nutrient loss and reduced water quality in nearby surface water bodies.	Short-term.

Table 4.3-2 Typical Impacts to Topography, Geology, and Geologic Hazards from Solar Energy Development

Project Phase	Activity	Impact	Time Frame
		– Upon completion of decommissioning, disturbed areas would be contoured and revegetated to minimize the potential for soil erosion. – Impacts to geologic resources would not be expected.	

4.3.3.3 Typical Geologic Impacts from Wind Energy Development

Typical impacts to topography, geology, and geologic hazards associated with wind energy development are incorporated by reference and summarized in Table 4.3-3.

Table 4.3-3 Typical Impacts to Topography, Geology, and Geologic Hazards from Wind Energy Development

Project Phase	Activity	Impact	Time Frame
Exploration	– Excavation activities and road construction for access to the West Chocolate Mountains REEA would be very limited. – Some clearing or grading could be necessary for installing monitoring towers and monitoring equipment enclosures. – Heavy-duty all-wheel-drive pickup trucks could be used to bring monitoring towers to the site; this, however, would not likely require major road construction. – Very little, if any, geologic resources would likely be used, and it is unlikely that activities could activate geological hazards or increase soil erosion.	– Minimal.	Short-term. Long-term.
Construction	– Clearing, excavation, blasting, trenching, grading, and heavy vehicle traffic.	Impacts to geological hazards include: – Slope (or grade) increase resulting from site grading or construction of access roads; – Toe-cutting at the bases of slopes for construction of on-site structures or access roads; and – Alteration of natural drainage patterns or increase of	Short-term. Long-term.

Table 4.3-3 Typical Impacts to Topography, Geology, and Geologic Hazards from Wind Energy Development

Project Phase	Activity	Impact	Time Frame
		precipitation infiltration that can increase pore pressure, which weakens the strength of soils on slopes or causes accelerated soil erosion, thereby creating slope instability. – Soil erosion can be aggravated locally through ground surface disturbance. The impact of soil erosion includes soil nutrient loss and degradation of water quality in nearby surface water bodies. The magnitude of the impact depends on the project size, erosion potential of the soil, local terrain, vegetation covers, and the distance from a site to nearby surface water bodies.	
Operation and Maintenance	– Vehicular traffic.	– Soil erosion induced by vehicle traffic on unpaved roads.	Short-term.

4.3.4 Topography, Geology, and Geologic Hazards Impacts by Alternative

This EIS analyzes impacts to all resources, including habitat and protected species, to the extent necessary for a programmatic document, subject to existing data availability. Site-specific analyses, based on data compiled from detailed studies, will be conducted for site-specific proposals. If the constraints discussed in Section 2.1.2 are discovered during project planning or following further future studies, as determined necessary by an authorized officer, portions of the West Chocolate Mountains REEA may be determined to be closed to and unsuitable for geothermal, solar, or wind energy development.

4.3.4.1 Alternative 1: No Action/No CDCA Plan Amendment

Because geothermal, wind, and solar development could still occur under the No Action/No CDCA Plan Amendment alternative, impacts to topography, geology, and geologic hazards would be expected to be similar to those detailed in Section 4.3.4.3 for Alternative 3. However, development under the No Action/No CDCA Plan Amendment alternative may occur at a slower rate because an individual plan amendment process would be necessary for each geothermal and solar or wind authorization; thus, impacts may occur at a slower rate, as well.

No renewable energy development cap, or other protective stipulations/measures pertaining to the east side of the Coachella Canal would be adopted under this alternative. Thus, there would be no restrictions on development east of the Coachella Canal, and geologic impacts

that would not occur under Alternative 3 east of the Coachella Canal could occur under Alternative 1.

4.3.4.2 Alternative 2: No Development/CDCA Plan Amendment to Identify Areas as Closed to and Unsuitable for Geothermal, Solar, and Wind Energy Development

There would be no new construction or operation of geothermal power plants, or solar or wind energy projects, except those which are currently approved or operating. Topography, geology, and geologic hazards would not be affected by new geothermal, wind, or solar projects; however, the closure of these lands for renewable energy development would represent an opportunity cost. The energy that could have been supplied by development of this area for geothermal, solar, and/or wind energy would have to be filled by other fossil fuel or renewable energy generating facilities constructed elsewhere.

No renewable energy development cap or other protective stipulations/measures pertaining to the east side of the Coachella Canal would be adopted under this alternative. Thus, there would be no restrictions on development east of the Coachella Canal, and geologic impacts that would not occur under Alternative 3 east of the Coachella Canal could occur under Alternative 2.

4.3.4.3 Alternative 3: Renewable Energy Development Emphasis

Under Alternative 3, geothermal, solar, and wind could be developed to the maximum extent as defined in the geothermal, solar, and wind RFD scenarios. Up to 1,026 acres of land could be disturbed for development of geothermal power plants; up to 29,758 acres of land could be disturbed for development of solar PV projects; up to 6,637 acres could be disturbed for development of CSP projects; and up to 76 acres of land could be disturbed for wind energy projects. Solar development could occur through the development of a 50-MW solar PV power plant and 500-MW CSP power plant.

Direct Geologic Impacts from Geothermal Energy Development

Short-term impacts to geological resources could occur from exploration and continue through the final phases of the project. Surveying activities could directly impact geologic resources through disturbance at seismic survey pulse sites. Detonation of explosives could greatly disturb a small area around each detonation. Any delicate geologic resources (e.g., natural arches, balancing rocks, cave formations) within the blast area could be disturbed. The use of thumper trucks is less likely to impact sensitive geologic resources. While the area of disturbance at each seismic pulse site would be small, a large seismic survey could include many sites.

Long-term impacts to geological resources would be proportional to the area required for geothermal energy development. This could occur where new roads would be developed to support geothermal energy development. New roads or routes could be necessary to allow survey equipment to access the potential geothermal sites. Roads could disturb geologic resources within the ROW. The drilling operations phase could result in long-term impacts to any geologic resources within the area of disturbance. The drilling operations phase would require additional access roads to accommodate larger equipment to drill production and injection wells and to

construct sump pits. Roads to accommodate production wells are typically 3.6 acres per mile and can total up to 40 miles for a disturbance of up to 144 acres. The drilling operations phase includes drill site development which, on average, requires a 2-acre disturbance from well pads. Impacts on geologic resources during initial build-out of the utilization phase of geothermal resource development would be greater than the other phases of development due to the increased footprint. The utilization phase requires construction of additional roads, wells, and structures to support full build-out of a direct use or indirect use facility. The utilization phase would require access roads to accommodate larger equipment, plus additional roads for accessing the power plant. The well field equipment includes pipelines with a disturbance zone approximately 1.2 acres per mile. Where feasible, pipelines would parallel access roads and existing roads. The disturbance would include the pads for pipeline supports as well as the access and maintenance roads along the pipeline.

A power plant requires approximately 30 acres to accommodate all the needed equipment. Similar to other construction required during this phase, this could result in a direct disturbance of any geologic resources within the footprint of the facility. Installing electrical transmission lines from the power plant could disturb approximately 12.1 acres per mile of transmission line for approximately 3 miles. The disturbance would include the pads for power line support structures as well as the access and maintenance roads along the power line.

Any geologic resource within the areas of disturbance described above could be impacted. These impacts could be long-term, as they would not be reclaimed. Access to sand, gravel, and other potential mineral resources would be limited by the operation footprint of the energy development. Impacts resulting from increased public access could also be long-term for the life of the development.

Other short-term impacts to geological resources could occur from drilling temperature gradient wells. The siting of the wells would not likely impact geologic resources, as clear flat areas are preferable for drilling sites. Similar to surveying activities, roads would be required to access wells, which could impact any geologic resources within the ROW. 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 could be drilled. Impacts could occur on lands directly under the well sites.

Spent or used geothermal fluids could be re-injected back into the geothermal resource, evaporated in sumps or lagoons, or used for potable and non-potable domestic and municipal uses depending on the water quality of the geothermal fluid, shallow groundwater quality, and surface water conditions. If geothermal resource development includes high-pressure reinjection, there is a small chance that seismic activity could increase along any faults intersected by the injection well.

The initial areas disturbed during construction of the utilization phase could continue to be used sporadically during standard O&M activities, such as maneuvering construction and maintenance equipment and the vehicles associated with these activities. No additional impacts would be recognized during this phase unless an additional drill site was required. Impacts from additional drill sites would be the same as those discussed above under the drilling operations phase.

Reclamation and abandonment activities include abandoning the wells after production ceases and reclaiming all disturbed areas. All disturbed lands could be reclaimed in accordance with BLM standards. If the roads are reclaimed, the impacts resulting from greater public access could decrease.

Conclusion

Short-term impacts to geological resources could occur from exploration and continue through the final phases of the project. Long-term impacts to geological resources would be proportional to the area required for geothermal energy development. This could occur where new roads would be developed to support geothermal energy development. A power plant and associated transmission lines require approximately 40 acres to accommodate all the needed equipment. Similar to other construction required during this phase, this could result in a direct disturbance of any geologic resources within the footprint of the facility. Any geologic resource within the areas of disturbance described above could be impacted. These impacts could be long-term, as they would not be reclaimed. Other short-term impacts to geological resources could occur from drilling temperature gradient wells. The siting of the wells would not likely impact geologic resources, as clear flat areas are preferable for drilling sites. However, by following BLM guidelines, sensitive geologic resources would be avoided. Specifically, as discussed in Section 2.2.6.5, stipulations would be imposed for development on soils with greater than three percent slopes, with extremely erodible or slumping soils, or soils with severe erosion hazards, badlands, rock outcrops, or slopes susceptible to mass failure. The long-term and short-term impacts could be minor. They would not be a concern to the public. The impacts of increased public access due to new road construction could be short-term, as the roads allowing the increased public access could be reclaimed after exploration activities are complete. There are no management goals in the CDCA Plan for this resource.

Under this alternative, the pending geothermal lease application (640 acres) would be approved. Geothermal exploration would begin which could result in the impacts to topography, geology, and geologic hazards discussed earlier in this section. Currently, the size of the power plant is unknown since exploration has not begun; however, other power plants in the region are less than 50 MW so it would be anticipated that exploration would be consistent with that of a geothermal power plant as discussed in the geothermal RFD scenario.

Indirect Geologic Impacts from Geothermal Energy Development

Development of geothermal fields typically results in the creation of micro-seismic events that seem to be related to production and/or injection. These micro-seismic events are detectable by sensitive instrumentation, but are usually too small for people to feel. Induced seismicity that is strong enough for people to feel is not typical of geothermal energy development. In certain vapor-dominated reservoirs (such as at The Geysers geothermal field in northern California), concerns have been raised that injection has resulted in seismic activity that could be felt by local residents. However, the vapor-dominated conditions that could be associated with seismicity at The Geysers are rare and not expected to be encountered within the West Chocolate Mountains REEA. While environmental analysis at The Geysers suggests that seismic events are a result of geothermal activity, these events are not large enough to cause

structural damage to homes or other improvements. Therefore, this potential has not been considered a significant impact for geothermal energy development within the REEA.

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 geothermal energy development which could lead to potential impacts to topography, geology and geologic hazards from geothermal energy projects similar to those described above, although the development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). However, geological resources BMPs to be required for each project design are expected to reduce this contribution so that it would not be adverse.

Direct Geologic Impacts from Solar Energy Development

Under this alternative, up to 6,637 acres of CSP or up to 29,758 acres of PV power could be developed, although lands acquired by BLM with LWCF funds would be managed as avoidance areas. It is assumed that either CSP or solar PV projects could be developed. Due to the wide range of solar development that could occur in the West Chocolate Mountains REEA, the activities that could occur during solar energy development have been based on the development of a 50-MW solar PV project and a 500-MW CSP project. These sizes were selected based on the availability of data related to development of these types of projects. PV and CSP are the two technologies that have been fielded most widely in the United States and throughout the world.

Conclusion

Short-term impacts to geological resources could occur from the exploration through the final phases of the project. Similar short-term impacts discussed above in the geothermal energy development could occur, such as clearing and grading activities, throughout the life of the project. Long-term impacts to geological resources could occur where new roads and construction would be developed to support solar energy development as previously discussed for geothermal energy development. However, by following BLM guidelines, sensitive geologic resources would be avoided. Specifically, as discussed in Section 2.2.6.5, stipulations would be imposed for development on soils with greater than three percent slopes, with extremely erodible or slumping soils, or soils with severe erosion hazards, badlands, rock outcrops, or slopes susceptible to mass failure. They would not be a concern to the public. There are no management goals in the CDCA Plan for this resource.

Indirect Geologic Impacts from Solar Energy Development

Because solar energy development could result in up to 29,758 acres of the West Chocolate Mountains REEA being covered in a large impervious surface, surrounding areas could be subject to long-term, adverse, downstream erosion due to increased runoff; however, the development cap would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Direct Geologic Impacts from Wind Energy Development

Under Alternative 3, one 45-MW wind project could be developed and up to 76 acres of land could be disturbed. Similar short-term impacts discussed above in the geothermal energy development could occur, such as clearing and grading activities, throughout the life of the project. Long-term impacts to geological resources could occur where new roads and construction could be developed to support wind energy development as previously discussed for geothermal energy development.

Conclusion

The same short- and long-term impacts from geothermal energy development would be associated with wind energy development; however, only 76 acres of BLM and other land could be initially disturbed during construction of a wind energy project. After reclamation, only 40 acres of BLM and private land would be disturbed. However, by following BLM guidelines, sensitive geologic resources would be avoided. Specifically, as discussed in Section 2.2.6.5, stipulations would be imposed for development on soils with greater than three percent slopes, with extremely erodible or slumping soils, or soils with severe erosion hazards, badlands, rock outcrops, or slopes susceptible to mass failure. They would not be a concern to the public.

Indirect Geologic Impacts from Wind Energy Development

Land disturbances and an increase in impervious features could result in increased surface water run-off, which could have an indirect impact from wind energy development through increased downstream erosion. However, since only 76 acres of BLM and other land could be initially disturbed during construction of a wind energy project and 40 acres of BLM and private land could be disturbed after reclamation, these effects could be long-term but not adverse.

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 topography, geology, and geologic hazards from construction of wind energy projects, however, the development cap would limit wind energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

4.3.4.4 Alternative 4: Geothermal Development Only

Under this alternative, geothermal energy could be developed to the achievement of levels of geothermal energy development consistent with the geothermal RFD scenario; there would be no solar or wind energy development. Under this alternative, the following impacts would be the same as Alternative 3:

- Direct and indirect geologic impacts from geothermal energy development;
- Acquired lands; and
- Existing noncompetitive lease application.

Under this alternative, the West Chocolate Mountains REEA would not be designated as an SEZ and solar or wind energy development would not be allowed. Additionally the development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Geologic impacts from geothermal energy development would be consistent with those found in Alternative 3. Special stipulations founds in Section 2.2.6.5 would be imposed. Since there would be no solar and wind development under this alternative, there would be no impacts from these energy sources. This alternative would not conform to the CDCA goal to identify potential sites for wind energy development.

4.3.4.5 Alternative 5: Solar Energy Development Emphasis with Moderate Geothermal Development and No Wind Development

Under this alternative, solar energy could be developed to the achievement of levels of development consistent with the maximum extent as defined in the solar RFD scenario. Geothermal energy could be developed to a moderate level (50 MW) as defined in geothermal RFD scenario. Under this alternative, the following would be the same as Alternative 3:

- Acquired lands;
- Existing noncompetitive lease application; and
- Direct and indirect geologic impacts from solar development.

Geologic impacts from solar energy development would be consistent with those found in Alternative 3. Under this alternative, all lands within the West Chocolate Mountains REEA would be designated as an SEZ, which would allow other compatible renewable energy developments to occur. An SEZ also would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments, including geothermal energy, to occur within the West Chocolate Mountains SEZ.

Direct Geologic Impacts from Geothermal Energy Development

Under this alternative, only one geothermal power plant could be constructed, and up to 342 acres of land could be disturbed. However, this could replace up to 50 MW of energy supplied by fossil fuel power facilities. A total of 95 acres of land could be disturbed during the exploration phase. The potential land that could be disturbed during construction of the well pads and related access roads and pipeline would be about 272 acres. Approximately 40 wells (40 wells per 50-MW power plant) could be drilled for this alternative. Well drilling and operation during the exploration and construction phases could result in the net addition of access roads and well pads. By following BLM guidelines, sensitive geologic resources would be avoided. Specifically, as discussed in Section 2.2.6.5, stipulations would be imposed for development on soils with greater than three percent slopes, with extremely erodible or slumping soils, or soils with severe erosion hazards, badlands, rock outcrops, or slopes susceptible to mass failure. They would not be a concern to the public. There are no management goals in the CDCA Plan for this resource.

Indirect Geologic Impacts from Geothermal Energy Development

Indirect impacts to geologic resources during geothermal energy development could occur through increased surface exposures and through potential development induced erosion.

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 geothermal energy development, which could lead to an increase in impacts to topography, geology, and geologic hazards from development of geothermal energy projects, although the development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Direct and Indirect Geologic Impacts from Wind Energy Development

Under this alternative, there would be no wind development in the West Chocolate Mountains REEA; therefore, there would be no direct or indirect impacts from wind energy sources.

4.3.4.6 Alternative 6: Geothermal Development Emphasis with Moderate Solar Development and No Wind Development

Under this alternative, it is assumed that achievement of levels of development consistent with the maximum development defined in the geothermal RFD scenario would take place (the same as discussed for Alternative 3) and that the level of achievement consistent with partial development of the solar RFD scenario would be realized. Lands within the West Chocolate Mountains REEA that lie east of the Coachella Canal would not be considered for an SEZ, modified or otherwise. Lands west of the canal would be identified as an SEZ, allowing other compatible renewable energy developments to occur.

Under this alternative, the following would be the same as Alternative 3:

- Acquired lands;
- Existing noncompetitive lease application;
- Direct and indirect geologic impacts from geothermal development; and
- Direct and indirect geologic impacts from CSP (dish engine only) and PV solar development.

Direct and Indirect Geologic Impacts from Geothermal Energy Development

Geologic impacts from geothermal energy development would be consistent with those found in Alternative 3. Under this alternative, the lands west of the Coachella Canal would be identified as an SEZ, a designation that would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments, including geothermal energy development, to occur within the West Chocolate Mountains SEZ. The lands east of the Coachella Canal would not be considered for an SEZ. In addition, all lands east of the Coachella Canal would have a development cap which would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Direct Geologic Impacts from Solar Energy Development

Direct effects to topography, geology, and geologic hazards could occur if development of up to 6,637 acres of CSP (dish engine technology only) or up to 29,758 acres of PV power were developed. Short-term impacts to geological resources could occur from exploration and continue through the final phases of the project. Similar short-term impacts discussed above for geothermal energy development could occur, such as clearing and grading activities, throughout the life of the project. Long-term impacts to geological resources could occur where new roads and construction could be developed to support solar energy development as previously discussed for geothermal energy development. Geologic impacts from solar energy development would be consistent with those found in Alternative 3 for CSP dish engine and PV projects; however, by following BLM guidelines, sensitive geologic resources would be avoided. Specifically, as discussed in Section 2.2.6.5, stipulations would be imposed for development on soils with greater than three percent slopes, with extremely erodible or slumping soils, or soils with severe erosion hazards, badlands, rock outcrops, or slopes susceptible to mass failure. They would not be a concern to the public.

Indirect Geologic Impacts from Solar Energy Development

Because solar energy development could result in up to 29,758 acres of the West Chocolate Mountains REEA being covered in a large impervious surface, surrounding areas could be subject to long-term, adverse, downstream erosion due to increased runoff. In addition, the development cap which would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Direct and Indirect Geologic Impacts from Wind Energy Development

Under this alternative, there would be no wind development in the West Chocolate Mountains REEA; therefore, there would be no direct or indirect impacts from wind energy sources.

4.4 Soils

This section discusses impacts to soils that could occur with implementation of the alternatives. This section contains a discussion of the management goals; impact indicators used to identify and analyze effects; typical impacts from geothermal, solar, and wind energy; and impacts by alternative.

4.4.1 Management Goals

The CDCA Plan did not establish any goals for soil resources.

4.4.2 Impact Criteria

The potential risks of impacts to soil resources are assessed with respect to the following criteria. Potential impacts to soil resources could occur if the any of the following were to take place:

- Increased erosion rates. Water would be required for dust suppression during construction, which could increase erosion. Land disturbance and impervious surfaces could result in increased stormwater runoff velocity and volume which would degrade water quality of affected downstream surface water bodies;
- Reduced soil productivity by compaction or soil mixing to a level that would prevent successful rehabilitation and eventual re-establishment of vegetative cover to the recommended or preconstruction composition and density; or
- Increased exposure of human or ecological receptors to potentially hazardous levels of chemicals or explosives due to the disturbance of contaminated soils or to the discharge or disposal into soils of hazardous materials.

4.4.3 Typical Soils Impacts from Energy Development

4.4.3.1 Typical Soils Impacts from Geothermal Energy Development

The potential impacts on soil resources from geothermal energy development could include physical disturbance (e.g., movement or removal), compaction, changes to erosion patterns, and changes in current use as farmland. Any development or infrastructure (e.g., wells, roads, or pipelines) on steep slopes could increase erosion and could increase the risk of landslides.

The Geothermal PEIS identified typical impacts to soils associated with geothermal energy development. These impacts are incorporated by reference and summarized in Table 4.4-1.

Table 4.4-1 Typical Impacts to Soils from Geothermal Energy Development

Project Phase	Activity	Impact	Time Frame
Exploration	– Surveying and drilling temperature gradient wells. – Several wells could be drilled per lease, for an area of disturbance of approximately 0.9 acre. – New roads or routes could be necessary to allow survey equipment to access the potential geothermal sites.	– Any development or infrastructure (e.g., wells, roads, or pipelines) on steep slopes could increase erosion and could increase risk of landslides. – Surveying activities could impact soil resources through disturbance at seismic survey pulse sites. – Detonation of explosives could greatly disturb a small area around each detonation. The soil resources beneath each thumper truck site could be compacted. While the area of disturbance at each seismic pulse site could be small, a large seismic survey could include many sites. – Impacts could occur on lands directly under the well sites; however, impacts last only the duration of the drilling and	Short-term. Long-term.

Table 4.4-1 Typical Impacts to Soils from Geothermal Energy Development

Project Phase	Activity	Impact	Time Frame
		reclamation activities (several weeks). – The impacts on soil resources from drilling temperature gradient wells could be minor.	
Construction	– Drilling operations would require access roads to accommodate larger equipment. – Roads for the production wells are typically between 0.5 and 4 miles long and 30 feet wide, for a disturbance of between 2 and 15 acres. – The drilling operations phase also includes drill site development which, on average, requires a 2-acre well pad.	– New roads could impact any soil resources within their ROWs. – Soil resources under each well pad could be impacted.	Short-term. Long-term.
Operation and Maintenance	– The O&M phase would require additional access roads to accommodate larger equipment and for accessing the power plant. – Construction of well field equipment including pipelines with a disturbance zone approximately 40 feet wide and typically 1 to 4 miles in length. – A power plant requires approximately 15 to 25 acres to accommodate all the needed equipment. – Installing electrical transmission lines from the power plant could disturb approximately 24 to 240 acres with a 40-foot-wide disturbance area along transmission line for lengths from 5 to 50 miles long. – The disturbance could include the pads for power line support structures and the access and maintenance roads along the power line.	– Disturbance of the soils within the footprint of the facility. – The initial areas disturbed during construction could continue to be used sporadically during standard O&M activities, such as maneuvering construction and maintenance equipment and the vehicles associated with these activities. No additional impacts would be recognized during this phase unless an additional drill site is required. Impacts from additional drill sites would be the same as those impacts discussed under the exploration and drilling operations phases, above.	Long-term (duration of the project).
Decommissioning	– Reclamation and abandonment activities include abandoning the wells after production ceases and reclaiming all disturbed areas.	– All disturbed lands would be reclaimed in accordance with BLM and FS standards.	Short-term.

4.4.3.2 Typical Soils Impacts from Solar Energy Development

Long-term impacts to soil resources could occur where project infrastructure (e.g., buildings, transmission lines, solar panels) would be present and where grading for access roads would occur. Additional soil resource impacts could occur where expansion of the energy development footprint occurs for unforeseen project needs or upon site closure activities.

Indirect impacts to soil resources during solar energy development could occur through increased surface exposures, runoff, and from potential development-induced erosion that would be downslope and out of the project boundaries.

Based on a review of environmental documentation for other solar energy projects, typical impacts for solar energy projects have been developed. Typical impacts to soils associated with solar energy development are incorporated by reference and summarized in Table 4.4-2.

Table 4.4-2 Typical Impacts to Soils from Solar Energy Development

Project Phase	Activity	Impact	Time Frame
Exploration	– Monitoring and site characterization. – Site evaluation activities, such as ground clearing (removal of vegetative cover), vehicular and pedestrian traffic, and drilling to characterize subsurface conditions (e.g., soils, depth to groundwater).	– Possible surface disturbance in areas that contain special (e.g., cryptobiotic) soils.	Short-term. Long-term.
Construction	– Pedestrian and vehicular traffic. – Excavation and blasting. – Altering drainage patterns	– Possible surface disturbance in areas that contain special (e.g., cryptobiotic) soils. – Possible geological hazards (earthquakes, landslides) could be activated by excavation and blasting for raw materials, increasing slopes during site grading and construction of access roads, altering natural drainage patterns, and toe-cutting bases of slopes. – Altering drainage patterns could also accelerate erosion and create slope instability. – Surface disturbance, heavy equipment traffic, and changes to surface runoff patterns could cause soil erosion and impacts to special soils (e.g., cryptobiotic soils). – Soil nutrient loss and reduced	Short-term. Long-term.

Table 4.4-2 Typical Impacts to Soils from Solar Energy Development

Project Phase	Activity	Impact	Time Frame
		water quality in nearby surface water bodies.	
Operation and Maintenance	– Operation of the solar energy facility, power generation, and associated maintenance activities that would require vehicular access and heavy equipment operation when components are being replaced.	– Soil erosion and soil compaction along access roads. – Within the project footprint, soil erosion, surface runoff, and sedimentation of nearby water bodies could occur during operation.	Long-term (duration of project).
Decommissioning	– Facility removal. – Breaking up concrete pads and foundations. – Removal of access and on-site roads, buildings, and other structures. – Heavy vehicular traffic. – Recontouring the surface. – Revegetation.	– Soil erosion. – Soil nutrient loss and reduced water quality in nearby surface water bodies.	Short-term.

4.4.3.3 Typical Soils Impacts from Wind Energy Development

Long-term impacts to soil resources could occur where a high potential exists for increased erosion. The potential to impact soil resources is greatest where project infrastructure (e.g., buildings, wind towers, transmission towers) are present and where grading for access roads, meteorological towers (METs), and turbine pads could occur. Additional impacts to soils could occur where expansion of the energy development footprint occurs for unforeseen project needs or upon site closure activities.

Indirect impacts to soil resources during wind energy development could occur through increased surface exposures, runoff, and from potential development-induced erosion that would be downslope and out of the project boundaries.

Typical impacts to soils associated with wind energy development are summarized in Table 4.4-3.

Table 4.4-3 Typical Impacts to Soils from Wind Energy Development

Project Phase	Activity	Impact	Time Frame
Exploration	– Limited excavation activities and road construction. – Clearing or grading. – Heavy vehicular traffic, recontouring the surface, and revegetation.	– Minimal.	Short-term. Long-term.

Table 4.4-3 Typical Impacts to Soils from Wind Energy Development

Project Phase	Activity	Impact	Time Frame
Construction	– Clearing, excavation, blasting, trenching, grading, and heavy vehicle traffic.	Impacts to soil resource hazards: – Slope (or grade) increase resulting from site grading or construction of access roads; – Toe-cutting at the bases of slopes for construction of on-site structures or access roads; and – Alteration of natural drainage patterns or increase of precipitation infiltration that can increase pore pressure, which weakens the strength of soils on slopes or causes accelerated soil erosion, thereby creating slope instability. – Soil erosion. – Soil nutrient loss. – Degradation of water quality in nearby surface water bodies.	Short-term Long-term.
Operation and Maintenance	– Vehicle traffic on unpaved roads.	– Soil erosion.	Long-term (duration of the project).
Decommissioning	– Removal of all access roads, on-site roads, substations, buildings, and other structures.	– Soil erosion.	Short-term. Long-term.

4.4.4 Soil Impacts by Alternative

This section describes the effects under each alternative using the respective methodology prescribed under NEPA. To compare effects, this analysis defines the temporal scale (time), spatial extent (area), and intensity of effects for each alternative.

This EIS analyzes impacts to all resources, including habitat and protected species, to the extent necessary for a programmatic document, subject to existing data availability.

4.4.4.1 Alternative 1: No Action/No CDCA Plan Amendment

Because geothermal, solar, and wind development could still occur under the No Action/No CDCA Plan Amendment alternative, impacts to soil would be expected to be similar to those detailed in Section 4.4.4.3 for Alternative 3. However, development under the No Action/No CDCA Plan Amendment alternative may occur at a slower rate because an individual plan amendment process would be necessary for each solar or wind authorization; thus, impacts may occur at a slower rate, as well.

No renewable energy development cap or other protective stipulations/measures pertaining to the east side of the Coachella Canal would be adopted under this alternative. Thus, there would be no restrictions on development east of the Coachella Canal, and soil impacts that would not occur under Alternative 3 east of the Coachella Canal could occur under Alternative 1.

4.4.4.2 Alternative 2: No Development/CDCA Plan Amendment to Identify Areas as Closed to and Unsuitable for Geothermal, Solar, and Wind Energy Development

There would be no new construction or operation of geothermal power plants, or solar or wind energy projects, except those which are currently approved or operating. Soils would not be affected by new geothermal, wind, or solar projects; however, the closure of these lands for renewable energy development would represent an opportunity cost. The energy that could have been supplied by development of this area for geothermal, solar, and/or wind energy would have to be filled by other fossil fuel or renewable energy generating facilities constructed elsewhere.

No renewable energy development cap or other protective stipulations/measures pertaining to the east side of the Coachella Canal would be adopted under this alternative. Thus, there would be no restrictions on development east of the Coachella Canal, and soil impacts that would not occur under Alternative 3 east of the Coachella Canal could occur under Alternative 2.

4.4.4.3 Alternative 3: Renewable Energy Development Emphasis

Under this alternative, geothermal, solar, and wind could be developed to the maximum extent as defined in the geothermal, solar, and wind RFD scenarios. Up to 1,026 acres of land could be disturbed for development of geothermal power plants; up to 29,578 acres of land could be disturbed for development of solar PV projects; up to 6,637 acres could be disturbed for development of CSP projects; and up to 76 acres of land could be disturbed for wind energy projects. Solar development could occur through the development of a 50-MW solar PV project and 500-MW CSP project.

Direct Soil Impacts from Geothermal Energy Development

Short-term impacts to soil resources could occur where geothermal energy development could affect potential delicate biological soil crusts (sometimes referred to as “cryptobiotic crusts”). The loss of biological soil crusts could result in increased surface runoff.

Long-term impacts to soil resources could occur where construction of large impermeable surfaces could increase runoff potential. Runoff could also be increased through compaction of roads, well pads, and other surfaces developed during the process. Increased runoff could result in higher than normal erosion and could cause sheet, rill, and gully erosion. Implementation of BMPs and erosion control measures would mitigate erosion impacts. Long-term, direct impacts to potential soil resources could occur during exploration on a total of 95 acres of the total West Chocolate Mountains REEA. The potential land disturbed during construction could be about 1,026 acres of the REEA.

Conclusion

Short-term and long-term impacts to soils could occur. The impacts of increased public access due to new road construction could be short-term, as the roads allowing the increased public access could be reclaimed after exploration activities are complete. However, the long-term and short-term impacts could be minor and would not be of concern to the public. They would not be a concern to the public. There are no management goals for this resource.

By following BLM guidelines, sensitive soil resources would be avoided. Specifically, as discussed in Section 2.2.6.5, stipulations and WEMs would be imposed for development on soils with greater than three percent slopes, with extremely erodible or slumping soils, or soils with severe erosion hazards, badlands, rock outcrops, or slopes susceptible to mass failure.

Under this alternative, the pending geothermal lease application (640 acres) would be approved. Geothermal exploration would begin which would result in the impacts to soils from geothermal exploration discussed earlier in this section. Currently, the size of the power plant is unknown since exploration has not begun; however, other power plants in the region are less than 50 MW so it would be anticipated that exploration would be consistent with that of a geothermal power plant as discussed in the geothermal RFD scenario.

Indirect Soil Impacts from Geothermal Energy Development

An indirect impact from geothermal energy development could occur if hazardous waste is generated through the well drilling and exploration process. All drilling wastes, fluids, muds, and sludge from evaporation ponds would be disposed at an approved land disposal facility. If produced, geothermal fluids would be ponded for evaporation or re-injected as approved by the EPA.

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 geothermal energy development which could lead to potential impacts to soil resources from geothermal energy projects similar to those described above, although the development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Direct Soil Impacts from Solar Energy Development

Under this alternative, up to 6,637 acres of CSP or up to 29,758 acres of PV power could be developed. It is assumed that either CSP or solar PV projects could be developed. Due to the wide range of solar development that could occur in the West Chocolate Mountains REEA, the activities that could occur during solar energy development have been based on the development of a 50-MW solar PV project and a 500-MW CSP project. These sizes were selected based on the availability of data related to development of these types of projects. PV and CSP are the two technologies that have been fielded most widely in the United States and throughout the world.

Conclusion

Short-term impacts to soil resources could occur where solar energy development could affect potential delicate biological soil surfaces (i.e., cryptobiotic crusts). The loss of biological

soil crusts could result in increased surface runoff. Long-term impacts to soil resources could occur where construction of large impermeable surfaces could increase runoff potential. Runoff could also be increased through compaction of roads, MET pads, and other surfaces developed during the process. Increased runoff could result in higher than normal erosion and could cause sheet, rill, and gully erosion. However, by following BLM guidelines, sensitive soil resources would be avoided. Specifically, as discussed in Section 2.2.6.5, stipulations would be imposed for development on soils with greater than three percent slopes, with extremely erodible or slumping soils, or soils with severe erosion hazards, badlands, rock outcrops, or slopes susceptible to mass failure. They would not be a concern to the public. They would not be a concern to the public. There are no management goals in the CDCA Plan for this resource.

Indirect Soil Impacts from Solar Energy Development

Indirect impacts to soil resources during geothermal energy development could occur through increased surface exposures and through potential development induced erosion; however, the development cap would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Direct Soil Impacts from Wind Energy Development

Under this alternative, up to 76 acres of the land in the West Chocolate Mountains REEA could be disturbed, 36 acres of which would be temporary disturbance areas. Disturbance of 76 acres of land could result in impacts to potential soil resources, including increased erosion potential. These impacts could be avoided or minimized by implementing BMPs that are required as part of the general construction permit and by siting land disturbance activities outside of floodplains. Based on the implementation of these measures, it is unlikely that land disturbance could significantly alter drainage patterns or adversely impact soil resources within the REEA.

Thirty-six (36) acres of land could be permanently disturbed and this disturbance could impact soil resources. It is unlikely that the permanently disturbed land could significantly alter drainage patterns or adversely impact erosion potential within the West Chocolate Mountains REEA, due to the implementation of BMPs and other erosion control measures.

Conclusion

Short-term impacts to soil resources could occur where wind energy development could affect potential delicate biological soil surfaces (i.e., cryptobiotic crusts). The loss of biological soil crusts could result in increased surface runoff. Long-term impacts to soil resources could occur where construction of large impermeable surfaces could increase runoff potential. Runoff could also be increased through compaction of roads, MET pads, and other surfaces developed during the process. Increased runoff could result in higher than normal erosion and could cause sheet, rill, and gully erosion. However, by following BLM guidelines, sensitive soil resources would be avoided. Specifically, as discussed in Section 2.2.6.5, stipulations and WEMs would be imposed for development on soils with greater than three percent slopes, with extremely erodible or slumping soils, or soils with severe erosion hazards, badlands, rock outcrops, or slopes susceptible to mass failure. They would not be a concern to the public. There are no management goals in the CDCA Plan for this resource.

Indirect Soil Impacts from Wind Energy Development

Indirect impacts to soil resources during wind energy development could occur through increased surface exposure and through potential development induced erosion. 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 soils from wind energy projects, although the development cap would limit wind energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

4.4.4.4 Alternative 4: Geothermal Development Only

Under this alternative, geothermal energy could be developed to the maximum extent as defined in the geothermal RFD scenario; there would be no solar or wind energy development. Under this alternative, geothermal energy could be developed to the achievement of levels of geothermal energy development consistent with the geothermal RFD scenario; there would be no solar or wind energy development. Under this alternative, the following impacts would be the same as Alternative 3:

- Direct and indirect soils impacts from geothermal energy development.
- Acquired lands; and
- Existing noncompetitive lease application.

Under this alternative, the West Chocolate Mountains REEA would not be designated as an SEZ and solar or wind energy development would not be allowed. In addition, the development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Soils impacts from geothermal energy development would be consistent with those found in Alternative 3. Special stipulations founds in Section 2.2.6.5 would be imposed. Since there would be no solar and wind development under this alternative, there would be no impacts from these energy sources. This alternative would not conform to the CDCA goal to identify potential sites for wind energy development.

4.4.4.5 Alternative 5: Solar Energy Development Emphasis with Moderate Geothermal Development and No Wind Development

Under this alternative, solar energy could be developed to the achievement of levels of development consistent with the maximum extent as defined in the solar RFD scenario. Geothermal energy could be developed to a moderate level (50 MW) as defined in geothermal RFD scenario. Under this alternative, the following would be the same as Alternative 3:

- Acquired lands;
- Existing noncompetitive lease application; and
- Direct and indirect soils impacts from solar development.

Soil impacts from solar energy development would be consistent with those for Alternative 3. All lands within the West Chocolate Mountains REEA would be designated as an SEZ, which would allow other compatible renewable energy developments to occur. An SEZ also would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments, including geothermal energy, to occur within the West Chocolate Mountains SEZ.

Direct Soil Impacts from Geothermal Energy Development

A total of 95 acres of land could be disturbed during the exploration phase of the total West Chocolate Mountains REEA. The potential land that could be disturbed during construction could be about 342 acres. Approximately 40 wells (40 wells per 50-MW power plant) could be drilled for this alternative. Well drilling and operation during the exploration and construction phases could result in the net addition of access roads and well pads. The addition of impervious surfaces could increase the risk of potential increased erosion. The proper administration of BMPs would mitigate increased erosional risk, making the risk not significant.

Long-term impacts to soil resources could occur where construction of large impermeable surfaces could increase runoff potential. Runoff could also be increased through compaction of roads, well pads, and other surfaces developed during the process. Increased runoff could result in higher than normal erosion and could cause sheet, rill, and gully erosion. Implementation of BMPs and erosion control measures could mitigate erosion impacts. Short-term impacts to soil resources could occur where geothermal energy development could affect potential delicate biological soil surfaces sometimes referred to as cryptobiotic crusts. The loss of biological soil crusts could result in increased surface runoff. However, by following BLM guidelines, sensitive geologic resources would be avoided. Specifically, as discussed in Section 2.2.6.5, stipulations would be imposed for development on soils with greater than three percent slopes, with extremely erodible or slumping soils, or soils with severe erosion hazards, badlands, rock outcrops, or slopes susceptible to mass failure. They would not be a concern to the public. There are no management goals in the CDCA Plan for this resource.

Indirect Soil Impacts from Geothermal Energy Development

Indirect impacts to soils resources during geothermal energy development could occur through increased surface exposures and through potential development induced erosion. 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 geothermal energy development which could lead to an increase in impacts to soils from geothermal energy projects, although the development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Direct and Indirect Soil Impacts from Wind Energy Development

Under this alternative, there would be no wind development; therefore, there would be no direct or indirect impacts from wind energy sources.

4.4.4.6 Alternative 6: Geothermal Development Emphasis with Moderate Solar Development and No Wind Development

Under this alternative, it is assumed that achievement of levels of development consistent with the maximum development defined in the geothermal RFD scenario would take place (the same as discussed for Alternative 3) and that the level of achievement consistent with partial development of the solar RFD scenario would be realized. Lands within the West Chocolate Mountains REEA that lie east of the Coachella Canal would not be considered for an SEZ, modified or otherwise. Lands west of the canal would be identified as an SEZ, allowing other compatible renewable energy developments to occur. Under this alternative, the following would be the same as Alternative 3:

- Acquired lands;
- Existing noncompetitive lease application;
- Direct and indirect soils impacts from geothermal development; and
- Direct and indirect soils impacts from CSP (dish engine only) and PV solar development.

Direct and Indirect Soil Impacts from Geothermal Energy Development

Soil impacts from geothermal energy development would be consistent with those for Alternative 3. Under this alternative, the lands west of the Coachella Canal would be identified as an SEZ, a designation that would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments, including geothermal energy development, to occur within the West Chocolate Mountains SEZ. The lands east of the Coachella Canal would not be considered for an SEZ. In addition, a development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Direct Soil Impacts from Solar Energy Development

Under this alternative, the total land disturbance could be approximately 6,637 acres for CSP development (dish engine technology only) and 29,758 acres for PV development. It is estimated that each 50-MW solar PV plant could result in 450 acres of land disturbance and 400 acres of permanent disturbance (impervious surface area, including panels, roads, and buildings), and each 500-MW CSP dish engine plant could result in land disturbance of 2,500 acres. The conversion of 29,758 acres of the REEA to impervious surfaces could contribute to higher erosion potential and significantly alter off-site drainage patterns. Geologic impacts from solar energy development would be consistent with those found in Alternative 3 for CSP dish engine and PV projects. However, by following BLM guidelines, sensitive geologic resources would be avoided. Specifically, as discussed in Section 2.2.6.5, stipulations would be imposed for development on soils with greater than three percent slopes, with extremely erodible or slumping soils, or soils with severe erosion hazards, badlands, rock outcrops, or slopes susceptible to mass failure. They would not be a concern to the public. There are no management goals in the CDCA Plan for this resource.

Indirect Soil Impacts from Solar Energy Development

Solar energy development could result in long-term impacts to 29,758 acres of the West Chocolate Mountains REEA. The conversion of 46 percent of the REEA to impervious surfaces could contribute to higher erosion potential and significantly alter off-site drainage patterns. In addition, the development cap which would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Direct and Indirect Soil Impacts from Wind Energy Development

Under this alternative, there would be no wind development; therefore, there would be no direct or indirect impacts from wind energy sources.

4.5 Water Resources

This section discusses the effects to water resources that could occur with implementation of the alternatives. First, the management goals are provided; second, the impact indicators used to identify and analyze effects are presented; third, typical impacts are discussed for geothermal, solar, and wind energy; and last, impacts are analyzed by alternative. An SB 610 Water Supply Assessment would be required prior to construction to identify the water supply impacts associated with a specific project. Additionally, a study would be required to identify the potential impacts to the local aquifer associated with the injection of imported groundwater and the withdrawal and injection of geothermal fluid.

4.5.1 Management Goals

There are no management goals for water resources in the CDCA Plan. The IID is developing an Integrated Regional Water Resources Management Plan which will include conservation and water supply programs. IID has also prepared the IID Water Conservation Plan, which entails activities required for IID to conserve up to 300,000 acre-feet (AF)/year for distribution to other water agencies in the region. The Coachella Valley Water Management Plan, prepared by the Coachella Valley Water District (CVWD), was prepared to develop a program to manage surface and groundwater resources in the future. The IID has also promulgated the Interim Water Supply Policy (IWSP) for Non-Agricultural Projects (IID 2009). Under this IWSP, IID has allocated 25,000 AF/year for non-agricultural projects within its service area. This allocation is pending the completion of the Integrated Regional Water Resources Management Plan, when its policies will supersede those of the interim policy. The use of water resources within the West Chocolate Mountains REEA would likely be required to be consistent with these plans and policies.

4.5.2 Impact Criteria

The potential risks of impacts to water resources are assessed with respect to the following criteria. Potential impacts to water resources could occur if the any of the following were to take place:

- Existing drainage patterns of the site or area are altered in a manner that results in substantial erosion or siltation on or offsite;

- Water temperature is changed in such a manner that it is no longer suitable as habitat for aquatic species or for its intended beneficial use;
- Water quality standards or waste discharge requirements are violated;
- Runoff water is created or contributed to, or substantial additional sources of polluted runoff are created;
- Groundwater supplies are substantially depleted, or groundwater recharge is substantially interfered with;
- Depletions of available supplies of surface water or shallow aquifers that could cause or exacerbate conflicts with other irrigation or domestic uses;
- A water source is contaminated such that it is no longer suitable for its intended beneficial use;
- An aquifer is caused adverse harm by groundwater depletion or by mineral precipitation;
- Structures which would impede or redirect flood flows are placed within 100-year flood hazard areas;
- Inundation by mudflow occurs;
- Runoff water is created or contributed to so that it exceeds the capacity of existing or planned stormwater drainage systems; or
- Existing draining patterns of the site or area are substantially altered or the rate or amount of surface runoff is substantially increased in a manner that results in flooding on- or offsite.

4.5.3 Typical Water Resources Impacts from Energy Development

4.5.3.1 Typical Water Resources Impacts from Geothermal Energy Development

Hydrology

The West Chocolate Mountains REEA is largely undeveloped. The new impervious surfaces associated with the development of geothermal power plants and appurtenant infrastructure such as roads, parking lots, and well pads would not likely have a significant impact on local hydrology through increased runoff depending on the specific location of the impervious surfaces. Under the geothermal RFD scenario, a total of approximately 938 acres within the total REEA (BLM land and private land) could be disturbed after restoration; it is, therefore, unlikely that the placement of aboveground structures associated with these facilities would have a significant impact on surface hydrology within the REEA. However, impacts resulting from the placement of structures within or adjacent to ephemeral or perennial desert washes could result in significant hydrological impacts to the drainage, including increased flooding frequency and intensity. The placement of impervious surfaces could also decrease infiltration to groundwater. Additionally, the long-term withdrawal of local groundwater could result in local aquifer drawdown. Aquifer drawdown could reduce the volume of groundwater

inflow to surface water bodies, including wetlands and desert washes identified in the REEA, that are in hydrological communication with the local aquifer.

Surface Water Quality

Exploration for geothermal energy resources, along with the construction and operation of geothermal energy facilities, could adversely impact surface water bodies. Surface water quality could be degraded due to increased erosion and runoff associated with construction activities, impervious surfaces, and discharge of cooling waters. As described in Chapter 3, surface water quality in the West Chocolate Mountains REEA and in the adjacent Salton Sea is generally poor; additional erosion could result in minor, localized degradation of local water quality in surface water features identified in the REEA, including wetlands and natural and artificial drainages, by resulting in runoff with increased total dissolved solids (TDS) concentrations and turbidity.

Groundwater Quality

Geothermal exploration and the operation of geothermal energy facilities could adversely impact groundwater quality. Groundwater quality could be degraded if geothermal fluid containing elevated dissolved compounds is discharged into it; however, existing groundwater quality is considered marginal to poor due to high concentrations of fluoride, chloride, sulfate, and TDS (California DWR 2003).However, the release of geothermal fluids into groundwater is expected to be prevented or avoided by implementing appropriate design standards. Thus, geothermal fluid injection could have a minor to negligible impact on groundwater quality.

Floodplains

The floodplains of many of the drainages in the West Chocolate Mountains REEA are substantial, and flooding could occur in these areas during infrequent precipitation events (FEMA 2010). Flood hazards also exist in the REEA along the upstream side of SR 111 and along portions of the Coachella and East Highline canals (FEMA 2010) because they are oriented in a northwestern direction and intersect natural drainages flowing to the southwest. Flash floods could cause damage to roads, pipelines, or other structures developed. The development of geothermal facilities, including impervious surfaces, could be located outside of major floodplains to avoid increased risk of flooding, as well as flooding damage to facilities. Additionally, the relatively small proportion of the REEA that could become impervious (less than 1.5 percent) could contribute a negligible increased risk of flooding due to increased runoff.

Water Supply

Binary cycle geothermal energy production requires the withdrawal of geothermal fluid from deep reservoirs typically segregated from underlying shallow aquifers that could be used for water supply, and in binary plant operations, the geothermal resource water is re-injected back into the deep source aquifer with the goal of maintaining underground water pressure, and thus is not consumed. While it is possible that excessive withdrawal of geothermal fluids could cause drawdown of overlying aquifers and could adversely impact local groundwater availability. Proper geothermal reservoir management under typical prudent operator practices that are the standard for the industry would prevent overdraft, which entails mixing of aquifer zones that could affect water quality, as well as the drawdown of shallow water supply aquifers;

therefore, drawdown of either the geothermal reservoir or the shallow water aquifer resources is unlikely. Risks to groundwater availability are, thus, considered low.

The exploration for and construction and operation of geothermal energy facilities could impact water supply in terms of quality and quantity. Drinking water quality could be impacted during exploration and operational phases due to the potential for the release of geothermal fluids with high concentrations of TDS into groundwater or surface waters that could serve as water supply sources; but as explained above, impacts to water quality are unlikely. Moreover, surface water resources within the West Chocolate Mountains REEA are generally limited to intermittent and ephemeral streams—unlikely sources of water supply. Additionally, groundwater in the area is of generally poor quality and not used for water supply purposes. Groundwater located near unlined IID water facilities could be the result of seepage from those facilities and would be subject to restrictions. Much of the regional water need is supplied from imported surface water; therefore, impacts to water supply quality within the West Chocolate Mountains REEA are likely negligible.

The operation of binary geothermal facilities often requires significant quantities of surface water for cooling purposes (the operation of the turbines utilize groundwater from deeper, usually segregated sources, and this water is not consumed but re-injected in a closed loop system. In existing California binary geothermal power plants, fluid loss (usage) for operations ranges from 623 to 2,556 acre-feet/year. Fluid loss for existing California multi-stage flash geothermal power plants for operations ranges from 10,807 to 13,540 acre-feet/year.

Geothermal fluids can be steam or fluid or a mixture under pressure. The geothermal fluids are extracted from the resource, and the heat is used either directly to heat air or water or indirectly to generate electrical power. Once the heat in the geothermal fluid has been used, it is considered “spent.” Direct use systems are smaller and have less impact than indirect uses. Indirect uses are discussed below.

Direct-use geothermal systems use low- to moderate-temperature fluids. Binary power systems use heat exchangers with lower boiling point working fluids. In a binary-cycle geothermal power plant, which is the most likely type to be constructed within the West Chocolate Mountains REEA, 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 (such as 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. Hot water from the production wells is gathered in a series of pipelines and delivered to the power plant site, where it is then passed through several heat exchangers, which transfer heat from the geothermal fluid to the working fluid. After flowing through the heat exchanger, the cooled geothermal fluid enters the injection system to be returned to the reservoir via the injection wells. This type of system incurs no loss of geothermal fluid; only a portion of the heat (but no mass) is removed. No geothermal fluid or steam is emitted to the atmosphere.

Condensation of the working fluid in a binary power plant may be achieved either through air-cooling or water-cooling; however, given the high ambient summer temperatures in the West Chocolate Mountains REEA, water cooling would be the preferred option (if an

adequate supply of cooling water is available), as it would result in greater generation efficiency. Some evaporative water loss is expected; the amount of loss increases during the hotter summer months.

The steam and flash steam power plants use the mixed geothermal fluids and pure steam. The spent geothermal fluid is usually re-injected into the geothermal resource, but it could be evaporated in lagoons or discharged to surface water depending on the relative water quality and temperature. In rare cases, the spent geothermal fluid could be potable and used for agricultural or domestic purposes. The dry steam power plants emit the steam after it has been used and reinject any condensed fluids.

Developing geothermal resources includes using surface water or groundwater for operations, mostly as cooling water. This water is primarily used for cooling the operating steam (used to turn turbines) back into a liquid state so that it can be reinjected into the geothermal reservoir.

The chemical and thermal properties of the geothermal fluid can pose potential threats to surface water and groundwater quality. Geothermal water can contain a variety of dissolved compounds, including silica, sulfates, carbonates, metals, and halides. Any mixing of geothermal fluids with surface or groundwater where the chemical and thermal qualities of the geothermal fluids could degrade the other water in the area could damage aquatic ecosystems and contaminate drinking water supplies.

In general, any ground disturbance activities associated with geothermal resource development (roads, transmission lines, pipelines) could have a minor to negligible impact on surface water and groundwater resources within the immediate area.

The Geothermal PEIS identified typical impacts to water resources associated with geothermal energy development. The impacts are incorporated by project stage and summarized in Table 4.5-1.

Table 4.5-1 Typical Impacts to Water Resources from Geothermal Energy Development

Project Phase	Activity	Impact	Time Frame
Exploration	– Exploration and drilling.	– Soil erosion resulting in surface runoff. – Geothermal fluids contamination to groundwater quality.	Short-term. Long-term.
Construction	– Road and foundation pad construction and utility installation.	– Soil erosion resulting in surface runoff. – Increased risk of fire which could also result in increased erosion.	Short-term.
Operation and Maintenance	– Cooling and waste water discharge.	– Geothermal fluids contamination to surface and groundwater quality.	Long-term.

Table 4.5-1 Typical Impacts to Water Resources from Geothermal Energy Development

Project Phase	Activity	Impact	Time Frame
Decommissioning	– Plugging and capping production and injection wells.	– Potential geothermal fluids contamination to groundwater quality.	Short-term.

4.5.3.2 Typical Water Resources Impacts from Solar Energy Development

Hydrology

Local hydrology could be impacted with the introduction of impervious surfaces associated with solar energy facilities. Increased impervious surface area could decrease infiltration and increase stormwater runoff volumes and velocity. Though individual solar energy facilities have little impact on hydrology, the construction of solar energy facilities on 45 percent of the West Chocolate Mountains REEA acreage could significantly impact local hydrology, depending on the technology implemented and the specific locations of facilities. Placement of structures within or adjacent to desert washes could result in adverse hydrological impacts.

Surface Water Quality

Surface water quality could be impacted by the construction and operation of solar energy facilities. Increased sediment loads in stormwater related to land disturbance and impervious surfaces could adversely impact surface water quality. Additionally, spills of fuels or other chemicals during construction could impact surface water quality. The degree of impact would be contingent on the number of acres disturbed and the location of solar facilities in relationship to surface water. As described in Chapter 3, surface water quality in the West Chocolate Mountains REEA and in the adjacent Salton Sea is generally poor; additional erosion could further degrade local water quality in surface water features identified in the REEA, including wetlands and natural and artificial drainages, by resulting in runoff with increased TDS concentrations and turbidity.

Groundwater Quality

Solar energy facilities have minimal impact on groundwater quality. Construction and operation of solar facilities do not require discharge to groundwater or excavation deep enough to impact aquifers. Groundwater wells could need to be developed for the project water supply; however, this would not likely result in groundwater quality impacts.

Floodplains

The floodplains of many of the drainages in the West Chocolate Mountains REEA are substantial, and flooding could occur in these areas during infrequent precipitation events (FEMA 2010). Flood hazards also exist in the REEA along the upstream side of SR 111 and along portions of the Coachella and East Highline canals (FEMA 2010) because they are oriented in a northwestern direction and intersect natural drainages flowing to the southwest. Flash floods could cause damage to roads, pipelines, or other structures developed; however, solar facilities could be sited to avoid these impacts.

The introduction of impervious surfaces, such as those associated with solar facilities, could adversely impact floodplain function by increasing the volume and velocity of stormwater runoff. The risk of increased flooding due to increased impervious surfaces is related to the location and area of impervious surfaces. Developing solar energy on almost 84 percent of the project acreage could adversely impact floodplain function.

Water Supply

Water is typically required for the construction and operation of solar energy facilities. For construction, water is used to suppress fugitive dust. For operation, water is required to clean panels and, for some technologies, cooling purposes. Operational water supply needs vary depending on technology. Solar PV technology requires minimal water for operational purposes (0.05 AF/year/MW); whereas solar trough technology would require 4.5 to 14.5 AF/year/MW (EPA 2004). Water required for construction is dependent on the size of the disturbed area. Technologies with significant water requirements could impact the quantity of existing water supplies. The construction of solar energy facilities has little or no impact on the quality of water supply. Water supply quality could be impacted if increased sediment loads or chemicals from construction activities are discharged into surface waters. Solar energy facilities have little or no impact on groundwater quality. Construction for solar energy facilities could be planned to minimize water supply impacts, and considerations related to operational water needs could be factored into the selected solar energy technology.

Based on a review of environmental documentation for other solar energy projects, typical impacts for solar energy projects have been developed. Typical impacts to water resources associated with solar energy development are summarized in Table 4.5-2.

Table 4.5-2 Typical Impacts to Water Resources from Solar Energy Development

Project Phase	Activity	Impact	Time Frame
Exploration	– Surveys. – Vehicular traffic. – Soil borings and, possibly, water well establishment.	– Minimal.	Short-term.
Construction	– Water used for dust control when clearing vegetation and grading, road traffic; for making concrete for foundations and ancillary structures; and for consumptive use by the construction crew. – Water is likely to be obtained from nearby surface water bodies or aquifers, depending on availability, but could be trucked in from off-site.	Water quality could be affected by: – Activities that cause soil erosion; – Weathering of newly exposed soils that could cause leaching and oxidation, thereby releasing chemicals into the water; – Discharges of waste or sanitary water; and – Pesticide applications. – Surface and groundwater flow systems could be affected by withdrawals made for water use, wastewater and storm water discharges,	Short-term.

Table 4.5-2 Typical Impacts to Water Resources from Solar Energy Development

Project Phase	Activity	Impact	Time Frame
		and the diversion of surface water flow for access road construction or storm water control systems. – Excavation activities and the extraction of geological materials could affect surface and groundwater flow. – The interaction between surface water and groundwater could also be affected if the surface water and groundwater were hydrologically connected, potentially resulting in unwanted dewatering or recharging of water.	
Operation and Maintenance	– Withdrawals of surface water and/or groundwater during the operations phase. – Vehicular traffic and machinery operations during maintenance.	– Possible degradation of water quality resulting from (e.g., erosion and sedimentation) and wastewater disposal.	Long-term.
Decommissioning	– Water might be trucked in from offsite or obtained from local groundwater wells or nearby surface water bodies, depending on availability. – It could be used for dust control for road traffic, dismantling of towers, substations, and other buildings, and for consumptive use by the decommissioning/site reclamation crew.	– Negative impacts to surface and groundwater quality.	Short-term.

4.5.3.3 Typical Water Resources Impacts from Wind Energy Development

Hydrology

The addition of impervious surfaces associated with wind energy development, as well as the disturbance of land, could impact hydrology. Land disturbance and impervious surfaces could result in increased erosion and decreased infiltration. However, wind energy facilities would be constrained to only a very small proportion of the West Chocolate Mountains REEA. Impacts to hydrology could, therefore, be negligible.

Surface Water Quality

Construction activities related to wind energy facilities could result in land disturbance, which could increase sediment loads in stormwater runoff, thereby adversely impacting downstream surface waters. Land disturbance activities associated with construction would be

temporary. Additionally, chemical spills during construction activities could impact surface water. Steps would be taken to avoid spills or mitigate the impacts of spills. Surface water quality impacts during construction could be negligible. Surface water quality impacts during operation could also be negligible. As described in Chapter 3, surface water quality in the West Chocolate Mountains REEA and in the adjacent Salton Sea is generally poor; additional erosion could further degrade local water quality in surface water features identified in the REEA, including wetlands and natural and artificial drainages, by resulting in runoff with increased TDS concentrations and turbidity.

Groundwater Quality

Construction and operation of wind energy facilities could have a negligible impact on groundwater quality. The construction and operation of these facilities would not result in discharges or impacts to groundwater.

Floodplains

The construction and operation of wind energy facilities could impact floodplain functions due to increased impervious surface area and land disturbance associated with construction. Construction related impacts would be temporary. Impervious surfaces could increase runoff; however, additional impervious surfaces could comprise a very small proportion of the West Chocolate Mountains REEA and could, therefore, have negligible impacts on flood risk. Additionally, facilities could be sited to avoid or minimize floodplain impacts.

Water Supply

Wind energy facilities could have little or no impact on water supply, in terms of quantity and quality. Water would be required for dust suppression during construction, but only a minimal amount would be needed for operational purposes. During the construction and operation of wind facilities, no direct discharges or impacts to groundwater would occur.

Typical impacts to water resources associated with wind energy development are summarized in Table 4.5-3.

Table 4.5-3 Typical Impacts to Water Resources from Wind Energy Development

Project Phase	Activity	Impact	Time Frame
Exploration	– Surveys. – Vehicular traffic.	– Minimal.	Short-term.
Construction	– Construction activities (e.g., excavation, blasting, trenching). – Storm water control systems. A number of construction activities could use water, including: – Water used for dust control during the construction of access roads, clearing of	– Surface and groundwater contamination and impacts to groundwater infiltration.	Short-term.

Table 4.5-3 Typical Impacts to Water Resources from Wind Energy Development

Project Phase	Activity	Impact	Time Frame
	vegetation, grading, and road traffic; – Water used for making concrete used in the foundations of wind towers, substations, central control buildings, and various personnel support facilities; and – Water used by the construction crew. Because the construction phase could last more than 1 year, potentially large amounts of water could be needed. The water could be trucked in from off site or obtained from local groundwater wells or surface water bodies near the facility, depending upon the availability of those sources.		
Operation and Maintenance	– Minimal water required.	– As various construction and related activities diminish, the environment will reestablish a new equilibrium.	Long-term.
Decommissioning	– Activities could involve removal of all access roads, on-site roads, transformer pads, and building foundations.	– Surface and groundwater contamination and impacts to groundwater infiltration.	Short-term.

4.5.4 Water Resources Impacts by Alternative

This EIS analyzes impacts to all resources, including habitat and protected species, to the extent necessary for a programmatic document, subject to existing data availability. This section describes the effects under each alternative using the respective methodology prescribed under NEPA. To compare effects, this analysis defines the temporal scale (time), spatial extent (area), and intensity of effects for each alternative.

4.5.4.1 Alternative 1: No Action/No CDCA Plan Amendment

Because geothermal, solar, and wind development could still occur under the No Action/No CDCA Plan Amendment alternative, impacts to water resources would be expected to be similar to those detailed in Section 4.5.4.3 for Alternative 3. However, development under the No Action/No CDCA Plan Amendment alternative may occur at a slower rate because an individual plan amendment process would be necessary for each geothermal and solar or wind authorization; thus, impacts may occur at a slower rate, as well.

No renewable energy development cap or other protective stipulations/measures pertaining to the east side of the Coachella Canal would be adopted under this alternative. Thus, there would be no restrictions on development east of the Coachella Canal, and water quality impacts that would not occur under Alternative 3 east of the Coachella Canal could occur under Alternative 1.

4.5.4.2 Alternative 2: No Development/CDCA Plan Amendment to Identify Areas as Closed to and Unsuitable for Geothermal, Solar, and Wind Energy Development

Under the No Development/CDCA Plan Amendment Alternative, the CDCA Plan would be amended to identify the West Chocolate Mountains REEA as closed to and unsuitable for geothermal leasing and development. The Plan Amendment also would identify the West Chocolate Mountains REEA as closed to and unsuitable for wind and solar energy development.

There would be no new construction or operation of geothermal power plants, or solar or wind energy projects, except those which are currently approved or operating. Water resources would not be affected by new geothermal, wind, or solar projects; however, the closure of these lands for renewable energy development would represent an opportunity cost. The energy that could have been supplied by development of this area for geothermal, solar, and/or wind energy would have to be filled by other fossil fuel or renewable energy generating facilities constructed elsewhere.

No renewable energy development cap or other protective stipulations/measures pertaining to the east side of the Coachella Canal would be adopted under this alternative. Thus, there would be no restrictions on development east of the Coachella Canal, and water quality impacts that would not occur under Alternative 3 east of the Coachella Canal could occur under Alternative 2.

4.5.4.3 Alternative 3: Renewable Energy Development Emphasis

Under this alternative, geothermal, solar, and wind could be developed to the maximum extent as defined in the geothermal, solar, and wind RFD scenarios. Up to 1,026 acres of land could be disturbed for development of geothermal power plants; up to 29,758 acres of land could be disturbed for development of solar PV projects; up to 6,637 acres could be disturbed for development of CSP projects; and up to 76 acres of land could be disturbed for wind energy projects. Solar development could occur through the development of a 50-MW PV project and a 500-MW CSP project.

Construction of energy facilities would be subject to stormwater measures contained in a SWPPP and would include BMPs as required by a General Construction Activity Stormwater Permit issued by the SWRCB. The SWPPP would be subject to the review and approval of the RWQCB. BMPs implemented during all phases of construction within the West Chocolate Mountains REEA would include road maintenance, grading, culvert maintenance and installation, water runoff control, installation of storm drain inlet protection devices, traffic control in erosion-damaged areas, use of erosion control blankets and soil stabilizers, use of hay bales and sand bags, and mulching areas with a protective cover of organic material such as wood chips and vegetation.

Any construction or operation on IID property or within its existing or proposed ROW or easements would require an encroachment permit, including, but not limited to: surface improvements such as proposed new streets; driveways; parking lots; landscapes; and all water, sewer, stormwater, or any other aboveground or underground utilities.

Direct Hydrology Impacts from Geothermal Energy Development

There is the potential for short-term hydrological impacts related to land disturbance during exploration and construction of geothermal facilities. Surface disturbances, including vegetation removal and the construction of impervious surfaces, could occur due to the construction of access roads, wells and well pads, the power plant, and transmission lines. During exploration, a total of 95 acres of BLM and other land could be disturbed. As discussed in Section 2.2.6.5, the BLM would impose stipulations that would not permit surface use and occupancy within a certain distance of hydrologic features on either side of the Coachella Canal. In addition, the BLM would impose stipulations related to the use of groundwater within the REEA. It is unlikely that exploration activities would result in significant direct impacts to local hydrology due to the small proportion of land disturbance within the REEA and the implementation of BLM stipulations.

The potential initial land disturbance during construction of production wells and a geothermal power plant could be approximately 1,026 acres of BLM and other land. Construction activities would likely not result in an increased flood risk or significantly alter drainage patterns within the REEA due to the small portion of the REEA impacted and the implementation of stipulations to protect water resources. Construction activities would not likely result in significant hydrological alterations within the REEA.

Surface water quality could be adversely impacted by increased sediment loading associated with land disturbance and the release of drilling fluids, geothermal fluid, or other chemicals during exploration and construction. Disposal of drilling fluids produced during exploration activities, which could include mud and geothermal residue, would need to be disposed of in appropriate landfills to avoid adverse surface water quality impacts. Additionally, local surface water could be impacted by groundwater drawdown if the geothermal reservoir is hydraulically connected to the shallow aquifer system that feeds local streams (Oak Ridge National Laboratory 1979). Surface water quality impacts related to land disturbance and erosion would likely be negligible due to the relatively small land area that could be disturbed during exploration and construction, stipulations that would be imposed as discussed in Section 2.2.6.5, and measures required as part of the general construction permit could be implemented to avoid or minimize adverse impacts to surface water quality related to erosion. Surface water impacts related to groundwater reservoir drawdown would be minimized by locating facilities outside of groundwater outflow areas. Additionally, streams within the West Chocolate Mountains REEA are generally intermittent to ephemeral and dependent not on groundwater flows but surface water flow related to storm events. It is unlikely that surface water quality would be adversely impacted during the short- or long-term.

The Salton Sea is the closest traditional navigable water to the West Chocolate Mountains REEA. It is assumed that all streams or aquatic resources located onsite within the 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 likely would be required for any type of discharge of dredge or fill material in ephemeral streams within the 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 NHD 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 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 would 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.

Approximately 120 wells (40 wells per 50-MW power plant) could be drilled for this alternative. Well drilling and operation during the exploration and construction phases could create pathways for geothermal fluid, possibly containing a high concentration of dissolved solids, to rise and mix with shallow aquifers, and the drawdown of geothermal reservoirs could alter hydraulically connected shallow groundwater temperature and potentially adversely impact water quality (Oak Ridge National Laboratory 1979).

Drawdown would be dependent on the consumptive use of the power plants since most of the water could be reinjected into the geothermal reservoir. Additionally, geothermal fluid released to the ground surface could infiltrate into shallow aquifers, adversely impacting water quality. BMPs related to well drilling and operation during the exploration and operation phases would be implemented to minimize the risk of a geothermal fluid release and groundwater drawdown; however, groundwater in the area is not suitable as a drinking water source; thus, the impacts to groundwater quality would not be considered adverse. Therefore, the risk associated with groundwater quality and quantity impacts is low and would not be considered significant.

The addition of impervious surfaces and land disturbance within floodplains could result in long-term hydrological impacts, including increased flood risk, by reducing infiltration and increasing runoff velocity. Approximately 938 acres of impervious surfaces would be permanently altered within the West Chocolate Mountains REEA under this alternative (well pads and power plant). The addition of impervious surfaces to and land disturbance within floodplains could create increase flood risk in the long term if proper measures are not implemented to minimize or avoid impacts. As discussed in Section 2.2.6.5, the BLM has imposed stipulations that would not permit surface use and occupancy within a certain distance of hydrologic features on either side of the Coachella Canal. Additionally, the relatively small portion of the REEA that could become impervious would not likely increase flood risk substantially; therefore, floodplain impacts would not be considered significant with proper siting and implementation of mitigation measures.

Water supply impacts could be short-term or long-term. Short-term water supply impacts could be caused by exploration and construction activities. Exploration activities require drilling

and testing wells, which could create pathways for geothermal fluid, potentially containing a high concentration of dissolved solids, to rise and mix with shallow aquifers that could be a source for water supply. Groundwater within the West Chocolate Mountains REEA is generally of poor quality and not used for drinking water supply; therefore, impacts on water supply from exploration would generally not be significant. With the proper siting of exploration activities in areas that are outside of drinking water protection zones and with the implementation by the BLM of stipulations to protect water resources, there would likely be no direct impacts on water supply related to exploration activities. Production of groundwater would not be allowed to exceed the recharge rate of a reasonably defined local sub-basin. Water would be required for dust suppression during construction, which could cause short-term water supply impacts. Water demand for dust suppression would be approximately 0.01 AF/acre (3,225 gallons/acre), for a total potential demand of 10.26 AF (3,308,850 gallons), a relatively small quantity of water, depending on the time of use. It is likely that this demand could be distributed over the entire duration of construction; the water would not be required at once, reducing potential water supply impacts; this represents less than one percent of the current IID allocation of imported surface water for non-industrial projects within its service area. Due to the relatively small quantity of water required, construction related water demand would not likely have significant direct impacts on water supply within the West Chocolate Mountains REEA.

The operation of geothermal energy facilities could result in long-term impacts on water supply in terms of quality and quantity. During operation, there is the risk that wells could discharge geothermal fluid, potentially containing a high concentration of dissolved solids, into the shallow aquifer, adversely impacting groundwater that could be a water supply source. There is the also the risk that geothermal fluid discharge to the ground could infiltrate shallow aquifers, adversely impacting water quality. With proper O&M procedures and by siting the power plant outside of a drinking water protection area, the operation of the geothermal facility would not result in direct water supply quality impacts.

The operational phase could impact water supply in terms of quantity. Under the RFD scenario for this alternative, water demand for operational purposes could be 4,499 gallons per megawatt-hour (MWH). According to the DOE, the geothermal steam condensing consumptive rate is 1,400 gallons/MWH (DOE 2006). This represents the amount of water that is not returned to the geothermal reservoir per MWH. In existing California binary geothermal power plants, fluid loss (usage) for operations ranges from 623 to 2,556 acre-feet/year. Operating at 100 percent capacity, the three 50-MW binary cycle geothermal power plants would require 1,869 to 7,668 acre-feet/year. More precise estimates of water usage would be developed in site-specific NEPA analysis upon receipt of an application for a power plant site license.

The operational water demand is significant and could impact local water supplies if competing uses exist at potential water supply sources. Competing uses could include water supply for domestic uses, irrigation, and commercial water uses, including any local or regional spas and resorts that use geothermal water. Specific water sources have not been identified. Local groundwater could be used. The storage capacity of the Imperial Valley has been estimated at approximately 14 million AF (Alward and Shatz 2009); the water required for the operation of the three geothermal power plants would represent less than 1 percent of this capacity. It is unlikely that this use would impact drinking water supply in the West Chocolate Mountains REEA since groundwater in this part of the Colorado Desert and in the Imperial

Valley is generally of poor quality and well yields of clean water are relatively quite low (California DWR 2003).

Another possible water source could be imported surface water from the IID which, due to the poor local groundwater quality, is the likely source of drinking water in the area, as well. IID's current policy allocates only 25,000 AF/year of water for non-industrial projects, which is more than what is required for this alternative (17,885 AF/year). Due to the volume of water required for operational purposes, full development of the geothermal RFD scenario could have direct impacts on water supplies within the West Chocolate Mountains REEA in the short and long term.

The following types of federal reserved water rights can occur on BLM lands: public water holes and springs, mineral hot springs, stock driveways, public oil shale withdrawals, wild and scenic rivers, national monuments and conservation areas, and wilderness areas. Probably the most common federal reserved water right for BLM is for public water holes and springs. These rights were created by Executive Orders called Public Water Reserves (PWR). Until 1926, PWRs were created on an ad hoc and site-specific basis. Federal agencies would identify the springs they wanted reserved and these would be incorporated (by EO) into a chronologically numbered PWR.

PWR 107 ended the site-specific system of reserving springs and water holes. The purpose of PWR 107 was to reserve natural springs and water holes yielding amounts in excess of homesteading requirements. This order states that "every . . . legal subdivision of the public land surveys which is vacant unappropriated unreserved public land and contains a spring or waterhole, and all land within one quarter of a mile of every spring or waterhole located on unsurveyed public land is hereby, withdrawn from settlement, location, sale, or entry, and reserved for public use . . ."

There was no intent to reserve the entire yield of each public spring or water hole; rather, reserved water was limited to domestic human consumption and stockwatering. All waters from these sources in excess of the minimum amount necessary for these limited public watering purposes is available for appropriation through state water law. To date, many of these PWRs have not been registered with the state and/or are not adjudicated.

Mineral hot springs with medicinal or curative properties located on vacant, unappropriated, and unreserved public lands constitute federal reserved water rights. The BLM is authorized to lease these springs for public purposes. PWR 107 does not specifically address geothermal energy development; therefore, PWR 107 would not result in the creation of new water rights outside of federal and state law.

Conclusion

It is unlikely that exploration activities would result in significant direct impacts to local hydrology due to the small proportion of land disturbance within the REEA and the implementation of BLM stipulations. Construction activities would not likely result in significant hydrological alterations within the REEA. Surface water quality impacts related to land disturbance and erosion would likely be negligible due to the relatively small land area that could be disturbed during exploration and construction, and measures required as part of the general

construction permit could be implemented to avoid or minimize adverse impacts to surface water quality related to erosion. Surface water impacts related to groundwater reservoir drawdown could be minimized by locating facilities outside of groundwater outflow areas. It is unlikely that surface water quality would be adversely impacted during the short- or long-term. With the proper siting of exploration activities in areas that are outside of drinking water protection zones and with the implementation by the BLM of stipulations to protect water resources, there would likely be no direct impacts on water supply related to exploration activities. Production of groundwater would not be allowed to exceed the recharge rate of a reasonably defined local sub-basin. Water would be required for dust suppression during construction, which could cause short-term water supply impacts. Due to the volume of water required for operational purposes, the partial geothermal RFD scenario could have direct impacts on water supplies within the West Chocolate Mountains REEA in the short and long term. However, stipulations outlined in Section 2.2.6.5 which include preparation of an SB-610 water supply assessment would ensure there are no long term impacts to water supply. They would not be a concern to the public. There are no management goals in the CDCA Plan for this resource.

Indirect Hydrology Impacts from Geothermal Energy Development

Exploration and construction activities in the northern portion of the West Chocolate Mountains REEA could adversely impact water quality in the adjacent Salton Sea, a highly impacted surface water body, due to increased erosion from land disturbance. Adverse water quality impacts would be avoided by BLM stipulations in Section 2.2.6.5, that do not permit surface use and occupancy a certain distance of hydrologic features on either side of the Coachella Canal.

High operational water demand could result in long-term impacts and off-site impacts. The projected lifespan of the geothermal plant is 30 years. This long-term water demand could adversely impact the availability of future water supplies, potentially constraining additional development and drinking water availability. Additionally, there is the risk of significant aquifer drawdown on and offsite, which could impact on-site and off-site water supplies. These indirect water supply impacts could be minimized or avoided by selecting water sources that are outside of drinking water protection zones or from sources where there is currently no competing use. However, the BLM would require preparation of an SB-610 water supply assessment to ensure there would be no long-term impacts to water supply.

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 geothermal energy development, which could lead to an increase in impacts to water resources from geothermal energy projects, although the stipulations to protect water resources and the development cap which would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres) would minimize the impact to water resources.

Direct Hydrology Impacts from Solar Energy Development

Direct effects to water resources could occur if up to 6,637 acres of CSP or up to 29,758 acres of solar PV power were developed. It is estimated that each 50-MW solar PV plant could result in 450 acres of land disturbance and each 500-MW CSP trough plant could result in land

disturbance of 2,500 acres. Though the construction of these projects would not likely occur simultaneously, the disturbance of such a large area could result in the substantial alteration of existing hydrology and drainage within the West Chocolate Mountains REEA. Widespread land disturbance could increase flood risk and erosion, possibly resulting in increased flooding intensity and frequency, increased sediment loading to surface waters, and substantial alterations to existing ephemeral and intermittent drainages.

The Salton Sea is the closest traditional navigable water to the West Chocolate Mountains REEA. 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 NHD 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 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 would 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.

Water would be required during construction activities for dust suppression. Since construction of all facilities would not likely occur simultaneously, the water demand for construction activities could be relatively negligible; however, the cumulative water demand required for the construction of all the projects under this RFD scenario would be substantial. Construction water needs for PV could be up to 2.26 AF/acre and CSP could be up to 1.484 AF/acre. It is possible that construction water needs could be supplied from local groundwater sources, which could directly impact local water supply, depending on the quantity and time of use. Should multiple projects require water for construction simultaneously, water supplies in the local area could be impacted if groundwater is the primary source of construction water. Production of groundwater would not be allowed to exceed the recharge rate of a reasonably defined local sub-basin. In addition, the BLM would impose stipulations to protect water resources related to the use of groundwater within the REEA.

Panel washing for both PV and CSP solar trough technologies is required to maximize efficiency. The operational water needs for panel and mirror cleaning are estimated to be up to 0.05 AF/year/MW for PV and 4.5 to 14.5 AF/year/MW for CSP. If all facilities became operational simultaneously, the total operational water demand could be up to 33 AF/year for PV and 10,875 AF/year for CSP. Over the 30-year lifespan of these facilities, the total cumulative operational water demand could be up to 362,250 AF. The annual operational water requirement could be 43 percent of the current IID allocation for non-industrial projects. Operational water needs for this alternative could result in long-term water supply impacts within the West

Chocolate Mountains REEA and in surrounding areas, depending on the water supply sources. It is likely that much of operational water needs could be supplied by local groundwater. The degree of local water supply impacts would likely be dependent on time of use, specifically the quantity and timing of the use. If a large quantity of water would be required over a short period of time, groundwater drawdown could result in and could have an adverse impact on local water supplies although the development cap and stipulations to protect water resources would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). However, stipulations outlined in Section 2.2.6.5, including the preparation of an SB-610 water supply assessment would ensure that no long-term impacts to water supply would occur.

Conclusion

Though the construction of these projects likely would not occur simultaneously, the disturbance of such a large area could result in the substantial alteration of existing hydrology and drainage within the West Chocolate Mountains REEA. Water would be required during construction activities for dust suppression. Since construction of all facilities would not likely occur simultaneously, the water demand for construction activities could be relatively negligible; however, the cumulative water demand required for the construction of all the projects under the solar RFD scenario would be substantial. Operational water needs for this alternative could result in long-term water supply impacts within the West Chocolate Mountains REEA and in surrounding areas, depending on the water supply sources. Panel washing for both PV and CSP solar trough technologies is required to maximize efficiency. The annual operational water requirement could be 43 percent of the current IID allocation for non-industrial projects. It is, therefore, likely that much of operational water needs could be supplied by local groundwater. If a large quantity of water would be required over a short period of time, groundwater drawdown could result and could have an adverse impact on local water supplies although the development cap and stipulations to protect water resources would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). However, stipulations outlined in Section 2.2.6.5, including the preparation of an SB-610 water supply assessment would ensure there are no long term impacts to water supply.

Indirect Hydrology Impacts from Solar Energy Development

This alternative could result in long-term and off-site water resource impacts. Land disturbance on up to 29,758 acres of the REEA could significantly alter off-site drainage patterns, particularly downstream of the area. Runoff volume and velocity could increase and disturb existing drainage patterns on land to the west of the REEA, potentially adversely impacting water quality in the adjacent Salton Sea, an already highly impacted water body, by increasing sediment loading.

Direct Hydrology Impacts from Wind Energy Development

Under Alternative 3, one 45-MW wind project could be developed. For the purpose of this analysis, it is assumed that 76 acres of BLM and other land could be disturbed, 36 acres of which would be temporary disturbance areas.

Disturbance of 76 acres of land could result in impacts to water resources, including increased flood risk, sedimentation, and erosion. These impacts could be avoided or minimized

by implementing BMPs that are required as part of the general construction permit and by siting land disturbance activities outside of floodplains. Based on the implementation of these measures and because the land disturbance area could be only 76 acres of the West Chocolate Mountains REEA, it is unlikely that land disturbance could significantly alter drainage patterns or adversely impact water quality within the REEA. Construction would require water for dust suppression purposes, but the quantity required could be negligible.

Forty acres of land could be permanently disturbed. It is unlikely that the permanently disturbed land could significantly alter drainage patterns or adversely impact water quality within the West Chocolate Mountains REEA due to the stipulations in Section 2.2.6.5 to protect water resources the BLM would impose that do not permit surface use and occupancy within a certain distance of hydrologic features on either side of the Coachella Canal. Production of groundwater would not be allowed to exceed the recharge rate of a reasonably defined local sub-basin. Thus, groundwater and surface water quality would likely not be impacted; the operation of wind energy facilities does not require or produce toxic chemicals.

The Salton Sea is the closest traditional navigable water to the West Chocolate Mountains REEA. 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 NHD 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 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 would 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.

Conclusion

Water usage associated with the construction and operation of the 45-MW wind energy facility could be negligible. Water supply impacts could, therefore, be negligible.

Indirect Hydrology Impacts from Wind Energy Development

Long-term and off-site impacts associated with this action could be negligible. Wind facilities could be sited and BMPs could be implemented to minimize or avoid hydrological impacts. Additionally, little or no water would be required for operational purposes. Long-term water supply impacts could, therefore, be negligible.

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 wind energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

4.5.4.4 Alternative 4: Geothermal Development Only

Under this alternative, geothermal energy could be developed to the achievement of levels of development consistent with the maximum extent as defined in the geothermal RFD scenario; there would be no solar or wind energy development. Under this alternative, geothermal energy could be developed to the achievement of levels of geothermal energy development consistent with the geothermal RFD scenario; there would be no solar or wind energy development. Under this alternative, the following impacts would be the same as Alternative 3:

- Direct and indirect hydrologic impacts from geothermal energy development;
- Acquired lands; and
- Existing noncompetitive lease application.

Under this alternative, the West Chocolate Mountains REEA would not be designated as an SEZ. In addition, the development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Since there would be no solar and wind development under this alternative, there would be no impacts from these energy sources. This alternative would not conform to the CDCA goal to identify potential sites for wind energy development

4.5.4.5 Alternative 5: Solar Energy Development Emphasis with Moderate Geothermal Development and No Wind Development

Under this alternative, solar energy could be developed to the achievement of levels of development consistent with the maximum extent as defined in the solar RFD scenario. Geothermal energy could be developed to a moderate level (50 MW) as defined in geothermal RFD scenario. Under this alternative, the following would be the same as Alternative 3:

- Acquired lands;
- Existing noncompetitive lease application; and
- Direct and indirect hydrologic impacts from solar development.

Water quality and hydrology impacts from solar development would be the same as Alternative 3. All lands within the West Chocolate Mountains REEA would be designated as an SEZ, which would allow other compatible renewable energy developments to occur. An SEZ also would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments, including geothermal energy, to occur within the West Chocolate Mountains SEZ.

Direct Hydrology Impacts from Partial Geothermal Energy Development

Direct hydrology impacts from Alternative 5 would be the same as Alternative 3, however, they would only be to the level consistent with development of one 50-MW geothermal power plant. As discussed in Section 2.2.6.5, the BLM has imposed stipulations that would not permit surface use and occupancy within a certain distance of hydrologic features on either side of the Coachella Canal. Any increase in flood risk would likely be temporary and highly localized. This alternative would not likely result in long-term, adverse, hydrological impacts, including increased flood risk.

It is unlikely that surface water quality could be adversely impacted during the short or long term. Approximately 40 wells (40 wells per 50-MW power plant) could be drilled for this alternative. Well drilling and operation during the exploration and construction phases could create pathways for geothermal fluid, possibly containing a high concentration of dissolved solids, to rise and mix with shallow aquifers, and the drawdown of geothermal reservoirs could alter hydraulically connected shallow groundwater temperature, potentially adversely impacting water quality (Oak Ridge National Laboratory 1979). Drawdown would be dependent on the consumptive use of the power plants since most of the water would be re-injected into the geothermal reservoir. BMPs related to well drilling and operation during the exploration and operation phases would be implemented to minimize the risk of a geothermal fluid release and groundwater drawdown; however, groundwater in the area is not suitable as a drinking water source; thus, the impacts to groundwater quality would not be considered adverse. The risk associated with groundwater quality and quantity impacts is low and would not be considered significant.

Approximately 313 acres could be permanently altered within the West Chocolate Mountains REEA under this alternative (well pads and power plant). The addition of impervious surfaces to and land disturbance within floodplains could create increased flood risk in the long term if proper measures were not implemented to minimize or avoid impacts. Impervious surfaces could be located outside of floodplains within the REEA to avoid or minimize an increase in flood risk. Additionally, the relatively small portion of the REEA that could become impervious (approximately 313 acres) would not likely increase flood risk substantially; therefore, floodplain impacts would not be considered significant with proper siting and implementation of mitigation measures.

Water would be required for dust suppression during construction, which could cause short-term water supply impacts. Water demand for dust suppression is approximately 0.01 AF/acre (3,225 gallons/acre), for a total potential demand of 3.42 AF (1,090,050 gallons), a relatively small quantity of water, depending on the time of use. Due to the relatively small quantity of water required and if water is acquired from a suitable source, construction related water demand would not likely have direct impacts on water supply within the West Chocolate Mountains REEA.

The operational phase could impact water supply in terms of quantity. Under this alternative, water demand for operational purposes is assumed to be 4,499 gallons/MHW. According to the DOE, the geothermal steam condensing consumptive rate is 1,400 gallons/MWH (DOE 2006). This represents the amount of water that is not returned to the

geothermal reservoir per MWH. Operating at 100 percent capacity, the one binary cycle geothermal power plant would require from 623 to 2,556 acre-feet/year.

It is unlikely that this use would impact the drinking water supply in the West Chocolate Mountains REEA since groundwater in this part of the Colorado Desert and in the Imperial Valley is generally of poor quality and well yields of clean water are relatively quite low (Alward and Shatz 2009).

Conclusion

It is unlikely that exploration activities would result in significant direct impacts to local hydrology due to the small proportion of land disturbance within the REEA and the implementation of BLM stipulations. Due to the volume of water required for operational purposes, the partial geothermal RFD scenario could have direct impacts on water supplies within the West Chocolate Mountains REEA in the short and long term. However, stipulations outlined in Section 2.2.6.5 which include preparation of an SB-610 water supply assessment would ensure there are no long-term impacts to water supply. They would not be a concern to the public. There are no management goals in the CDCA Plan for this resource.

Indirect Hydrologic Impacts from Geothermal Energy Development

Exploration and construction activities in the northern portion of the West Chocolate Mountains REEA could adversely impact water quality in the adjacent Salton Sea, a highly impacted surface water body, due to increased erosion from land disturbance. Adverse water quality impacts could be avoided because the BLM would not permit surface use and occupancy within 300 feet of artificial surface waters and associated wetlands. In addition, the BLM would impose specific water resources stipulations related to the use of groundwater.

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 geothermal energy development, which could lead to an increase in impacts to water resources from geothermal energy projects although the stipulations to protect water resources and the development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

4.5.4.6 Alternative 6: Geothermal Development Emphasis with Moderate Solar Development and No Wind Development

Under this alternative, it is assumed that the achievement of levels of development consistent with the maximum development defined in the geothermal RFD scenario would take place (the same as discussed for Alternative 3) and that the level of achievement consistent with partial development of the solar RFD scenario would be realized. Lands within the West Chocolate Mountains REEA that lie east of the Coachella Canal would not be considered for an SEZ, modified or otherwise. Lands west of the canal would be identified as an SEZ, allowing other compatible renewable energy developments to occur. There would be no wind energy development.

Under this alternative, the following would be the same as Alternative 3:

- Acquired lands;
- Existing noncompetitive lease application;
- Direct and indirect hydrologic impacts from geothermal development; and
- Direct and indirect hydrologic impacts from CSP (dish engine only) and PV solar development.

Water quality and hydrology impacts would be the same under this alternative as Alternative 3.

Direct Hydrologic Impacts from Solar Energy Development

Direct impacts to water resources could occur if up to 6,637 acres of CSP (dish engine technology only) or up to 29,758 acres of solar PV power were developed. It is estimated that each 50-MW solar PV plant could result in 450 acres of land disturbance and each 500-MW CSP plant could result in land disturbance of 2,500 acres. Though the construction of these projects would not likely occur simultaneously, the disturbance of such a large area could result in the substantial alteration of existing hydrology and drainage within the West Chocolate Mountains REEA. Widespread land disturbance could increase flood risk and erosion, possibly resulting in increased flooding intensity and frequency, increased sediment loading to surface waters, and substantial alterations to existing ephemeral and intermittent drainages.

Water would be required during construction activities for dust suppression. Since construction of all facilities would not likely occur simultaneously, the water demand for construction activities could be negligible; however, the cumulative water demand required for the construction of all the projects under this alternative would be substantial. Assuming construction water needs are 0.01 AF/acre, the total construction water demand could range between approximately 134 to 499 AF. Should multiple projects be constructed simultaneously, water supplies in the local area could be impacted if groundwater is the primary source of construction water.

Operational water needs for this alternative could result in long-term water supply impacts within the West Chocolate Mountains REEA and in surrounding areas if local groundwater is the primary source. Water is required for panel washing for both PV solar and CSP dish engine (mirror washing) technologies to maximize efficiency. 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 AF/year/MW for CSP technology. If all facilities became operational simultaneously, the total operational water demand could be up to 1,665 AF/year/MW. Over the 30-year lifespan of these facilities, the total cumulative operational water demand could be 49,950 AF/year/MW.

Conclusion

Though the construction of these projects would not likely occur simultaneously, the disturbance of such a large area could result in the substantial alteration of existing hydrology and drainage within the West Chocolate Mountains REEA. Water would be required during construction activities for dust suppression. Since construction of all facilities would not likely occur simultaneously, the water demand for construction activities could be relatively negligible;

however, the cumulative water demand required for the construction of all the projects under the solar RFD scenario would be substantial. Panel washing for PV is required to maximize efficiency. The annual operational water requirement could be 43 percent of the current IID allocation for non-industrial projects. It is, therefore, likely that much of operational water needs could be supplied by local groundwater. If a large quantity of water would be required over a short period of time, groundwater drawdown could result and could have an adverse impact on local water supplies although the development cap would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Indirect Hydrologic Impacts from Solar Energy Development

This alternative could result in long-term and off-site water resource impacts. Land disturbance related to this RFD scenario could occur on up to 29,758 acres of the West Chocolate Mountains REEA, which could significantly alter off-site drainage patterns, particularly downstream of the area, depending on the location of the solar facilities. Runoff volume and velocity could increase and disturb existing drainage patterns on downstream land west of the REEA, potentially adversely impacting water quality in the adjacent Salton Sea, an already highly impacted water body, by increasing sediment loading.

4.6 Vegetation

This section discusses the effects to vegetation that could occur with implementation of the alternatives. Management goals are provided, impact indicators used to identify and analyze effects are presented, typical impacts are discussed for geothermal, solar, and wind energy, and impacts are analyzed by alternative.

4.6.1 Management Goals

The vegetation resources of the West Chocolate Mountains REEA are part of the larger CDCA. The BLM management goals for vegetation from the CDCA Plan, as amended, are outlined below:

- Maintain the productivity of the vegetation resources while meeting the consumptive needs of wildlife, livestock, wild horses and burros, and man. Provide for such uses under principles of sustained yield;
- Manage plant species on the federal and state lists of threatened and endangered species and their habitats so the continued existence of each will not be jeopardized. Stabilize and, where possible, improve populations through management and recovery plans developed and implemented cooperatively with the USFWS and the CDFG;
- Manage plant species BLM officially designated as sensitive for California and their habitats so the potential for federal or state listing is minimized. Include consideration of sensitive species habitats in all decisions so impacts are avoided, mitigated, or compensated;

- Manage unusual plant assemblages so their continued existence is maintained. In all actions, include consideration of unusual plant assemblages so impacts are avoided, mitigated, or compensated;
- Manage wetland and riparian areas in the CDCA with the following specific objectives: (a) avoid the long-term and short-term impacts associated with the destruction, loss, or degradation of wetland and riparian areas; (b) preserve and enhance the natural and beneficial values of wetland and riparian areas which may include constraining or excluding those uses that would cause significant long-term ecological damage; (c) include practical measures to minimize harm in all actions causing adverse impacts on wetland and riparian areas; and (d) retain all wetland and riparian habitats presently under BLM administration wherever high resource values exist and adverse impacts cannot be mitigated; and
- Accomplish the objectives of other resources by altering plant composition, density, and/or cover. Objectives include eliminating harmful or noxious plants, increasing livestock or wildlife forage production, and improving wildlife habitat characteristics. Diversified native plant communities are favored over monocultures or communities based on non-native species.

4.6.2 Impact Criteria

The potential risks of impacts to vegetation are assessed with respect to the following criteria. Potential impacts to vegetation and important habitats could occur if actions were to result in the following:

- Changes to the diversity or substantial alteration of the numbers of a local population of any plant, or interference with the survival, growth, or reproduction of affected plant populations;
- Substantial long-term loss of existing habitat;
- Introduction of new invasive plant species to an area, or increased existing populations of invasive plant species;
- Destruction of or extensive alteration to habitats or vegetation communities in such a way that they would be unfavorable to native species;
- Creation of a potential health hazard or involvement in the use, production, or disposal of materials that pose a hazard to plant populations; or
- Conflicts with BLM management strategies.

4.6.3 Typical Vegetation Impacts from Energy Development

Impacts on vegetation could include:

- A net loss in the functional habitat value of a sensitive biological habitat (such as unusual plant assemblages or wetland or riparian areas);

- Disturbance of a substantial portion of a vegetation type within the local region to the point where natural or enhanced regeneration would not restore the resource to pre-disturbance conditions in at least three years;
- Fragmentation of habitat;
- Introduction of new (or leads to the expanded range of existing) noxious weed species or soil pests so that they substantially interfere with successful revegetation;
- Adverse impacts on a species, natural community, or habitat that is recognized specifically as biologically significant in local, state, or federal policies, statutes, or regulations;
- Adverse impacts to vegetation from the construction of well pads, wells, ponds, power plants, access roads, pipelines, transmission lines, other generation or transmission facilities, and any temporary extra workspace. The impacts to vegetation from these activities would depend on the scale, intensity, duration, and permanence of construction activities. Potential adverse impacts could include direct mortality, loss of plant habitat, plant injury, alteration of plant community structure and community fragmentation, invasive species introduction, soil compaction and erosion, and dust, which could decrease plant photosynthesis; and
- Other potential impacts to vegetation from improperly planned or poorly executed handling of geothermal fluids include uncontrolled releases, spills, seepages, or well blowouts that could result in the addition of toxic, mineralized, or saline geothermal waters to soil, streams, ponds, or wetlands. This contamination could adversely impact vegetation growth and distribution.

4.6.3.1 Typical Vegetation Impacts from Geothermal Energy Development

Regardless of the location of geothermal energy development projects, the nature of the impacts from exploration and development to vegetation and important habitats and communities would be similar. The extent of the impacts is typically associated with the size of the area that is disturbed and the types of vegetation habitats and communities present. The ability of an area to recover from disturbance also affects the extent of the damage.

The Geothermal PEIS identified typical impacts to vegetation associated with geothermal energy development. The impacts are incorporated by reference and summarized in Table 4.6-1.

Table 4.6-1 Typical Impacts to Vegetation from Geothermal Energy Development

Project Phase	Activity	Impact	Factors
Exploration	– Site clearing and grading; well drilling and construction. – Access road watering for compaction and dust control. – Accidental spill during equipment refueling. – Accidental release of stored fuel or hazardous materials. – Drilling mud spill or accidental	– Habitat disturbance. – Increased erosion. – Increased fire risk. – Removal of vegetation, increased risk of invasive species, altered water and seed dispersion. – Introduction or spread of invasive plants.	Short-term. Long-term.

Table 4.6-1 Typical Impacts to Vegetation from Geothermal Energy Development

Project Phase	Activity	Impact	Factors
	spill of geothermal fluids and working fluids. – Accidental spill of herbicides.	– Changes in species composition, increased risk of fire, elimination native species. – Direct mortality to vegetation, loss of seed bank, erosion, increased potential for invasive species, loss of species diversity. – Reduced habitat quality, direct loss of vegetation, loss of topsoil and seed bank, increased risk of invasive species. – Growth impairment, direct mortality, changes in species composition.	
Construction	– Pipeline, access road, and ancillary facility construction; construction and maintenance vehicle travel. – Construction of additional roads, wells, and structures.	– Habitat disturbance. – Introduction or spread of invasive plants. – Direct injury or mortality to native species. – Increased erosion and runoff. – Impacts to plant physiology and metabolic function. – Increased fire risk. – Increased noise. – Exposure to contaminants.	Short-term.
Operation and Maintenance	– Existence of drilling pads, facilities, roadways, and transmission corridors. – Mowing. – Legal and illegal take of vegetation.	– Habitat disturbance. – Invasive vegetation. – Direct injury or mortality to native species. – Erosion and runoff. – Fire. – Noise. – Exposure to contaminants.	Long-term.
Decommissioning	– Facility removal. – Removal of access roads that are not maintained for other uses. – Recontouring the surface. – Revegetation.	– Similar to construction but smaller in scale.	Short-term.

Each stage of geothermal energy development could have impacts to vegetation. During exploration, small areas of vegetation and habitat could be disturbed or removed during the construction of access roads and drill pads. Exploration activities could also introduce weed propagules to the site. Production drilling operations could remove large areas of vegetation for expanded well pads, production wells, injection wells, sump pits, roadways, and other infrastructure. Drilling operations could also expose soils, create erosion potential, and provide

unvegetated ground for invasive weed infestation. Additionally, vehicle traffic on unpaved roads and in parking areas could create fugitive dust and air pollutants and could increase the likelihood of fuel, lubricant, and other chemical spills. Water used for drilling could travel in surface or groundwater flows and affect nearby upland, wetland, and riparian vegetation.

The greatest amount of disturbance to vegetation would occur during construction. Large areas of vegetation could be cleared for well pads, power plants, pipelines, roads, and other infrastructure. During operation, increased vehicle traffic from drilling operations could create more fugitive dust and pollutants and increase the potential for fuel spills. Drilling during the operation phase could also increase the spread of invasive species, affect wetland and riparian areas through runoff from roads and bridges to access drilling operation areas, and affect vegetation through mowing, cutting, and herbicide application for site maintenance. Decommissioning of geothermal energy development would have similar effects as those described for construction, but on a smaller scale.

4.6.3.2 Typical Vegetation Impacts from Solar Energy Development

Based on a review of environmental documentation for other solar energy projects, typical impacts for solar energy projects have been developed. Typical impacts to vegetation associated with solar energy development are summarized in Table 4.6-2.

Table 4.6-2 Typical Impacts to Vegetation from Solar Energy Development

Project Phase	Activity	Impact	Factors
Site Selection	– Surveys. – Vehicular traffic. – Soil borings.	– Possible introduction and spread of invasive vegetation. – Destruction of vegetation.	Short-term.
Construction	– Water well establishment. – Ground clearing (removal of vegetation cover). – Grading. – Excavation. – Vehicular and pedestrian traffic. – Construction and installation of facilities. – Access road watering for compaction and dust control.	– Erosion and runoff. – Fugitive dust. – Noise. – Introduction and spread of invasive vegetation. – Modification, fragmentation, and reduction of habitat. – Mortality of plants. – Impacts to plant physiology and metabolic function.	Short-term. Long-term.
Operation and Maintenance	– Presence of the fenced solar energy facility, utility ROWs, and access roads. – Access road watering for compaction and dust control. – Solar panel washing to remove dust and grime. – Mowing of vegetation. – Increased human use of surrounding areas. – Legal and illegal take of vegetation.	– Habitat fragmentation – Introduction and spread of invasive plants due to changes in water inputs from road watering and panel washing. – Introduction and spread of invasive plants due to changes in microclimate under the shade of solar panels. – Increased potential for fire.	Long-term.

Table 4.6-2 Typical Impacts to Vegetation from Solar Energy Development

Project Phase	Activity	Impact	Factors
Decommissioning	– Facility removal. – Breaking up concrete pads and foundations. – Removal of access roads that are not maintained for other uses. – Recontouring the surface.	– Similar to construction but on smaller scale.	Short-term.

Each stage of solar development could result in impacts to vegetation. During site selection, impacts would be minimal due to the limited nature of the activities, although soil borings and water well establishment, if necessary, could disturb small areas of vegetation. Vehicle and foot traffic could spread invasive plant propagules during site selection. Construction activities could affect large areas of vegetation as solar fields are cleared and graded to accommodate solar modules, roadways are cleared, and other infrastructure is put in place. Construction could remove vegetation, expose soils creating erosion potential, and increase the potential of invasive weed introduction and spread. Additionally, vehicle traffic on roads and in parking areas could create fugitive dust and pollutants and could increase the likelihood of fuel or other chemical spills. O&M activities could further increase the spread of invasive species. Water used in road maintenance and solar panel washing could travel in surface and groundwater flows and affect upland, wetland, and riparian vegetation. Vegetation loss could also occur through mowing, cutting, and herbicide application for site maintenance. Decommissioning of solar developments would have similar effects as those described for construction, but on a smaller scale.

4.6.3.3 Typical Vegetation Impacts from Wind Energy Development

The Wind PEIS identified typical impacts to vegetation associated with wind energy development. The impacts are incorporated by reference and summarized in Table 4.6-3.

Table 4.6-3 Typical Impacts to Vegetation from Wind Energy Development

Project Phase	Activity	Impact	Factors
Site Monitoring and Testing	– Limited Road construction and excavation. – Grading required to install monitoring equipment or access a site.	– Introduction and spread of invasive vegetation.	Short-term.
Construction	– Clearing and grading. – Fugitive dust generation. – Access road watering for compaction and dust control. – Exposure to contaminants. – Accidental spill during equipment refueling or accidental release of stored	– Destruction and injury of vegetation, habitat reduction, or degradation. – Impacts to plant physiology and metabolic function. – Establishment of invasive vegetation, decrease in native vegetation, decrease in wildlife habitat quality.	Impacts can be long-term or short-term and could largely be localized to the immediate West Chocolate Mountains REEA.

Table 4.6-3 Typical Impacts to Vegetation from Wind Energy Development

Project Phase	Activity	Impact	Factors
	fuel or hazardous materials.		
Operation and Maintenance	– Mowing. – Exposure to contaminants. – Increased foot and vehicle traffic. – Access road watering for compaction and dust control. – Legal and illegal take of vegetation.	– Maintenance of plant communities in early successional stages. – Exposure could affect plant survival, reproduction, development, or growth. – Trampling of vegetation by foot and vehicle traffic. – Reduced abundance and/or distribution of some species. – Establishment of invasive vegetation. – Exclusion of native vegetation; decrease in wildlife habitat quality. – Loss of native vegetation. – Decrease in wildlife habitat quality.	Long-term.
Decommissioning	– Removal of wind energy project facilities and site restoration.	– Destruction and injury of vegetation, habitat reduction or degradation.	Short-term.

Each stage of wind development could result in impacts to vegetation. During site monitoring and testing, limited road construction and some grading could disturb vegetation in small areas. Construction activities could affect areas of vegetation cleared to accommodate individual wind turbines, roads, and other infrastructure. Construction could expose topsoils and, thus, create erosion potential. Vehicle and foot traffic could spread invasive plant propagules and increase incidence of invasive weed infestation. Additionally, vehicle traffic and parking areas could create fugitive dust and pollutants and could increase the likelihood of fuel and other hazardous substance spills. Dust could also cause damage to plant cuticles and, thereby, increase water loss, decrease carbon dioxide uptake, and decrease photosynthesis for affected plants.

Exposure to dust and pollutants could affect plant survival, reproduction, development, or growth. O&M could also increase the spread of invasive species, affect upland, wetland, and riparian vegetation through runoff from road maintenance watering, and further affect vegetation through mowing, cutting, and herbicide application for general site maintenance. Decommissioning of wind development would have similar effects as those described for construction, but on a smaller scale.

4.6.4 Vegetation Impacts by Alternative

This section describes the effects under each alternative using the respective methodology prescribed under NEPA. To compare effects, this analysis defines the temporal scale (time), spatial extent (area in acres), and intensity of effects for each alternative.

This EIS analyzes impacts to all resources, including habitat and protected species, to the extent necessary for a programmatic document, subject to existing data availability.

4.6.4.1 Alternative 1: No Action/No CDCA Plan Amendment

Because geothermal, solar, and wind development could still occur under the No Action/No CDCA Plan Amendment alternative, impacts to vegetation would be expected to be similar to those detailed in Section 4.6.4.3 for Alternative 3. However, development under the No Action/No CDCA Plan Amendment alternative may occur at a slower rate because an individual plan amendment process would be necessary for each geothermal and solar or wind authorization; thus, impacts may occur at a slower rate, as well.

No renewable energy development cap or other protective stipulations/measures pertaining to the east side of the Coachella Canal would be adopted under this alternative. Thus, there would be no restrictions on development east of the Coachella Canal, and vegetation impacts that would not occur under Alternative 3 east of the Coachella Canal could occur under Alternative 1.

4.6.4.2 Alternative 2: No Development/CDCA Plan Amendment to Identify Areas as Closed to and Unsuitable for Geothermal, Solar, and Wind Energy Development

Under the No Development/CDCA Plan Amendment Alternative, the CDCA Plan would be amended to identify the West Chocolate Mountains REEA as closed to and unsuitable for geothermal leasing and development. The Plan Amendment also would identify the West Chocolate Mountains REEA as closed to and unsuitable for wind and solar energy development.

There would be no new construction or operation of geothermal power plants, or solar or wind energy projects, except those which are currently approved or operating. Vegetation would not be affected by new geothermal, wind, or solar projects; however, the closure of these lands for renewable energy development would represent an opportunity cost. The energy that could have been supplied by development of this area for geothermal, solar, and/or wind energy would have to be filled by other fossil fuel or renewable energy generating facilities constructed elsewhere.

No renewable energy development cap or other protective stipulations/measures pertaining to the east side of the Coachella Canal would be adopted under this alternative. Thus, there would be no restrictions on development east of the Coachella Canal, and vegetation impacts that would not occur under Alternative 3 east of the Coachella Canal could occur under Alternative 2.

4.6.4.3 Alternative 3: Renewable Energy Development Emphasis

Under Alternative 3, geothermal, solar, and wind could be developed to the maximum extent as defined in the geothermal, solar, and wind RFD scenarios. Up to 1,026 acres of land could be disturbed for development of geothermal power plants; up to 29,758 acres of land could be disturbed for development of solar PV projects; up to 6,637 acres could be disturbed for development of CSP projects; and up to 76 acres of land could be disturbed for wind energy

projects. Solar development could occur through the development of a 50-MW solar PV power plant and 500-MW CSP power plant.

Under this alternative, all lands within the West Chocolate Mountains would be designated as an SEZ. An SEZ would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments, including geothermal and wind energy development, to occur within the West Chocolate Mountains SEZ.

Direct Vegetation Impacts from Geothermal Energy Development

The RFD scenario estimates three power plants with an average capacity estimated at 50 MW could be constructed across the West Chocolate Mountains REEA. Each power plant would include the facility, itself, access roads, transmission lines, and drilling wells. Each geothermal power plant facility would require approximately 70 acres for development, which could result in direct, long-term impacts to a total of 123 acres of vegetation (210 acres before reclamation, 123 acres after reclamation). Under this alternative, 3.6 acres per mile of roads would be required per power plant, which could result in 10.8 total acres of vegetation being directly impacted for the life of the power plants due to power plant roads. Each 50-MW power plant would require approximately 36.3 acres to be disturbed for transmission lines, resulting in 108.9 total acres of short-term direct impacts to vegetation due to transmission lines; however, transmission line restoration could lower the acreage of long-term impacts to vegetation from transmission lines to 7.2 acres for each 50-MW power plant. Therefore, a total of only 21.6 acres of vegetation could have long-term disturbance from transmission lines.

Two types of drilling wells could be used for geothermal development: TG wells and FD wells. Approximately 30 TG wells could be drilled for geothermal exploration, resulting in a total surface disturbance of 95 acres of direct impacts to vegetation due to TG wells; however, most exploratory wells would be removed after a short time and vegetation impacts associated with TG wells could be short-term. Each 50-MW power plant would require 80 acres for FD well pads, resulting in 240 total acres of direct impacts to vegetation due to FD well pads in the West Chocolate Mountains REEA. FD well pads could also require 40 miles of access roads and 40 miles of pipeline for each 50-MW power plant, which could result in long-term, direct impacts to 432 acres of vegetation for these roads and 144 acres of vegetation for these pipelines.

For portions of geothermal energy development areas within the perimeter fence and along access roads, the existing vegetation is likely to be mowed. Vegetation that re-colonizes during the O&M of the power plant could also be mowed or thinned. Mowing could result in the loss of a percentage of each plant's biomass and the nutrient and carbohydrate stores contained within the lost biomass. Direct damage to plants from mowing could result in the direct mortality of some plant species, while the surviving plants could respond to the mowing by using energy stored in root systems to replace the lost stems. The continual mowing activities during the operation of the project could lead to the direct mortality of the remaining plant individuals, as each period of attempted stem replacement by these plants following mowing could deplete energy stores within the plant and increase metabolic stress. Removal of plant stems potentially bearing seeds could also result in loss of seed production in these plants. Mowing could also result in the direct mortality or injury of existing plants, as the discarded biomass created by the mowing could damage, smother, and/or shade the remaining vegetation. Mowing could also

expose plant cut stems to infection from bacterial and fungal disease which could result in morality. Universal plant assemblages associated with springs, seeps, and near-surface water largely consisting of mesquite thickets in a variety of localities throughout the CDCA would be removed.

The Chocolate-Mule Mountains Herd Area (HA) intersects the southeast corner of the REEA. Each geothermal power plant could result in the long-term use of approximately 313 acres of land which could be used in other capacities in the REEA. Since the total land disturbance for geothermal energy development could be only 938 acres, these projects could be sited away from the Chocolate-Mule Mountains HA and there would be no effects.

Over the lifetime of geothermal energy development, the continual use of mowing as maintenance of the West Chocolate Mountains REEA to manage the local vegetation could cause a shift within the current composition of the local plant community. The composition of the plant community could shift to favor those species that are more tolerant and able to reproduce under continual disturbance from mowing. The selective pressure on plants from mowing during the operation phase could cause some plant species to decline and, perhaps, die out, while other species could tolerate the mowing and may even thrive under the new conditions. This shift would likely favor the propagation of invasive weed species, while existing native plants would be least likely to tolerate this treatment and could be out-competed by the growth strategy of most invasive weed species.

Conclusion

Adverse impacts to vegetation could include impacts from excavating, grading, and clearing activities associated with construction of the well field, power plants, and associated infrastructure. However, the total land disturbance for geothermal energy development would be only 938 acres, a small percentage of the total size of the planning area, and geothermal development could be sited away from sensitive vegetation resources. Thus, it would be consistent with the management goals for this resource and the long-term and short-term impacts could be minor and would not be of concern to the public.

Indirect Vegetation Impacts from Geothermal Energy Development

Geothermal energy development could introduce added water to the site for dust control on roads, soil compaction and stabilization, facility washing, and miscellaneous other maintenance uses. This sudden introduction of additional water inputs could directly impact the composition of the local plant community by providing a competitive advantage to those plant species that thrive in wetter conditions. The additional water source could also provide moisture for the germination of existing seeds. Invasive weed species could also benefit from the additional moisture, potentially out-competing the native vegetation which thrives under xeric conditions.

Soil disturbance and erosion could result in the loss of topsoils and the removal of the native plant seed bank. If there is not an adequate source of native plant reproductive material on or near the site, native plant species would not be able to recolonize the site. If invasive plant species are present and the native seed bank is diminished, invasives could more easily out-compete native plant species. Invasive plant species thrive in disturbed areas and can be

introduced to new areas by surface-disturbing activities associated with construction. Known invasive species within the West Chocolate Mountains REEA include Sahara mustard (*Brassica tournefortii*) and saltcedar (*Tamarix* spp.). Both species could be introduced by any of the surface-disturbing activities associated with geothermal energy development along access roads and pipeline and transmission line routes, and adjacent to power plants and well pads. Because invasive plant species tend to out-compete native species, introductions in these areas could indirectly lead to the spread of invasive plants from developed areas to adjacent undeveloped areas over time.

Riparian areas and wetlands could be avoided by geothermal energy development. However, water could be extracted from groundwater sources to support geothermal exploration, production, and operation. This water extraction could result in lowered groundwater tables, which, in turn, could affect local stream flow volume and duration and could also dewater wetland and marsh habitat nearby. Resulting overall changes in riparian and wetland hydrology could affect vegetation species assemblages and could eventually alter dependent wildlife species composition. Altering the groundwater table could influence the spread of invasive species. Saltcedar is highly tolerant of high salinity soils and low water tables, and could also lower water tables once established. Saltcedar could out-compete native plant species more easily in altered soil moisture conditions. However, as discussed in Section 2.2.6.5, the BLM has imposed stipulations that would not permit surface use and occupancy within a certain distance of hydrologic features on either side of the Coachella Canal.

Although BLM would require operators to implement practices to avoid or minimize potential soil contamination, there is a potential for accidents to cause soils to become contaminated with construction related materials, such as oils, greases, and hydraulic fluids. Depending on the concentration and extent of contamination, the growth and distribution of vegetation communities could be inhibited. In addition, the pollutants or disturbed soil could be transported through groundwater or surface water runoff to adjacent vegetation communities, impacting plant growth outside the immediate construction area. Indirect impacts from potential fuel spills could be short- or long-term.

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 geothermal energy development, which could lead to an increase in impacts to vegetation from geothermal energy projects although the development cap which would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres) would minimize the impact to vegetation east of the Canal.

Direct Vegetation Impacts from Solar Energy Development

Adverse impacts to vegetation could include impacts from surface-disturbing activities (e.g., clearing and grading) associated with construction. Under this alternative, up to 6,637 acres for CSP or up to 29,758 acres for solar PV power could be developed within the West Chocolate Mountains REEA.

It is assumed that either CSP or solar PV projects could be developed. Due to the wide range of solar development that could occur in the West Chocolate Mountains REEA, the activities that could occur during solar energy development have been based on the development

of a 50-MW solar PV project and a 500-MW CSP project. These sizes were selected based on the availability of data related to development of these types of projects. PV and CSP are the two technologies that have been fielded most widely in the United States and throughout the world.

Both the 500-MW CSP plant and the 50-MW solar PV power plant would require solar arrays, access roads, transmission lines, an O&M building, a substation switchyard, a parking and laydown area, and fencing and other discretionary facilities. The solar arrays of each 500-MW CSP plant could have long-term, direct impacts on approximately 2,000 acres of vegetation. Associated access roads could directly impact an additional 7 acres of vegetation. Approximately 200 acres of vegetation could be directly impacted due to construction of 230-kilovolt (kV) lines, and an additional 100 acres could be directly impacted with the construction of 33-kV collector lines, resulting in a potential total of 300 acres of direct impacts to vegetation from transmission lines for each 500-MW CSP plant. Additional direct impacts to vegetation could result from installation of the O&M building (0.06 acre), substation switchyard (0.03 acre), parking laydown area (50 acres), and fencing and other discretionary facilities (125 acres). All of the above direct impacts to vegetation from the CSP plant could be long-term, except for the parking laydown area. This area could be revegetated with native plant species. Overall, 2,482 acres of vegetation could be directly impacted by each 500-MW CSP plant, with long-term impacts to 2,432 acres of vegetation and short-term impacts to 50 acres of vegetation. Full CSP development of the West Chocolate Mountains REEA, which could include up to five CSP plants, could have long-term, direct impacts to 6,637 acres of vegetation.

For each 50-MW PV project, direct impacts could affect much less acreage than CSP. For solar PV technology, long-term direct impacts could occur to approximately 400 acres of vegetation for development of the solar arrays. Access roads could directly impact an additional 7 acres of vegetation. Approximately 20 acres of vegetation could be directly impacted due to construction of the 230-kV lines, and an additional 10 acres could be directly impacted from 33-kV collector lines, resulting in a total of 30 acres of direct impacts to vegetation from all transmission lines for each 50-MW PV project. Additional direct impacts to vegetation could result from installation of the O&M building (0.006 acre), substation switchyard (0.003 acre), parking laydown area (0.5 acre), and fencing and other discretionary facilities (12.5 acres). All of the above direct impacts to vegetation from the PV project could be long-term except for the parking laydown area. This area could be revegetated with native plant species. Overall, 450 acres of vegetation could be directly impacted by each 50-MW PV project, with impacts to 449.5 acres of vegetation being long-term and impacts to 0.5 acre of vegetation being short-term. Full solar PV power development of the West Chocolate Mountains REEA could have long-term, direct impacts to 29,758 acres of vegetation.

For portions of solar development areas within the perimeter fence and along access roads, the existing vegetation is likely to be mowed. Vegetation that re-colonizes during O&M could also be mowed or thinned. Mowing could result in the loss of a percentage of each plant's biomass and the nutrient and carbohydrate stores contained within the lost biomass. Direct damage to plants from mowing could result in the direct mortality of some plant species, while the surviving plants could respond to the mowing by using energy stored in root systems to replace the lost stems. The continual mowing activities during operation of solar developments could lead to the direct mortality of the remaining plant individuals, as each period of attempted stem replacement by these plants following mowing could deplete energy stores within the plant

and increase metabolic stress. Removal of plant stems potentially bearing seeds could also result in loss of seed production in these plants. Mowing could also result in the direct mortality or injury of existing plants, as the discarded biomass created by the mowing could damage, smother, and/or shade the remaining vegetation. Mowing could also expose cut stems to infection from bacterial and fungal disease which could result in morality.

There could be long-term, adverse effects to rangeland within the West Chocolate Mountains REEA. The Chocolate-Mule Mountains HA intersects the southeast corner of the REEA. Even though solar energy development would not be allowed within this HA, the development of up to 29,758 acres of 50-MW PV projects and up to 6,637 acres of 500-MW CSP projects could result in increased dust and the possible introduction of new invasive species which could cause long-term, adverse effects to existing forage. The amount of potential development could preclude new rangeland from being open or developed.

The continual use of mowing during operation of solar developments to manage local vegetation could cause a shift within the current composition of the local plant community. Over the lifetime of solar developments, the composition of the plant community could shift to favor those species that are more tolerant and able to reproduce under continual disturbance from mowing. The selective pressure on plants from mowing during the operation of solar developments could cause some plant species to decline and, perhaps, die out, while other species could tolerate the mowing and may even thrive under the new conditions. This shift would likely favor the propagation of invasive plant species, while existing native plants would be least likely to tolerate this treatment and could be out-competed by the growth strategy of most invasive plant species.

Conclusion

Adverse impacts to vegetation could include impacts from excavating, grading, and clearing activities associated with construction of the solar power plants and associated infrastructure. The total land disturbance for geothermal energy development would up to 29,758 acres of 50-MW PV projects and up to 6,637 acres of 500-MW CSP projects, up to half the size of the REEA. Special stipulations outlined in Section 2.2.6.5 and BMPs outlined in Appendices I-A and I-B would be imposed as required and would ensure the protection of special status species and unusual plant assemblages which is consistent with the management goals for this resource. Rangeland would not be directly affected, however, new rangeland would not be able to be expanded and the long-term productivity of vegetation would be affected due to the amount of potential disturbance.

Indirect Vegetation Impacts from Solar Energy Development

Solar development could introduce added water to the site for dust control, soil compaction and stabilization, cooling towers (CSP), panel and mirror washing, and miscellaneous other maintenance uses. This sudden introduction of additional water inputs could directly impact the composition of the local plant community by providing a competitive advantage to those plant species that thrive in wetter conditions. The additional water source could also provide moisture for the germination of existing seeds. Invasive plant species could also benefit from the additional moisture, potentially out-competing the native vegetation which thrives under xeric conditions.

Solar developments could change the quantity, frequency, and location of sunlight reaching the ground beneath the solar arrays. Artificial shading caused by the solar panels and mirrors could result in a decrease in photosynthesis and reduced soil and plant temperatures. These changes to the microhabitat underneath solar panels and mirrors could result in a change to the composition of the natural plant community, as species that are better adapted to the new conditions could have a competitive advantage over those species that are not as well adapted to the new conditions. The changes to the microhabitat under the panels and mirrors could create a more suitable habitat for the propagation of invasive species.

Invasive plant species thrive in disturbed areas and can be introduced to new areas by surface-disturbing activities associated with construction. Known invasive species within the West Chocolate Mountains REEA include Sahara mustard and saltcedar. Both species could be introduced by any of the surface-disturbing activities associated with solar development. Areas potentially affected include those adjacent to solar arrays, along access roads and transmission line routes, near the O&M buildings, substation switchyards, parking laydown areas, and fencing. Project activities may introduce invasive species of plants or spread already occurring invasive species within the West Chocolate Mountains REEA. Because invasive species tend to out-compete native species, introductions in these areas could indirectly lead to the spread of invasive plants from developed areas to adjacent undeveloped areas over the long term.

Riparian areas and wetlands could be avoided by solar developments; however, water could be extracted from groundwater sources to support the washing of solar panels and mirrors. Water extraction could result in lowered groundwater tables, which could affect local stream flow volume and duration and could also dewater wetland and marsh habitat nearby. Changes in riparian and wetland hydrology could affect vegetation species assemblages and could eventually alter associated wildlife species composition. However, as discussed in Section 2.2.6.5, the BLM has imposed stipulations that would not permit surface use and occupancy within a certain distance of hydrologic features on either side of the Coachella Canal.

In addition, the development cap would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Direct Vegetation Impacts from Wind Energy Development

Under this alternative, adverse impacts to vegetation could include impacts from surface-disturbing activities (e.g., excavation, clearing, and grading) associated with construction or preparation of turbine tower infrastructure, utility corridors, and access roads. Under this alternative, one wind farm with a capacity of approximately 45 MW could be developed in the REEA. This could result in short-term, direct impacts to 76 acres. Restoration would be implemented within disturbed areas to the extent possible. After restoration, the remaining wind turbine infrastructure could result in direct, long-term impacts to 40 acres of vegetation. As part of this, 6 miles of roads would be required to access individual wind turbines.

There would be no anticipated short- or long-term effects to rangeland within the West Chocolate Mountains REEA. The Chocolate-Mule Mountains HA intersects the southeast corner of the REEA. Since the total land disturbance for geothermal is only 76 acres, these projects could be sited away from the Chocolate-Mule Mountains HA and there would be no effects.

Each wind energy facility could result in the use of approximately 14 acres on BLM land and 76 acres of BLM and other land which could be used for other purposes in the West Chocolate Mountains REEA. This effect would not be adverse.

Conclusion

Due to the small amount of vegetation that would be disturbed, the long-term and short-term impacts would be minor and would not be of concern to the public. Wind energy development would be consistent with the management goals of this resource.

Indirect Vegetation Impacts from Wind Energy Development

Wind development could introduce added water to the site for dust control on roads, soil compaction and stabilization, and miscellaneous other maintenance uses. This sudden introduction of additional water inputs could directly impact the composition of the local plant community by providing a competitive advantage to those plant species that thrive in wetter conditions. The additional water source could also provide moisture for the germination of existing seeds. Invasive plant species could also benefit from the additional moisture, potentially out-competing the native vegetation which thrives under xeric conditions.

Invasive plant species thrive in disturbed areas and can be introduced to new areas by surface-disturbing activities associated with construction. Known invasive species within the West Chocolate Mountains REEA include Sahara mustard and saltcedar. Both species could be introduced by any of the surface-disturbing activities associated with wind development. Areas potentially affected include those adjacent to wind turbines and along access roads. Project activities could introduce invasive species of plants or spread already occurring invasive species within the West Chocolate Mountains REEA. Because invasive species tend to out-compete native species, introductions in these areas could indirectly lead to the spread of invasive plants from developed areas to adjacent undeveloped areas over the long term.

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 vegetation from wind energy projects, although the development cap would limit wind energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres) would minimize the impact to vegetation.

4.6.4.4 Alternative 4: Geothermal Development Only

Under Alternative 4, geothermal energy could be developed to the achievement of levels of development consistent with the maximum extent as defined in the geothermal RFD scenario; there would be no solar or wind energy development. Under this alternative, geothermal energy could be developed to the achievement of levels of geothermal energy development consistent with the geothermal RFD scenario; there would be no solar or wind energy development. Under this alternative, the following impacts would be the same as Alternative 3:

- Direct and indirect vegetation impacts from geothermal energy development;
- Acquired lands; and

- Existing noncompetitive lease application.

Under this alternative, the West Chocolate Mountains REEA would not be designated as an SEZ and solar or wind energy development would not be allowed although the development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). The BLM would not consider, process, or approve solar or wind energy development within the West Chocolate Mountains REEA. Impacts from geothermal energy development would be the same as Alternative 3. Since there would be no solar and wind development under this alternative, there would be no impacts from these energy sources. This alternative would not conform to the CDCA goal to identify potential sites for wind energy development.

4.6.4.5 Alternative 5: Solar Energy Development Emphasis with Moderate Geothermal Development and No Wind Development

Under Alternative 5, solar energy could be developed to the maximum extent as defined in the solar RFD scenario. Geothermal energy could be developed to a moderate level (50 MW) as defined in geothermal RFD scenario. There would be no wind energy development. Under this alternative, the following would be the same as Alternative 3:

- Acquired lands;
- Existing noncompetitive lease application; and
- Direct and indirect vegetation impacts from solar development.

All lands within the West Chocolate Mountains REEA would be designated as an SEZ, which would allow other compatible renewable energy developments to occur. An SEZ also would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments, including geothermal energy, to occur within the West Chocolate Mountains SEZ.

Direct Vegetation Impacts from Geothermal Energy Development

Under this alternative, only one geothermal power plant could be constructed and could replace up to 50 MW of energy supplied by fossil fuel power facilities. Adverse impacts to vegetation would be similar to those under Alternative 3. The power plant would include the facility, itself, access roads, transmission lines, and drilling wells. The geothermal power plant facility could result in direct, long-term impacts to 41 acres of native vegetation. Access roads could directly impact 3.6 acres per mile of vegetation and 36.3 acres of vegetation could be directly impacted for transmission lines; however, restoration of disturbed areas for transmission lines could drastically lower the acreage of long-term, direct impacts to vegetation from transmission lines to 7.2 acres for a 50-MW power plant. Two types of drilling wells could be used for geothermal development: TG wells and FD wells.

Approximately 30 TG wells could be drilled for geothermal exploration drilling, resulting in a total surface disturbance of 95 acres of direct impacts to vegetation. However, most exploratory wells would be removed after a short time and vegetation impacts associated with TG wells could be short-term. The 50-MW power plant could also result in 80 acres of direct

impacts to vegetation for FD well pads. These FD well pads could also require approximately 40 miles of access roads and, thus, contribute to the direct, long-term impacts of 144 acres of vegetation. Approximately 40 miles of pipeline would also be required for the geothermal power plant, which could result in direct, long-term impacts to an additional 48 acres of vegetation. Therefore, in total, FD wells could result in long-term, direct impacts to approximately 272 acres of vegetation.

There are no anticipated short- or long-term effects to rangeland within the West Chocolate Mountains REEA. The Chocolate-Mule Mountains HA intersects the southeast corner of the REEA. Each geothermal power plant could result in the long-term use of approximately 313 acres of land which could be used in other capacities in the REEA. Since the total land disturbance for geothermal could be only 313 acres, these projects could be sited away from the Chocolate-Mule Mountains HA and there would be no effects.

Conclusion

Adverse impacts to vegetation could include impacts from excavating, grading, and clearing activities associated with construction of the well field, power plants, and associated infrastructure. However, the total land disturbance for geothermal energy development would be only 313 acres, a small percentage of the total size of the planning area, and geothermal development could be sited away from sensitive vegetation resources. Thus, it would be consistent with the management goals for this resource and the long-term and short-term impacts could be minor and would not be of concern to the public.

Indirect Vegetation Impacts from Geothermal Energy Development

Indirect vegetation impacts would be the similar to those for Alternative 3.

4.6.4.6 Alternative 6: Geothermal Development Emphasis with Moderate Solar Development and No Wind Development

Under this alternative, it is assumed that the achievement of levels of development consistent with the maximum development defined in the geothermal RFD scenario would take place (the same as discussed for Alternative 3) and that the level of achievement consistent with partial development of the solar RFD scenario would be realized. There would be no wind energy development. Under this alternative, the following would be the same as Alternative 3:

- Acquired lands;
- Existing noncompetitive lease application;
- Direct and indirect vegetation impacts from geothermal development; and
- Direct and indirect vegetation impacts from CSP (dish engine only) and PV solar development.

Impacts from geothermal energy development would be the same as Alternative 3. Lands within the West Chocolate Mountains REEA that lie east of the Coachella Canal would not be considered for an SEZ, modified or otherwise. Lands west of the canal would be identified as an SEZ, allowing other compatible renewable energy developments to occur.

Direct Vegetation Impacts from Solar Energy Development

Under this alternative, up to 6,637 acres for CSP (dish engine only) or up to 29,758 acres for solar PV power could be developed within the West Chocolate Mountains REEA. Direct impacts to vegetation would affect the same acreages as discussed in Alternative 3 for one 500-MW CSP project and one 50-MW solar PV power project.

There could be long-term, adverse effects to rangeland within the West Chocolate Mountains REEA. The Chocolate-Mule Mountains HA intersects the southeast corner of the West Chocolate Mountains REEA. Even though solar energy development would not be allowed within this HA, the development of up to 29,758 acres of PV projects of 50 MW each and up to 6,637 acres of 500-MW CSP projects (dish engine only) could result in increased dust and the possible introduction of new invasive species which could cause long-term, adverse effects to existing forage. The amount of potential development could preclude new rangeland from being open or developed. However, as discussed in Section 2.2.6.5, the BLM has imposed stipulations that would not permit surface use and occupancy within a certain distance of hydrologic features on either side of the Coachella Canal.

Indirect Vegetation Impacts from Solar Energy Development

Solar development would introduce added water to the site for dust control, soil compaction and stabilization, panel washing, and miscellaneous other maintenance uses. This sudden introduction of additional water inputs could impact the composition of the local plant community in similar ways as those discussed in Alternative 3. Water could also be extracted from groundwater sources to support washing of solar panels and mirrors. This extraction could impact riparian, wetland, and other vegetation in similar ways as those discussed in Alternative 3. Solar developments would change the quantity, frequency, and location of sunlight reaching the ground beneath the solar arrays. Artificial shading caused by the solar panels would result in the same impacts described in Alternative 3. Finally, invasive plant species introduced in solar development areas could spread invasive plant species to adjacent undeveloped lands in similar ways as those described for Alternative 3, although the development cap would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

4.7 Fish and Wildlife

This section discusses the effects to fish and wildlife that could occur with implementation of the alternatives. Management goals are provided, impact indicators used to identify and analyze effects are presented, typical impacts are discussed for geothermal, solar, and wind energy, and impacts are analyzed by alternative.

4.7.1 Management Goals

Wildlife abundance and diversity varies by season and habitat type throughout the West Chocolate Mountains REEA. Furthermore, while the area has limited suitable habitat for many of the birds from the Salton Sea, several species, such as the California brown pelican, may fly through the REEA. As a result, through the Wildlife Element of the CDCA Plan, the BLM has developed five goals for managing and promoting wildlife resources within the REEA:

- Avoid, mitigate, or compensate for impacts of conflicting uses on wildlife populations and habitats. Promote wildlife populations through habitat enhancement projects so balanced ecosystems are maintained and wildlife abundance provides for human enjoyment;
- Develop and implement detailed plans to provide special management for: (1) areas that contain rare or unique habitat; (2) areas with habitat sensitive to conflicting uses; (3) areas with habitat especially rich in wildlife abundance or diversity; and (4) areas that are good representatives of common habitat types. Many areas falling into these categories contain listed species, which, as indicator species, may become the focus of management;
- Manage wildlife species on the federal and state lists of threatened and endangered species and their habitats so their continued existence is not jeopardized. Stabilize and, where possible, improve populations through management and recovery plans developed and implemented cooperatively with the USFWS and the CDFG;
- Manage wildlife species officially designated as sensitive by the BLM for California and their habitats so the potential for federal or state listing is minimized; and
- Include consideration of crucial habitats of sensitive species in all decisions so impacts are avoided, mitigated, or compensated.

4.7.2 Impact Criteria

The potential risk of impacts to fish and wildlife are assessed with respect to the following criteria. Potential impacts to fish and wildlife could result if the following were to occur:

- Changes to the diversity or substantial alteration of the numbers of a local population of any fish or wildlife species, or interference with the survival, growth, or reproduction of affected fish and wildlife populations;
- Substantial interference with the seasonal or daily movement or range of migratory birds and other wildlife;
- Substantial long-term loss of existing wildlife habitat;
- Destruction of or extensive alteration to habitats in such a way that would render them unfavorable to native fish and wildlife species;
- Creation of a potential health hazard or involvement in the use, production, or disposal of materials that pose a hazard to wildlife populations in the West Chocolate Mountains REEA; or
- Conflicts with BLM management strategies.

4.7.3 Typical Fish and Wildlife Impacts from Energy Development

Impacts on fish and wildlife could include:

- Injury or mortality to wildlife species;
- Habitat disturbance or loss;

- Fragmentation of wildlife habitat;
- An adverse effect on a species or its habitat that is recognized specifically as biologically significant in local, state, or federal policies, statutes, or regulations;
- The introduction of new (or leads to the expanded range of existing) noxious weed species or soil pests that substantially alter wildlife habitat conditions; and
- Exposure to contaminants through uncontrolled releases, spills, or seepages that result in the addition of pollutants to soil, streams, ponds, or wetlands where wildlife species could be exposed, which could adversely impact growth, distribution, and survival of certain wildlife species.

4.7.3.1 Typical Fish and Wildlife Impacts from Geothermal Energy Development

One of the main threats to wildlife is anthropogenic activity, such as geothermal activity (BLM 2003). Geothermal activities can cause the following impacts to wildlife habitat:

- Habitat disturbance or habitat loss;
- Increase in surrounding noise levels;
- Change in wildlife migrating and wintering patterns;
- Soil, surface water, and groundwater contamination;
- Obstacle collisions resulting in death or injury (e.g., pipelines and well drilling structures); and
- Increased impervious surface area could decrease infiltration and increase stormwater runoff volumes and velocity, which could affect available water supplies for wildlife and/or degrade habitat downstream of impervious surfaces through erosional processes.

The Geothermal PEIS identified typical impacts to fish and wildlife associated with geothermal energy development. The impacts are incorporated by reference and summarized in Table 4.7-1.

Table 4.7-1 Typical Impacts to Fish and Wildlife from Geothermal Energy Development

Project Phase	Activity	Impact	Factors
Exploration	– Surveys. – Vehicular traffic. – Site clearing and grading. – Well drilling and construction. – Exposure to contaminants. – Accidental spill during equipment refueling. – Accidental release of stored fuel or hazardous materials. – Drilling mud spill or accidental spill of geothermal fluids and working fluids.	– Direct mortality or injury of wildlife species. – Reduced habitat quality. – Possible introduction and spread of invasive vegetation. – Destruction of vegetation and disturbance of wildlife. – Noise.	Short-term.

Table 4.7-1 Typical Impacts to Fish and Wildlife from Geothermal Energy Development

Project Phase	Activity	Impact	Factors
	– Accidental spill of herbicides.		
Construction	– Pipeline, access road, and ancillary facility construction. – Construction and maintenance vehicle travel. – Construction of additional roads, wells, and structures.	– Habitat disturbance. – Invasive vegetation. – Direct injury or mortality to native species. – Erosion and runoff. – Fire. – Noise. – Exposure to contaminants.	Short-term.
Operation and Maintenance	– Existence of drilling pads, facilities, roadways, and transmission corridors.	– Habitat disturbance. – Invasive vegetation. – Direct injury or mortality to species. – Erosion and runoff. – Fire. – Noise. – Exposure to contaminants.	Long-term.
Decommissioning	– Facility removal. – Removal of access roads that are not maintained for other uses. – Recontouring the surface. – Revegetation.	– Similar to construction but smaller in scale.	Short-term.

Each stage of geothermal energy development could impacts wildlife species, particularly through disturbance of habitat. During exploration, small areas of vegetation and habitat could be disturbed during the construction of access roads and drill pads. Habitat could be removed and vegetation would likely be destroyed. These activities could also cause disruption of breeding and migration, mortality and injury, spread invasive plant species, and alter wildlife use of the exploration area. Drilling operations could affect large areas of habitat as expanded well pads are cleared to accommodate production wells, injection wells, and sump pits, roadways are cleared, and other infrastructure is put in place. Drilling operations could disturb habitat and create erosion potential which could degrade terrestrial habitat and increase turbidity in aquatic habitat. Noise from exploratory drilling could affect avian and terrestrial wildlife breeding, nesting, and foraging habitat. Additionally, vehicle traffic and parking areas could create fugitive dust and pollutants that could affect wildlife use of the area and could increase the likelihood of fuels spills that could expose wildlife to contaminants. Vehicle traffic could also result in direct mortality and injury of wildlife. Water used for drilling could affect nearby wetland and riparian habitat if any is present in the area. The large amounts of water used for drilling could also have a direct effect on groundwater flows and wetlands, which can directly affect riparian habitat. The greatest amount of disturbance to habitat would occur during the initial construction within the

utilization phase. Large areas of habitat could be cleared for well pads, power plants, pipelines, roads, and other infrastructure. Decommissioning of geothermal energy development would have similar effects as those described for construction but on a smaller scale.

4.7.3.2 Typical Fish and Wildlife Impacts from Solar Energy Development

Based on a review of environmental documentation for other solar energy projects, typical impacts for solar energy projects have been developed. Typical impacts to fish and wildlife associated with solar energy development are summarized in Table 4.7-2.

Table 4.7-2 Typical Impacts to Fish and Wildlife from Solar Energy Development

Project Phase	Activity	Impact	Factors
Site Selection	– Surveys. – Vehicular traffic. – Soil borings and, possibly, water well establishment.	– Destruction of habitat and disturbance of wildlife. – Possible introduction and spread of invasive vegetation.	Short-term.
Construction	– Ground clearing (removal of vegetative cover). – Grading. – Excavation. – Vehicular and pedestrian traffic. – Construction and installation of facilities.	– Erosion and runoff. – Fugitive dust. – Noise. – Introduction and spread of invasive vegetation. – Modification, fragmentation, and reduction of habitat. – Direct mortality and injury of wildlife species. – Exposure to contaminants. – Interference with behavioral activities.	Short-term. Long-term.
Operation and Maintenance	– Presence of the fenced solar energy facility, utility ROWs, and access roads. – Increased human use of surrounding areas. – Presence of a solar energy project.	– Habitat fragmentation. – Introduction and spread of invasive vegetation. – Disturbance of native species of wildlife. – Mortality of wildlife from vehicles. – Increased hunting (including poaching). – Increased potential for fire. – Interference with migratory and other behaviors of some wildlife.	Long-term.
Decommissioning	– Facility removal. – Breaking up concrete pads and foundations. – Removal of access roads that are not maintained for other uses. – Recontouring the surface. – Revegetation.	– Similar to construction but smaller in scale.	Short-term.

Each stage of solar development could have impacts on wildlife. During site selection, impacts would be minimal due to the limited nature of the activities, although vehicle traffic could cause mortality or injury to wildlife, spread invasive plant species, and degrade habitat, and soil borings and water well establishment, if necessary, could disturb small areas of vegetation. Construction activities could affect large areas of habitat as solar fields are cleared to accommodate solar modules, roadways are cleared, and other infrastructure is put in place. Construction could disturb vegetation, create erosion potential, and increase incidence of invasive weed infestation. Additionally, vehicle traffic and parking areas could create fugitive dust and pollutants which may alter wildlife use of the area and increase the likelihood of vehicle impacts that cause mortality and injury to certain species. O&M could increase the spread of invasive species, affect wetland and riparian habitat through runoff from roads, and affect terrestrial habitat through mowing, cutting, and herbicide application for site maintenance. Increased impervious surface area could decrease infiltration and increase stormwater runoff volumes and velocity, which could affect available water supplies for wildlife and/or degrade habitat downstream of impervious surfaces through erosional processes. Decommissioning of solar developments would have similar effects as those described for construction but on a smaller scale.

4.7.3.3 Typical Fish and Wildlife Impacts from Wind Energy Development

The Geothermal PEIS identified typical impacts to fish and wildlife associated with wind energy development. The impacts are incorporated by reference and summarized in Table 4.7-3.

Table 4.7-3 Typical Impacts to Fish and Wildlife from Wind Energy Development

Project Phase	Activity	Impact	Factors
Site Selection	– Limited road construction and excavation. – Grading required to install monitoring equipment or access a site.	– Destruction of habitat. – Direct mortality and injury to wildlife species. – Direct mortality and injury to birds and bats from colliding with the METs.	Short-term.
Construction	– Site clearing and grading, and facility construction. – Exposure to contaminants. – Accidental spill during equipment refueling. – Accidental release of stored fuel or hazardous materials.	– Erosion and runoff. – Fugitive dust. – Noise. – Introduction and spread of invasive vegetation. – Modification, fragmentation, and reduction of habitat. – Direct mortality and injury to wildlife. – Exposure to contaminants. – Interference with behavioral activities.	Short-term. Long-term.
Operation and Maintenance	– Presence of wind energy facility. – Mowing.	– Disturbance of wildlife by turbine noise and human activity. – Exposure of wildlife to contaminants. – Direct mortality and injury to birds and bats from colliding	Long-term.

Table 4.7-3 Typical Impacts to Fish and Wildlife from Wind Energy Development

Project Phase	Activity	Impact	Factors
		with the turbines and meteorological towers. – Mortality of wildlife from electrocution or collision with transmission lines.	
Decommissioning	– Facility removal. – Breaking up concrete pads and foundations – Removal of access roads that are not maintained for other uses. – Recontouring the surface. – Revegetation.	– Similar to construction but smaller in scale.	Short-term.

Each stage of wind development could have impacts. During site monitoring and testing, limited road construction and some grading could disturb habitat in small areas. Construction activities could affect habitat cleared to accommodate individual wind turbines, roads, and other infrastructure. Construction could disturb habitat, create erosion potential, and increase incidence of invasive weed infestation. Additionally, vehicle traffic and parking areas could create fugitive dust and pollutants which could alter wildlife use of the area and increase the likelihood of vehicle impacts that cause mortality and injury to certain species. O&M could increase the spread of invasive species, affect wetland and riparian habitat through runoff from roads, and affect terrestrial habitat through mowing, cutting, and herbicide application for site maintenance. Increased impervious surface area could decrease infiltration and increase stormwater runoff volumes and velocity, which could affect available water supplies for wildlife and/or degrade habitat downstream of impervious surfaces through erosional processes. Decommissioning of wind development would have similar effects as those described for construction, but on a smaller scale.

4.7.4 Fish and Wildlife Impacts by Alternative

This section describes the effects under each alternative using the respective methodology prescribed under NEPA. To compare effects, this analysis defines the temporal scale (time), spatial extent (area), and intensity of effects for each alternative.

This EIS analyzes impacts to all resources, including habitat and protected species, of future development of renewable energy resources that might occur consistent with each of the alternatives, to the extent necessary for a programmatic document, subject to existing data availability

4.7.4.1 Alternative 1: No Action/No CDCA Plan Amendment

Because geothermal, solar, and wind development could still occur under the No Action/No CDCA Plan Amendment alternative, impacts to fish and wildlife would be expected to be similar to those detailed in Section 4.7.4.3 for Alternative 3. However, development under the No Action/No CDCA Plan Amendment alternative may occur at a slower rate because an

individual plan amendment process would be necessary for each geothermal and solar or wind authorization; thus, impacts may occur at a slower rate, as well.

No renewable energy development cap or other protective stipulations/measures pertaining to the east side of the Coachella Canal would be adopted under this alternative. Thus, there would be no restrictions on development east of the Coachella Canal, and fish and wildlife impacts that would not occur under Alternative 3 east of the Coachella Canal could occur under Alternative 1.

4.7.4.2 Alternative 2: No Development/CDCA Plan Amendment to Identify Areas as Closed to and Unsuitable for Geothermal, Solar, and Wind Energy Development

There would be no new construction or operation of geothermal power plants, or solar or wind energy projects, except those which are currently approved or operating. Fish and wildlife would not be affected by new geothermal, wind, or solar projects; however, the closure of these lands for renewable energy development would represent an opportunity cost. The energy that could have been supplied by development of this area for geothermal, solar, and/or wind energy would have to be filled by other fossil fuel or renewable energy generating facilities constructed elsewhere.

No renewable energy development cap or other protective stipulations/measures pertaining to the east side of the Coachella Canal would be adopted under this alternative. Thus, there would be no restrictions on development east of the Coachella Canal, and fish and wildlife impacts that would not occur under Alternative 3 east of the Coachella Canal could occur under Alternative 2.

4.7.4.3 Alternative 3: Renewable Energy Development Emphasis

Under Alternative 3, geothermal, solar, and wind could be developed to the maximum extent as defined in the geothermal, solar, and wind RFD scenarios. Up to 1,026 acres could be disturbed for development of geothermal power plants; up to 29,758 acres could be disturbed for development of solar PV projects; up to 6,637 acres could be disturbed for development of CSP projects; and up to 76 acres could be disturbed for wind energy projects. Solar development could occur through the development of a 50-MW solar PV project and a 500-MW CSP project.

Under this alternative, REEA would be designated as an SEZ. An SEZ would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments, including geothermal and wind energy development, to occur within the West Chocolate Mountains SEZ.

Direct Fish and Wildlife Impacts from Geothermal Energy Development

Geothermal energy development in the West Chocolate Mountains REEA could result in habitat loss for wildlife and, potentially, for fish. Surface-disturbing activities associated with exploration and construction could remove plants, excavate soils, and grade areas for development of geothermal facilities. These activities could reduce the amount of available habitat for wildlife in the REEA for the short and long term. If the projects result in impacts to surface or groundwater resources, the amount of available habitat for fish could also be reduced.

However, as discussed in Section 2.2.6.5, the BLM has imposed stipulations that would not permit surface use and occupancy a certain distance of hydrologic features on either side of the Coachella Canal.

Under this alternative, three 50-MW geothermal power plants could be constructed across the REEA, although lands acquired by BLM with LWCF funds would be managed as avoidance areas. Each power plant would require the facility, itself, access roads, transmission lines, and drilling wells. Each geothermal power plant facility would require approximately 70 acres for development, which could result in long-term, direct loss of 123 acres of habitat in the West Chocolate Mountains REEA. This loss of habitat could displace or kill wildlife present in the selected 123 acres and, if aquatic habitat is present, fish could be displaced or killed, as well. However, as discussed in Section 2.2.6.5, the BLM has imposed stipulations that would not permit surface use and occupancy a certain distance of hydrologic features on either side of the Coachella Canal.

Access roads could also displace or kill fish and wildlife through loss of habitat. The RFD scenario states that 3.6 acres per mile of road would be required per power plant; therefore, 10.8 acres of long-term habitat loss could occur. Each 50-MW power plant would require approximately 36.3 acres to be disturbed for transmission lines, resulting in 108.9 acres of habitat loss to wildlife and potentially to fish if aquatic habitat is present along the transmission line route. However, as discussed in Section 2.2.6.5, the BLM has imposed stipulations that would not permit surface use and occupancy a certain distance of hydrologic features on either side of the Coachella Canal.

Restoration of a majority of the disturbed areas for transmission lines could drastically lower the acreage of long-term habitat loss. After restoration is complete, habitat loss from transmission lines for a 50-MW power plant could be 7.2 acres; therefore, 21.6 acres of habitat could be lost long term from transmission lines.

Two types of drilling wells could be used for geothermal development: TG wells and FD wells. Approximately 30 TG wells could be drilled for geothermal exploration drilling, resulting in a total habitat loss of 95 acres; however, most exploratory wells would be removed after a short time and habitat could be restored. Thus, loss of habitat from TG wells could be short-term. Some wildlife, particularly small mammals and reptiles that are less mobile, could be injured or killed by the construction of TG wells, but many individuals could avoid exploratory well construction areas and reoccupy these areas after exploration is completed and habitat recovers. Habitat loss could also result from FD wells. Each 50-MW power plant would require 80 acres for FD well pads resulting in 240 acres of wildlife habitat loss in the West Chocolate Mountains REEA. FD well pads would also require access roads and pipelines. Approximately 40 miles of access roads for FD well pads would be required for each 50-MW power plant, which could result in long-term habitat loss of 432 acres. Approximately 40 miles of pipeline would also be required for each power plant, which could result in long-term impacts to 144 acres of habitat; therefore, FD wells could result in long-term habitat loss to a total of approximately 816 acres of wildlife habitat.

Wildlife habitat could be altered for portions of geothermal energy development areas within the perimeter fence and along access roads by mowing existing vegetation and

introducing added water to the site for dust control on roads, soil compaction and stabilization, facility washing, and miscellaneous other maintenance uses. Mowing could result in damage and direct mortality to native plants and cause a shift within the current composition of the local plant community. Wildlife habitat could be altered in these areas as species that are more tolerant and able to reproduce under continual disturbance from mowing could become dominant. Altered wildlife habitat could be of less value to some wildlife species and more valuable to others in the REEA, which could result in a shift in the wildlife species composition in the vicinity of mowed areas. This impact could be long-term and could cause some wildlife species to decline and, perhaps, die out, while other species could tolerate the mowing and may even thrive under new conditions.

Wildlife habitat could also be altered by invasive plant species in the vicinity of geothermal energy development, which could degrade habitat quality for wildlife. Invasive species within the West Chocolate Mountains REEA may not be edible for native wildlife species and may not provide the same habitat value as native plant species. Birds are most affected by invasive plants, as their food source is often seeds from native grasses and shrubs (BLM 2008). Invasive plant species thrive in disturbed areas and can be introduced to new areas by surface-disturbing activities associated with geothermal construction along access roads and pipeline and transmission line routes, and adjacent to power plants and well pads. Changes within the current composition of the local plant community caused by mowing of vegetation would likely favor the propagation of invasive weed species, as well, while existing native plants would be least likely to tolerate this treatment and could be out-competed by the growth strategy of most invasive weed species. Invasive weed species could also benefit from the additional moisture associated with adding water to the site for construction and maintenance uses, potentially out-competing the native vegetation which thrives under xeric conditions.

Erosion from construction and operation of geothermal facilities could alter fish and wildlife habitat in the vicinity of development. Soil disturbance from clearing and grading could cause eroded material to collect in certain areas and degrade or alter terrestrial wildlife habitat in depositional areas by burying low lying plants. Erosion could also increase turbidity in aquatic habitat. Large amounts of suspended matter associated with high turbidity levels could clog the gills of fish and kill them directly. Turbidity could also affect the ability of fish and other aquatic biota downstream of geothermal energy development by impairing their ability to find food.

The increased number of vehicles and equipment in the West Chocolate Mountains REEA associated with construction and operation of geothermal energy development could result in direct mortality and injury to wildlife species through collisions and crushing. Equipment used for clearing vegetation, roadways, well pads, and facility sites and vehicles used during construction and operation could particularly affect species that are not mobile enough to avoid construction operations. Reptiles, amphibians, and small mammals would be the most susceptible. More mobile wildlife species such as deer, birds, and large predators could avoid the initial clearing activity by moving into habitats in adjacent areas (BLM 2008).

Geothermal energy development produces extensive noise, and prolonged noise from geothermal operations could adversely affect some lizards and small mammals. Hearing loss in small animals, such as lizards, occurs at around 100 dBA (BLM 2003). This level of noise could be apparent in the vicinity of geothermal facilities for the lifetime of any development project.

Therefore, noise impacts could be long-term. Additionally, hearing loss could lead to mortality due to increased susceptibility to predation; however, exposure to noise by wildlife would be localized.

Water pipes along pipeline routes in geothermal energy development are generally insulated. This is necessary to prevent energy loss between the production well and the plant, and to prevent minerals from solidifying in the lines while water returns to the injection site. Pipelines associated with geothermal energy development could be suspended less than 5 feet off the ground; therefore, some larger wildlife species could jump over pipelines, and small mammals, reptiles, and amphibians could travel under pipelines without ever coming into contact with the pipe.

Although BLM would require operators to implement practices to avoid or minimize potential soil contamination, there is a potential for accidental spills of construction related materials, such as oils, greases, and hydraulic fluids to cause impacts to fish and wildlife. Depending on the concentration and extent of contamination, the growth, distribution, reproductive capacity, and survival of affected animals could be inhibited and some direct mortality could occur in localized areas. In addition, the pollutants could be transported through groundwater or surface water runoff to adjacent habitat, impacting fish and wildlife outside the immediate construction area. Impacts from potential fuels spills could be short- or long-term.

Under this alternative, the pending geothermal lease application (640 acres) would be approved. Geothermal exploration would begin which would result in the impacts to fish and wildlife from geothermal exploration discussed earlier in this section. Currently, the size of the power plant is unknown since exploration has not begun; however, other power plants in the region are less than 50 MW, so it is anticipated that exploration would be consistent with that of a geothermal power plant as discussed in the geothermal RFD scenario.

Conclusion

Adverse impacts to fish and wildlife could include impacts from excavating, grading, and clearing activities associated with construction of the well field, power plants, and associated infrastructure. However, the total land disturbance for geothermal energy development would be only 938 acres, a small percentage of the total size of the planning area, and geothermal development would be sited away from sensitive wildlife and sensitive habitat. Thus, it would be consistent with the management goals for this resource and the long-term and short-term impacts could be minor and would not be of concern to the public.

Indirect Fish and Wildlife Impacts from Geothermal Energy Development

Geothermal energy development in the West Chocolate Mountains REEA could have indirect impacts. The development of three 50-MW geothermal power plants could result in fish and wildlife habitat fragmentation within the REEA, which could prevent movement of individuals between patches of habitat or between habitat and geographically discrete resources such as water. Site selection for all three plants would determine the significance of this effect. Siting all three power plants close together, or in a location that blocks a critical foraging area or water supply, would have the most substantial effects to fish and wildlife.

Fragmentation of habitat can affect how wildlife utilize the habitat in areas near geothermal development. Fragmented habitat can separate larger wildlife populations into smaller populations which can limit genetic diversity within breeding groups. Smaller populations of wildlife may also be more vulnerable to predation, drought, and disease (BLM 2008). Fragmentation of habitat can also disrupt the Peninsula-Borrego, the Parque-Park linkage as well as any other wildlife corridors in the area and affect migratory corridors for wildlife populations.

Impacts to wildlife corridors would occur through limiting or preventing access to corridors and either limiting or preventing the flow of individuals. Decrease or prevention of movement would increase disease, death, fire and decrease gene flow, pollen and seed dispersal and movement of food sources. If geothermal piping is too close to a corridor, it may prevent or deter individuals from passing through. Fencing around the solar power plant would remove habitat. If the removed habitat is high quality, it would force species into a lower quality area where there is already a population, potentially causing a food shortage or die-off. Therefore, geothermal power plants would not be sited within known wildlife corridors. If wildlife species must travel around geothermal energy development to migrate to another habitat area or resources they depend on to survive, or if fish or less mobile wildlife species are blocked from an area, connections between areas that may be integral to maintaining regional biological diversity and population viability could be lost.

Fish and wildlife in areas surrounding geothermal energy development could be impacted by competition with fish and wildlife that were displaced from development areas. Wildlife occupying areas where geothermal energy development occurs that can avoid direct mortality from construction equipment would likely move out of these areas and attempt to occupy nearby habitat, which could lead to increased competition for resources such as food and water. If habitat in these surrounding areas is already at carrying capacity for a given wildlife species, the displaced individuals from the habitat that was lost to geothermal energy development could cause direct mortality, reduced population size, or decreased fitness of individuals within the local population over the long term.

During the past few decades, the population of the common raven (*Corvus corax*) has increased substantially in the California desert, primarily in response to human-provided subsidies of food, water, and nest sites. They are efficient hunters and scavengers. The common raven is a known predator of birds (eggs, nestlings, and adults), snakes, lizards, rodents, and lagomorphs (rabbits and hares) (USFWS 2008). Therefore, if geothermal energy development facilitates a population expansion of the common raven in the West Chocolate Mountains REEA, wildlife species could be impacted by increased predation from common ravens.

Wildlife can be affected indirectly by invasive species as well, which not only thrive in disturbed areas, but can spread from disturbed areas into surrounding habitat. After being introduced by surface-disturbing activities associated with construction, invasive plant species tend to out-compete native species. Therefore, introductions in construction areas could indirectly lead to the spread of invasives from developed areas to undeveloped areas over the long term and degrade wildlife habitat in areas outside of geothermal energy development.

Riparian areas and wetlands would be avoided by geothermal energy development to the extent possible. However, water could be extracted from groundwater sources to support geothermal exploration, production, and operation. Water extraction could result in lowered groundwater tables, which could decrease the amount of water in baseline stream flows and shorten the duration of increased flows associated with precipitation. This could alter and degrade aquatic habitat for fish and other wildlife that depend on these areas by decreasing the amount of surface water available and altering the hydrology of aquatic habitat. Additionally, lowered groundwater tables could dewater wetland and marsh habitat surrounding the Salton Sea. Changes in riparian and wetland hydrology could affect riparian and wetland habitat by altering vegetation species assemblages. If this were to occur, fish and wildlife species compositions could be altered, as well. However, as discussed in Section 2.2.3.1, the BLM has imposed stipulations that would not permit surface use and occupancy within 100 feet of the 25-year floodplain of a riparian or wetland feature or 300 feet of artificial surface waters and associated wetlands and within 300 feet of any hydrologic feature east of the Coachella Canal. In addition, the BLM would impose stipulations to protect water resources related to the use of groundwater within the REEA.

Geothermal energy development could increase the number of access roads to the West Chocolate Mountains REEA. This could lead to increased human presence in currently inaccessible fish and wildlife habitat. Over time, increased numbers of people accessing the REEA could lead to an increase in hunting, poaching, and other wildlife harvesting activities, which could reduce the population size of targeted fish and wildlife species.

The designation as an SEZ would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments, including geothermal energy development, to occur within the West Chocolate Mountains SEZ, which could lead to an increase in impacts to fish and wildlife from geothermal energy projects.

The designation of all lands within the REEA with an MUC of “I” means these lands would be managed for concentrated use to meet human needs. Thus, intensive renewable energy development would be allowed, but the development cap which would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres) would minimize the impact to fish and wildlife east of the Canal. Although reasonable protection would be provided for sensitive natural values and mitigation of impacts and rehabilitation of impacted areas would occur when possible, the goal would be to allow development to occur within this area.

Direct Fish and Wildlife Impacts from Solar Energy Development

Direct effects to fish and wildlife could occur if up to 6,637 acres of CSP or up to 29,758 acres of solar PV power that could be developed. It is assumed that either CSP or solar PV projects could be developed. Due to the wide range of solar development that could occur in the West Chocolate Mountains REEA, the activities that could occur during solar energy development have been based on the development of a 50-MW solar PV project and a 500-MW CSP project. These sizes were selected based on the availability of data related to development of these types of projects. PV and CSP are the two technologies that have been fielded most widely in the United States and throughout the world.

Solar development in the West Chocolate Mountains REEA could result in habitat loss for wildlife and, potentially, for fish. Surface-disturbing activities associated with construction would remove plants, excavate soils, and grade areas for development of solar facilities. These activities could reduce the amount of available habitat for wildlife in the REEA for the short and long term. If the projects result in impacts to surface or groundwater resources, the amount of available habitat for fish could also be reduced. Both the 500-MW CSP plants and the 50-MW solar PV power plants require solar arrays, access roads, transmission lines, an O&M building, a substation switchyard, a parking laydown area, and fencing and other discretionary facilities. For each 500-MW CSP plant, approximately 2,000 acres of wildlife habitat could be lost long term for development of the solar arrays in the REEA. Access roads could result in an additional 7 acres of habitat loss. Transmission lines would consist of both 230-kV lines and 33-kV collector lines.

Approximately 200 acres of habitat could be lost due to the 230-kV lines for each 500-MW CSP project. An additional loss of 100 acres could be due to collector lines resulting in a total loss of 300 acres of wildlife habitat from all transmission lines for each 500-MW CSP plant. Additional habitat loss could result from installation of the O&M building (0.06 acre), the substation switchyard (0.03 acre), the parking laydown area (50 acres), and fencing and other discretionary facilities (125 acres). Direct losses of habitat could be long-term except for the parking laydown area. This area could be revegetated with native species so direct impacts could be short-term. Some wildlife, particularly small mammals and reptiles that are less mobile, could be injured or killed by the construction of the parking laydown area, but many individuals could avoid this area during construction and then return once construction has been completed and habitat has recovered. Overall, 2,482 acres of habitat loss could result from each 500-MW CSP plant. Full CSP development of the West Chocolate Mountains REEA could have long-term, direct impacts to 6,637 acres of vegetation.

For each 50-MW solar PV project, fish and wildlife habitat loss would be less severe. Long-term, direct impacts could occur on approximately 400 acres of wildlife habitat as a result of the development of solar arrays in the West Chocolate Mountains REEA. Access roads could result in the loss of an additional 7 acres of habitat. Transmission lines would consist of both 230-kV lines and 33-kV collector lines. Approximately 20 acres of habitat could be lost due to the 230-kV lines for each 50-MW solar PV project. An additional 10 acres could be lost due to collector lines resulting in a total of 30 acres of direct habitat loss from all transmission lines for each 50-MW PV project. Additional habitat loss could result from installation of the O&M building (0.006 acre), the substation switchyard (0.003 acre), the parking laydown area (0.5 acre), and fencing and other discretionary facilities (12.5 acres). Direct habitat loss could be long-term except for the parking laydown area. This area would be revegetated with native species so direct impacts could be short-term. Overall, 450 acres of wildlife habitat could be lost as a result of each 50-MW PV project. Full solar PV development of the REEA could result in the loss of up to 49,951 acres of wildlife habitat.

Wildlife habitat could be altered for portions of solar development areas within the perimeter fence and along access roads by mowing existing vegetation, introducing added water to the site for dust control on roads, soil compaction and stabilization, panel and mirror washing, and miscellaneous other maintenance uses. Mowing and the introduction of additional water inputs could affect wildlife and their habitat in similar ways as those described for geothermal

development. However, solar developments typically require more extensive mowing than geothermal energy development. Therefore, impacts from mowing could be more substantial for solar development. Impacts from additional water inputs would be similar in severity to geothermal impacts. Impacts from mowing and additional water inputs would be more substantial for individual CSP projects than for individual PV projects due to the larger acreage required for development.

Wildlife habitat could also be altered by invasive plant species in the vicinity of solar developments, which could degrade habitat quality for wildlife in similar ways as those described for geothermal development. Impacts from invasive plant species would be more substantial for individual CSP projects than for individual solar PV projects due to the larger acreage required for development.

Erosion from construction and operation of solar facilities could alter fish and wildlife habitat in the vicinity of development in similar ways as those described for geothermal development; however, up to one-third of solar PV projects developed in the West Chocolate Mountains REEA could be built in areas with slopes less than 5 percent. These projects could be located in steeper locations than geothermal or CSP projects and, therefore, erosion may be more severe for these PV projects.

Development of a solar energy project site would represent a loss of habitat (including loss of foraging habitats and prey base for predators), which could result in a long-term reduction in wildlife abundance and richness within the project area overall. A species affected by habitat disturbance might be able to shift its habitat use for a short period.

The effects of disturbance on bird breeding and breeding success in Important Bird Areas include reduced nest attendance, nest failures, reduced nest building, increased predation on eggs and nestlings, nest abandonment, inhibition of laying, increased absence from nest, reduced feeding and brooding, exposure of eggs and nestlings to heat or cold, retarded chick development, and lengthening of the incubation period. The most adverse impacts associated with noise could occur if critical life-cycle activities were disrupted (e.g., mating and nesting). For instance, disturbance of birds during the nesting season could result in nest or brood abandonment. The eggs and young of displaced birds would be more susceptible to cold or predators.

While this situation is not well studied, birds, bats, and insects that fly through a solar energy project could also be burned by flying through standby points and reflection beams in the reflector area. Glare could also affect birds at solar energy facilities. While not well studied, glare impacts could range from disorientating a bird in flight to causing eye damage.

Migrating birds and bats would be expected to simply fly over these facilities and continue their migratory movement. However, bats use riparian areas for foraging, and in many places, these areas are an important source of drinking water. Moths, the preferred prey of many bats, reproduce on shrubs, trees, and flowering plants, but not on grasses. Vegetation structure is a critical component in the life cycles of insect prey, especially for moths. The impacts to vegetation structure from development of wind energy development potentially would be significant to some populations of bats.

The increased number of vehicles and equipment in the West Chocolate Mountains REEA associated with construction and operation of solar developments could result in direct mortality and injury to wildlife species through collisions and crushing. This would be the same effect as for geothermal energy development. During operation of solar power plants, individual CSP projects could result in more substantial effects to wildlife than individual solar PV projects or geothermal energy development because the number of people required for routine operations of CSP power plants would be greater. According to the RFDs, approximately 90 people would be required for routine operations of CSP plants. For comparison, geothermal power plants only require approximately 15 people, and solar PV projects only require 5 people; therefore, the greatest amount of vehicle traffic and the greatest chance for impacts to wildlife species would be from CSP plants. However, as discussed in Section 2.2.6.5, the BLM has imposed stipulations that would not permit surface use and occupancy a certain distance of hydrologic features on either side of the Coachella Canal.

Although the BLM would require operators to implement practices to avoid or minimize potential soil contamination, there is a potential that fish and wildlife could be impacted in similar ways as those described for geothermal energy development by accidental spills consisting of construction related materials, such as oils, greases, and hydraulic fluids. For solar trough and power tower CSP technologies, accidental spills are more likely than for other solar technologies because both utilize HTFs throughout their solar arrays. Heat transfer fluids consist of hazardous material that could impact fish and wildlife if leaks or spills occur.

Conclusion

Adverse impacts to fish and wildlife could include impacts from excavating, grading, and clearing activities associated with construction of the solar power plants and associated infrastructure. The total land disturbance for geothermal energy development would up to 29,758 acres of 50-MW PV projects and up to 6,637 acres of 500-MW CSP projects, up to half the size of the REEA. Special stipulations outlined in Section 2.2.6.5 and BMPs outlined in Appendices I-A and I-B would be imposed as required and would ensure the protection of special status species and sensitive habitat, which is consistent with the management goals for this resource.

Indirect Fish and Wildlife Impacts from Solar Energy Development

Full solar development could include up to 29,758 acres of disturbance for development of PV projects and up to 6,637 acres for development of CSP projects, which could result in substantial wildlife habitat fragmentation (and potentially fish habitat fragmentation if aquatic habitat is present within selected sites) within the REEA. Fragmentation of habitat could affect how wildlife utilize the habitat in areas near development in similar ways as those described for geothermal energy development. Strategic site selection for the large number of potential power plants planned for the REEA will be essential in determining the significance of this impact. Siting many power plants close together, in riparian or wetland habitat, or in a location that blocks a critical foraging area or water supply would have the most substantial impacts to fish and wildlife. However, as discussed in Section 2.2.6.5, the BLM has imposed stipulations that would not permit surface use and occupancy a certain distance of hydrologic features on either side of the Coachella Canal.

Fish and wildlife in areas surrounding solar developments could be impacted by competition with fish and wildlife that were displaced from development areas in similar ways as those described for geothermal energy development. These effects could be more substantial for solar energy development if multiple power plants were clustered in one particular area.

Fragmentation of habitat could also disrupt the Peninsula-Borrego, the Parque-Park linkage, as well as any other wildlife corridors in the area and affect migratory corridors for wildlife populations. Impacts to wildlife corridors would be limiting or preventing access to corridors and either limiting or preventing the flow of individuals. Decrease or prevention of movement would increase disease, death, fire and decrease gene flow, pollen and seed dispersal and movement of food sources. If solar panels are too close to a corridor, individuals may be prevented or deterred from passing through. Fencing around the solar panels would remove habitat. If the removed habitat is high quality, they would be forced into a lower quality area where there is already a population, potentially causing a food shortage or die-off.

Wildlife in areas surrounding solar developments could be impacted by common ravens in similar ways as those described for geothermal development. These effects could be more substantial for solar energy development if multiple power plants were clustered in one particular area and this led to a population expansion of common ravens. Additionally, effects could be more severe for solar developments as a result of the large number of potential new power plants that could be developed in the West Chocolate Mountains REEA. It is likely that common raven populations could expand in more locations with solar energy development than with geothermal energy development and, thus, could impact a larger portion of the REEA.

Wildlife can be affected indirectly by invasive species as well, which not only thrive in disturbed areas, but can spread from disturbed areas into surrounding habitat in similar ways as those described for geothermal energy development. These effects could be more severe for solar developments as a result of the large number of potential new power plants that could be developed in the West Chocolate Mountains REEA. It is likely that invasive plant species could be introduced to more locations with solar energy development than with geothermal energy development and, thus, could impact a larger portion of the REEA.

Solar developments could increase the number of access roads to the West Chocolate Mountains REEA. This could lead to increased human presence in currently inaccessible fish and wildlife habitat. Over time, increased numbers of people accessing the REEA could lead to an increase in hunting, poaching, and other wildlife harvesting activities, which could reduce the population size of targeted fish and wildlife species.

The development cap which would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres) would minimize the impact to fish and wildlife east of the Canal.

Direct Fish and Wildlife Impacts from Wind Energy Development

Under this alternative, one wind farm with a capacity of approximately 45 MW could disturb up to 76 acres in the West Chocolate Mountains REEA, although lands acquired by BLM with LWCF funds would be managed as avoidance areas. Wind development in the REEA could result in habitat loss for wildlife and potentially for fish. Surface-disturbing activities associated

with construction could remove plants, excavate soils, and grade areas for development of wind facilities.

If a meteorological tower were required (especially one requiring guy wires), some bird and bat mortality could be expected. If clearing or other construction activities occurred during the spring and summer, bird nests and eggs or nestlings could be destroyed.

Preparation of tower and infrastructure construction, utility corridors and access roads, assembly of turbines and towers, and construction of transmission line towers would all require surface-disturbing activities. These activities could reduce the amount of available habitat for wildlife in the REEA for the short and long term. If project sites are selected that involve aquatic habitat, the amount of habitat available for fish could also be reduced. However, as discussed in Section 2.2.6.5, the BLM has imposed stipulations that would not permit surface use and occupancy a certain distance of hydrologic features on either side of the Coachella Canal.

Wind energy development could cover 76 acres of habitat that could be lost due to development, and restoration could be implemented within disturbed areas to the extent possible. Some wildlife, particularly small mammals and reptiles that are less mobile, could be injured or killed by construction activities within the affected 76 acres of disturbed habitat, but many individuals could avoid this area and then return once construction has been completed and habitat has recovered. After restoration, the remaining wind turbines could result in the direct, long-term loss of 40 acres of habitat. As part of this, 6 miles of roads would be required to access individual wind turbines.

Wildlife habitat could be altered for portions of the wind energy development area along access roads as a result of mowing existing vegetation, introducing added water to the site for dust control on roads, soil compaction and stabilization, and miscellaneous other maintenance uses. Mowing and the introduction of additional water inputs could affect wildlife and their habitat in similar ways as those described for geothermal energy development. However, wind developments typically require only limited mowing; therefore, impacts would be less substantial when compared to geothermal energy development. Impacts from additional water inputs would be similar in severity to geothermal and solar.

Wildlife habitat could also be altered by invasive plant species in the vicinity of wind energy development, which could degrade habitat quality for wildlife in similar ways as those described for geothermal energy development. However, because only one wind project could be built in the West Chocolate Mountains REEA, invasive plant impacts would be much less severe than for geothermal or solar energy development.

Erosion from construction of wind facilities could alter fish and wildlife habitat in the vicinity of the development in similar ways as those described for geothermal energy development; however, because wind turbines have a small footprint and only one wind project could be built in the West Chocolate Mountains REEA, erosion would be much less severe than for solar or geothermal energy development.

The increased number of vehicles and equipment in the West Chocolate Mountains REEA associated with construction and operation of wind energy development could result in

direct mortality and injury to wildlife species through collisions with vehicles and wind turbines, and vehicles driving over animals. This is the same effect as described for geothermal energy development; however, operation of the wind power plant could result in more substantial effects to wildlife than individual solar or geothermal energy development because direct mortality to birds and bats due to wind turbine operation is likely to occur. Recently, the impact to bats from wind energy facilities has become a concern due to an unexpectedly large number of bat mortalities at several wind facilities in North America (Kunz et al. 2007). The concern is that populations of affected species could decrease in the long term due to the cumulative effects of wind farm influenced bat mortalities (Kunz et al. 2007). Vehicle collisions with wildlife would be much less substantial at the wind facility when compared to CSP and geothermal facilities due to the low number of people required for routine operations of the wind power plant. Only four people would be required for routine operations of the wind facility, whereas 37 would be required for each geothermal energy development and 90 people would be required for CSP facilities. Vehicle collisions with wildlife would likely be similar to solar PV projects, which would require only 5 people for routine operations.

Bats use riparian areas for foraging, and in many places, these areas are an important source of drinking water. Moths, the preferred prey of many bats, reproduce on shrubs, trees, and flowering plants, but not on grasses. Vegetation structure is a critical component in the life cycles of insect prey, especially for moths. The impacts to vegetation structure from development of wind energy development potentially would be significant to some populations of bats.

Conclusion

Adverse impacts to birds and bats could occur from collisions with wind turbines. BMPs outlined in Appendices I-A and I-B specific to prevention of avian and bat mortality would be imposed as required and would ensure the protection of avian and bat species as well as other special status species, which is consistent with the management goals for this resource.

Indirect Fish and Wildlife Impacts from Wind Energy Development

Wind energy development in the West Chocolate Mountains REEA could have indirect impacts. If wind turbine and access road siting affects how wildlife or fish utilize habitat in areas near development, impacts would be similar to those described for geothermal energy development. It is likely that habitat fragmentation would be less severe for wind because only one wind power plant could be developed.

Fish and wildlife in areas surrounding wind energy development could be impacted because they would have to compete with fish and wildlife that were displaced from development areas, and impacts would be the same as those described for geothermal energy development; however, these effects would be less substantial for wind because only one wind power plant could be developed.

Wildlife in areas surrounding wind development could be impacted by common ravens in similar ways as those described for geothermal energy development. These effects would be less severe for wind development because only one wind power plant could be developed.

Wildlife could be affected indirectly by invasive species which not only thrive in disturbed areas, but can spread from disturbed areas into surrounding habitat in similar ways as those described for geothermal energy development. These effects would be less severe for wind development because only one wind power plant would be developed

Wind development could increase the number of access roads to the West Chocolate Mountains REEA. This could lead to increased human presence in currently inaccessible fish and wildlife habitat. Over time, increased numbers of people accessing the REEA could lead to an increase in hunting, poaching, and other wildlife harvesting activities, which could reduce the population size of targeted fish and wildlife species.

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 vegetation from wind energy projects, although the development cap would limit wind energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

4.7.4.4 Alternative 4: Geothermal Development Only

Under Alternative 4, geothermal energy could be developed to the achievement of levels of geothermal energy development consistent with the geothermal RFD scenario; there would be no solar or wind energy development. Under this alternative, the following impacts would be the same as Alternative 3:

- Direct and indirect fish and wildlife impacts from geothermal energy development;
- Acquired lands; and
- Existing noncompetitive lease application.

Impacts from geothermal energy development would be consistent with those for Alternative 3. Under this alternative, the West Chocolate Mountains REEA would not be designated as an SEZ and solar or wind energy development would not be allowed. Additionally, the development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). The BLM would not consider, process, or approve solar or wind energy development within the West Chocolate Mountains REEA.

Since there would be no solar and wind development under this alternative, there would be no impacts from these energy sources. This alternative would not conform to the CDCA goal to identify potential sites for wind energy development.

4.7.4.5 Alternative 5: Solar Energy Development Emphasis with Moderate Geothermal Development and No Wind Development

Under this alternative, solar energy could be developed to the achievement of levels of development consistent with the maximum extent as defined in the solar RFD scenario. Geothermal energy could be developed to the achievement of levels of geothermal energy development consistent with a moderate level (50 MW) as defined in geothermal RFD scenario.

Under this alternative, the following would be the same as Alternative 3:

- Acquired lands;
- Existing noncompetitive lease application; and
- Direct and indirect fish and wildlife impacts from solar development.

Direct Fish and Wildlife Impacts from Geothermal Energy Development

Under this alternative, only one 50-MW geothermal power plant could be constructed and could replace up to 50 MW of energy supplied by fossil fuel power facilities. However, since only one geothermal power plant could be constructed, direct mortality, displacement of species, and loss of habitat could only occur on 30 acres for construction of the power plant, itself, 3.6 acres per mile for construction of roads, 7.2 acres for construction of transmission lines, and 272 acres for wells and well pads, access roads, and pipelines. Ultimately, only 312 acres of BLM and other land could be disturbed after reclamation under this alternative because only one geothermal power plant could be constructed. The short- and long-term effects to fish and wildlife could include the same types of effects discussed under Alternative 3; however, the potential for their occurrence would be reduced by one-third, since only one project could be constructed.

Indirect Fish and Wildlife Impacts from Geothermal Energy Development

Indirect impacts to fish and wildlife could include the same types of impacts discussed under Alternative 3, but the impacts would not be on as large a scale because only one 50-MW geothermal project could be constructed. Siting one project would less complicated than siting three plants; therefore, many of the effects discussed under Alternative 3 could be minimized by implementation of the stipulations that BLM would impose which would not permit surface use and occupancy within 100 feet of the 25-year floodplain of a riparian or wetland feature or 300 feet of artificial surface waters and associated wetlands and within 300 feet of any hydrologic feature east of the Coachella Canal. In addition, the BLM would impose stipulations to protect water resources related to the use of groundwater within the REEA.

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 geothermal energy development, which could lead to an increase in impacts to fish and wildlife from geothermal energy projects. Additionally, the development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Conclusion

Adverse impacts to fish and wildlife could include impacts from excavating, grading, and clearing activities associated with construction of the well field, power plants, and associated infrastructure. However, the total land disturbance for geothermal energy development would be only 313 acres, a small percentage of the total size of the planning area, and geothermal development could be sited away from sensitive fish and wildlife and their habitats. Thus, it

would be consistent with the management goals for this resource and the long-term and short-term impacts could be minor and would not be of concern to the public.

4.7.4.6 Alternative 6: Geothermal Development Emphasis with Moderate Solar Development and No Wind Development

Under this alternative, it is assumed that achievement of levels of development consistent with the maximum development defined in the geothermal RFD scenario would take place (the same as discussed for Alternative 3) and that the level of achievement consistent with partial development of the solar RFD scenario would be realized. There would be no wind energy development. Lands within the West Chocolate Mountains REEA that lie east of the Coachella Canal would not be considered for an SEZ, modified or otherwise. Lands west of the canal would be identified as an SEZ, allowing other compatible renewable energy developments to occur.

Under this alternative, the following would be the same as Alternative 3:

- Acquired lands;
- Existing noncompetitive lease application;
- Direct and indirect fish and wildlife impacts from geothermal development; and
- Direct and indirect fish and wildlife impacts from CSP (dish engine only) and PV solar development.

Impacts from geothermal energy development would be the same as Alternative 3.

Direct Fish and Wildlife Impacts from Solar Energy Development

Under this alternative, direct effects to the fish and wildlife could occur if development of up to 6,637 acres of CSP (dish engine technology only) or up to 29,758 acres of PV projects were developed. Adverse effects to fish and wildlife could include all of the same impacts discussed under Alternative 3. Additionally, under this alternative, the CSP projects could only utilize dish engine technology which only uses water for mirror cleaning. Therefore, water sources utilized by special status species would not be affected by CSP development under this alternative. The impacts would be less than Alternative 3 if only three 500-MW CSP projects were developed instead of five. However, the same amount of solar PV land could be developed under this alternative; therefore, potential effects would be the same as Alternative 3.

Indirect Fish and Wildlife Impacts from Solar Energy Development

Indirect impacts to fish and wildlife would be the same as those under Alternative 3.

4.8 Special Status Species

This section discusses the effects on special status species that could occur with implementation of the alternatives. Management goals are provided, impact indicators used to identify and analyze effects are presented, typical impacts are discussed for geothermal, solar, and wind energy, and impacts are analyzed by alternative.

4.8.1 Management Goals

The following are the management goals from the CDCA Plan Wildlife Element that pertain to special status species and their habitats:

- Develop and implement detailed plans to provide special management for: (a) areas which contain rare or unique habitat; (b) areas with habitat sensitive to conflicting uses; (c) areas with habitat especially rich in wildlife abundance or diversity; and (d) areas which good representative of common habitat types. Many areas falling into these categories contain listed species, which may become the focus of management as indicator species;
- Manage those wildlife species on the federal and state lists of threatened and endangered species and their habitats so the continued existence of each is not jeopardized. Stabilize and, where possible, improve populations through management and recovery plans developed and implemented cooperatively with the USFWS and the CDFG;
- Manage wildlife species officially designated as sensitive by the BLM for California and their habitats so the potential for federal or state listing is minimized; and
- Include consideration of crucial habitats of sensitive species in all decisions so impacts are avoided, mitigated, or compensated.

4.8.2 Impact Criteria

The potential risk of impacts to special status species has been assessed with respect to the following criteria. Potential impacts to special status species could occur if actions were to result in the following:

- Changes to the diversity or substantial decrease of the numbers of a special status species population, or interference with the survival, growth, or reproduction of affected special status species populations;
- Direct or indirect impacts on special status species populations or habitat that contribute to or result in the federal or state listing of the species (e.g., by substantially reducing species numbers, or by resulting in the permanent loss of habitat essential for the continued existence of a species); any “take” of a state or federal listed species or other special status species is considered significant;
- Reduced designated critical habitat of a listed species;
- Substantial long-term loss of existing habitat for special status species populations;

- Destruction of or extensive alteration to habitats in such a way that the habitats are rendered unfavorable to special status species;
- Introduction of new invasive plant species to an area, or the increase of existing populations of invasive plant species that alter or degrade habitat for special status species populations;
- Creation of potential health hazards or involvement in the use, production, or disposal of materials that pose a hazard to special status species populations in the West Chocolate Mountains REEA; or
- Conflicts with BLM management strategies.

4.8.3 Typical Special Status Species Impacts from Energy Development

Typical impacts on special status species include:

- Injury or mortality to special status species individuals and populations;
- Special status species habitat disturbance or loss;
- Fragmentation of special status species habitat;
- Introduction of new invasive plant species (or spreading existing invasive species populations) that substantially alter habitat conditions; and
- Exposure of special status species to contaminants through uncontrolled releases, spills, or seepages of hazardous materials that adversely impact growth, distribution, and/or survival of the species.

4.8.3.1 Typical Special Status Species Impacts from Geothermal Energy Development

Activities associated with geothermal energy development could cause the following impacts to special status species and their habitat:

- Habitat degradation or habitat loss;
- Increase in surrounding noise levels;
- Change in wildlife migration and wintering patterns;
- Soil, surface water, and groundwater contamination;
- Obstacle collisions resulting in death or injury (e.g., pipelines and well drilling structures); and
- Increased impervious surface area that could decrease infiltration and increase stormwater runoff volumes and velocity, which could affect available water supplies for special status species and/or degrade habitat downstream of impervious surfaces through erosional processes.

The Geothermal PEIS identified typical impacts on special status species associated with geothermal energy development. The impacts are summarized in Table 4.8-1.

Table 4.8-1 Typical Impacts on Special Status Species Resulting from Geothermal Energy Development

Project Phase	Activity	Impact	Factors
Exploration	– Site clearing and grading. – Well drilling and construction. – Access road construction. – Access road watering for compaction and dust control. – Accidental spill during equipment refueling; accidental release of stored fuel or hazardous materials; drilling mud spill or accidental spill of geothermal fluids and working fluids; accidental spill of herbicides. – Noise, geothermal exploratory well drilling also includes noise impacts, similar to oil and gas drilling, that could affect avian and terrestrial wildlife breeding, nesting, and foraging habitat. Timing limitation during nationally significant Pacific migratory bird season would be a BMP in West Chocolate Mountains REEA. See noise impacts defined in Section 4.2.	– Direct mortality or injury of special status species. – Reduced habitat quality. – Possible introduction and spread of invasive vegetation. – Destruction of vegetation and disturbance of special status species.	Short-term. Long-term.
Construction	– Construction of pipelines, access road, and ancillary facility construction. – Construction and maintenance vehicle travel. – Construction of additional roads, wells, and structures.	– Habitat disturbance. – Invasive vegetation. – Direct injury or mortality to special status species. – Erosion and runoff. – Fire. – Noise. – Exposure to contaminants.	Short-term.
Operation and Maintenance	– Existence of drilling pads, facilities, roadways, and transmission corridors.	– Habitat disturbance. – Invasive vegetation. – Direct injury or mortality to special status species. – Erosion and runoff. – Fire. – Noise. – Exposure to contaminants.	Long-term.
Decommissioning	– Facility removal. – Removal of access roads that are not maintained for other uses. – Recontouring the surface.	– Similar to construction but smaller in scale.	Short-term.

Each phase of geothermal energy development could have impacts on special status species if any are present or routinely utilize habitat in the West Chocolate Mountains REEA, particularly through disturbance of habitat. During the exploration phase, small areas of vegetation and habitat could be disturbed as a result of constructing access roads and drill pads. Vegetation would be removed, and habitat could be lost. These activities could disrupt wildlife breeding activities and migration patterns, cause mortality and injury to wildlife individuals, spread invasive plant species, and alter wildlife use of the exploration area. If any of the special status species listed in Tables 3.8-1 or 3.8-2 (Chapter 3, Affected Environment) are present in the immediate area of development, impacts to these species would be likely. Drilling operations could affect large areas of habitat as expanded well pads are cleared to accommodate production wells, injection wells, and sump pits, roadways are cleared, and other infrastructure is put in place. Drilling operations could remove habitat and increase the risk of erosion, which, in turn, could lead to the degradation of terrestrial habitat and increased turbidity in aquatic habitat.

Project vehicle traffic and parking areas could create fugitive dust and pollutants in levels that could adversely impact plant or wildlife species in the West Chocolate Mountains REEA and could increase the likelihood of fuels spills that could expose plants, fish, and wildlife to contaminants. Vehicle traffic could also result in direct mortality and injury of special status species.

Water used for drilling could affect nearby wetland and riparian habitats if any are present in the area. The large amount of water used for drilling could also have a direct effect on groundwater flows and wetlands, which could directly affect riparian habitat. The greatest amount of disturbance to habitat would occur during construction. Large areas of habitat would be cleared for well pads, power plants, pipelines, roads, and other infrastructure. During the operation phase, drilling could increase the spread of invasive species, affect wetland and riparian areas through runoff from roads and bridges to access drilling operation areas, and affect habitat through mowing, cutting, and herbicide application for site maintenance. Increased vehicle traffic from drilling operations could cause more collisions with wildlife. Increased impervious surface area could decrease infiltration and increase stormwater runoff volumes and velocity, which could affect available water supplies for special status species and/or degrade habitat downstream of impervious surfaces through erosional processes. Decommissioning of geothermal energy development would have similar effects as those described for construction, but on a smaller scale.

4.8.3.2 Typical Special Status Species Impacts from Solar Energy Development

Based on a review of environmental documentation for other solar energy projects, typical impacts for solar energy projects have been developed. Typical impacts on special status species associated with solar energy development are summarized in Table 4.8-2.

Table 4.8-2 Typical Impacts on Special Status Species from Solar Energy Development

Project Phase	Activity	Impact	Factors
Site Selection	– Surveys. – Vehicular traffic.	– Destruction of habitat and disturbance of special status species. – Possible introduction and spread of invasive vegetation.	Short-term.
Construction	– Soil borings and, possibly, water well establishment. – Ground clearing (removal of vegetation cover). – Grading. – Excavation. – Vehicular and pedestrian traffic. – Construction and installation of facilities.	– Erosion and runoff. – Fugitive dust – Noise. – Introduction and spread of invasive vegetation. – Modification, fragmentation, and reduction of habitat. – Direct mortality and injury of special status species. – Exposure to contaminants. – Interference with behavioral activities.	Short-term. Long-term.
Operation and Maintenance	– Presence of the fenced solar energy facility, utility ROWs, and access roads. – Increase human use of surrounding areas. – Presence of a solar energy project.	– Habitat fragmentation. – Introduction and spread of invasive vegetation. – Disturbance of special status species. – Mortality of special status plants and wildlife from vehicles. – Increased potential for fire. – Interference with migratory and other behaviors of special status wildlife.	Long-term.
Decommissioning	– Facility removal. – Breaking up concrete pads and foundations. – Removal of access roads that are not maintained for other uses. – Recontouring the surface. – Revegetation.	– Similar to construction but smaller in scale.	Short-term.

Each phase of solar development could have impacts on special status species if any are present or routinely utilize habitat in the West Chocolate Mountains REEA, particularly through disturbance of habitat. During site selection, impacts could be minimal due to the limited nature of the activities, although vehicle traffic could cause mortality or injury to special status wildlife, spread invasive plant species, and degrade habitat, and soil borings and water well establishment, if necessary, could disturb small areas of habitat that could be important to special status species. Construction activities could affect large areas of habitat as solar fields are cleared to accommodate solar modules, roadways are cleared, and other infrastructure is put in place. Construction could disturb vegetation, create erosion potential, and increase the incidence of invasive plant species infestation. Additionally, vehicle traffic and parking areas could create

fugitive dust and pollutants which could affect plant species or alter wildlife use of the area and increase the likelihood of vehicle impacts that cause mortality and injury to certain species. O&M could increase the spread of invasive species, affect wetland and riparian habitat through runoff from roads, and affect terrestrial habitat through mowing, cutting, and herbicide application for site maintenance. Increased impervious surface area could decrease infiltration and increase stormwater runoff volumes and velocity, which could affect available water supplies for special status species and/or degrade habitat downstream of impervious surfaces through erosional processes. Decommissioning of solar developments would have similar effects as those described for construction, but on a smaller scale.

4.8.3.3 Typical Special Status Species Impacts from Wind Energy Development

The Wind PEIS identified typical impacts on special status species associated with wind energy development. Those impacts on special status species associated with wind energy development are summarized in Table 4.8-3.

Table 4.8-3 Typical Impacts on Special Status Species from Wind Energy Development

Project Phase	Activity	Impact	Factors
Site Selection	– Site monitoring and testing. – Limited road construction and excavation. – Grading required to install monitoring equipment or access a site.	– Destruction of habitat. – Direct mortality and injury to special status species. – Direct mortality and injury to birds and bats from colliding with the METs.	Short-term.
Construction	– Site clearing and grading, and facility construction. – Exposure to contaminants. – Accidental spill during equipment refueling. – Accidental release of stored fuel or hazardous materials.	– Erosion and runoff. – Fugitive dust. – Noise. – Introduction and spread of invasive vegetation. – Modification, fragmentation, and reduction of habitat. – Direct mortality of special status species of plants and animals. – Exposure to contaminants. – Interference with behavioral activities.	Impacts could be long-term or short-term and largely localized to the immediate West Chocolate Mountains REEA.
Operation and Maintenance	– Presence of wind energy facility. – Mowing.	– Disturbance of wildlife by turbine noise and human activity. – Exposure of special status species to contaminants. – Direct mortality and injury to birds and bats from colliding with the turbines and METs. – Mortality of wildlife from electrocution or collision with transmission lines.	Long-term.
Decommissioning	– Facility removal. – Breaking up concrete pads and foundations, removal of	– Similar to construction but smaller in scale.	Short-term.

Table 4.8-3 Typical Impacts on Special Status Species from Wind Energy Development

Project Phase	Activity	Impact	Factors
	access roads that are not maintained for other uses. – Recontouring the surface. – Revegetation.		

Each stage of wind energy development could result in impacts to special status species. During site monitoring and testing, limited road construction and some grading could disturb habitat in small areas. Special status bird and bat species listed in Table 3.8-2 (Chapter 3, Affected Environment) have the potential to collide with METs used for site monitoring. Construction activities could affect habitat cleared to accommodate individual wind turbines, roads, and other infrastructure. Construction could disturb habitat, create erosion potential, and increase incidence of invasive plant infestation. Additionally, vehicle traffic and parking areas could create fugitive dust and pollutants which could affect special status plant species present in the area, alter wildlife use of the area, and increase the likelihood of vehicle impacts that cause mortality and injury to certain species. O&M could increase the spread of invasive species, affect wetland and riparian habitat through runoff from roads, and affect terrestrial habitat through mowing, cutting, and herbicide application for site maintenance. Decommissioning of wind development would have similar effects as those described for construction, but on a smaller scale.

4.8.4 Special Status Species Impacts by Alternative

This section describes the effects under each alternative using the respective methodology prescribed under NEPA. To compare effects, this analysis defines the temporal scale (time), spatial extent (area), and intensity of effects for each alternative. This section provides a summary of impacts specific to the groups of special status species with the potential to occur within the West Chocolate Mountains REEA (see Tables 3.8-1 and 3.8-2 of Chapter 3, Affected Environment), including 92 special status plant species and 34 special status fish and wildlife species. A few special status wildlife species or groups of species warrant specific discussion, which is provided below.

Desert Tortoise

The desert tortoise (*Gopherus agassizii*) inhabits creosote bush scrub with lower densities of tortoises occurring in Joshua tree woodland and Mojave-saltbush-allscale scrub plant communities. Major topographical features used by tortoises include flats, valleys, bajadas, and rolling hills generally from 600 to 1,000 meters in elevation and occasionally above 1,250 meters. Tortoises typically avoid plateaus, playas, sand dunes, steep slopes (>20 percent), and areas with many obstacles to free movement. They prefer surfaces covered with sand and fine gravel versus course gravel, pebbles, and desert pavement (Boarman 2002). Friable soil is important for digging burrows, but when friability (i.e., diggability) is similar, productivity of plants is more important (Boarman 2002). The desert tortoise is entirely herbivorous and forages on a variety of plants, including cactus species, grasses, and annual vegetation (Boarman 2002). Desert tortoise populations are declining throughout their range and are particularly affected by

habitat destruction/loss, predation, illegal collecting, invasive species of plants, grazing, and vehicle collisions (Boarman 2002). Habitat for the desert tortoise occurs within the West Chocolate Mountains REEA, particularly east of the Coachella Canal.

Flat-Tailed Horned Lizard

The flat-tailed horned lizard (*Phrynosoma mcallii*) inhabits sandy desert hardpan or gravel flats with scattered sparse vegetation of low species diversity (CaliforniaHerps.com 2010). Threats to flat-tailed horned lizards include development, habitat loss, and vehicle collisions. This species' main defense is to remain motionless and use its cryptic coloring to blend into the background making it difficult to see. Flat-tailed horned lizards are also known to bury themselves in loose sand to hide (CaliforniaHerps.com 2010). Both of these behaviors, along with having a relatively large home range, make this species particularly susceptible to mortality on roads and areas of development activity. Development reduces habitat but also crushes lizards and their burrows. Habitat for the flat-tailed horned lizard occurs within the West Chocolate Mountains REEA.

Nelson's Bighorn Sheep

Nelson's bighorn sheep (*Ovis Canadensis nelsoni*) are fairly uncommon in California, but they do inhabit several habitat types in the West Chocolate Mountains REEA including desert scrub and desert riparian habitat present within the REEA (CDFG 2010). Nelson's bighorn sheep feed on a large variety of plant species and diet composition varies seasonally and among locations (Wehausen 1999) as well as noise or other disturbances that frighten bighorn sheep away from foraging areas and water sources. Threats to Nelson's bighorn sheep include actions that impair the ability of sheep to move between mountain ranges (e.g., fencing along highways or around large developments, canals, and high densities of human habitation) (Wehausen 1999).

Special Status Bird Species

While nearly all of the birds potentially present in the West Chocolate Mountains REEA are protected under the Migratory Bird Treaty Act (MBTA), the Bald and Golden Eagle Protection Act (BGEPA), or agency-specific raptor avoidance guidelines, a number of bird species also have some level of state or federal special status. These include 12 species in addition to the burrowing owl. Birds are generally able to retreat from areas of disturbance so direct mortality of adult birds from development within the REEA would be minimal; however, all bird species are affected by the loss of habitat, and nests, eggs, and young birds are vulnerable to destruction during construction. Additionally, collisions with wind turbines could cause direct mortality and injury to birds utilizing areas of development for foraging.

Burrowing Owl

The burrowing owl (*Athene cunicularia*) inhabits dry, open, native or non-native grasslands, deserts, and other arid environments with low-growing and low-density vegetation (Ehrlich et al. 1988). Insects form the bulk of its diet in the summer, and small mammals, birds, and reptiles in the winter (Klute et al. 2003). Threats to burrowing owl populations include the loss and destruction of habitat by agriculture and urban development, the destruction of burrows, and indirect poisoning via rodent eradication efforts (Klute et al. 2003). Suitable habitat and recorded sightings exist for burrowing owls in the West Chocolate Mountains REEA (California

Natural Diversity Database [CNDDB] 2010) and burrowing owls and burrows were identified during surveys in the central portion of the REEA northwest of Niland on IID property (AECOM 2012).

Special Status Bat Species

Five species of bats potentially present in the West Chocolate Mountains REEA are listed as California Species of Special Concern. Bats are generally able to escape from areas of intrusion; therefore, direct mortality of adult bats from development within the REEA could be minimal; however, all bat species are affected by the loss and degradation of habitat. Among all species, there is a lack of knowledge quantifying their tolerance to habitat modification (Western Bat Working Group [WBWG] 2005). Four of these species roost in caves, mines, rock cliffs, and occasionally man-made structures (abandoned buildings, bridges). Maternity colonies of these bats are formed during late spring through mid-summer. Young bats are vulnerable to disturbance due to their immobility during construction activities. Additionally, the operation of wind turbines could cause direct mortality and injury to bats that occur within the area through collision and as an effect of drastic drops in air pressure near the turbine blades, causing a condition known as barotrauma (Baerwald et al. 2008). To date, no fatalities of the listed special concern bat species have been reported as a result of a collision with a wind turbine.

California leaf-nosed bat (*Macrotus californicus*)

California leaf-nosed bats occur in lowland desert habitat near desert wash vegetation. This species is typically defined as a gleaner, taking prey from vegetation or the ground (WBWG 2005). They are dependent on either caves or mines for roosting habitat (BLM 2002), and occasionally can be found in abandoned buildings or bridges (WBWG 2005). All major maternity, mating, and overwintering sites are in mines or caves (BLM 2002). They are known to use mine shafts in the Chocolate Mountains and could forage in the West Chocolate Mountains REEA.

Pallid bat (*Antrozous pallidus*)

Pallid bats are found throughout the Southwest, in rocky regions where the dominant vegetation consists of scattered desert scrub (CDFG 2010). Their foraging areas include shrub-steppe grasslands, talus slopes, and gravel roads where they mainly capture prey on the ground or vegetation instead of the air (WBWG 2005). Daytime roosts are common in rock crevices and buildings and less common in mines, caves, hollow trees, and also in bridges, particularly wooden and concrete girder designs (WBWG 2005). They are intolerant of disturbance and may abandon a roost when disturbed, not returning for years (CDFG 2010). Rocky outcrops occur within the West Chocolate Mountains REEA and recorded occurrences exist in the area. Therefore, this species has a moderate potential of occurring in the REEA.

Pocketed free-tailed bat (*Nyctinomops femorosaccus*)

Pocketed free-tailed bats are known to occur in semi-arid desert lands in Southern California, south Arizona, southeast New Mexico, and the Big Bend area of Texas. They feed on insects captured in mid-flight (WBWG 2005). Common roosts of this species are in caves, crevices in cliffs, but have occasionally been found among the plants of the desert shrub habitat (WBWG 2005). Associated roosting conditions are present within the West Chocolate

Mountains REEA and there is a recorded occurrence in the vicinity REEA (CNDDB 2010). Therefore, this species has a moderate potential of occurring in the REEA.

Western mastiff bat (*Eumops perotis californicus*)

The western mastiff bat is a large free-tailed bat that typically forages high above the ground, regularly 100 to 200ft, in broad open areas considerable distances from roosting sites (WBWG 2005). They roost generally in rock crevices that form vertical or nearly vertical cliffs. This species has been observed near the eastern end of the West Chocolate Mountains REEA (CNDDB 2010). Suitable habitat is available in the West Chocolate Mountains. Therefore, this species has moderate potential for occurring in the West Chocolate Mountains REEA. The relatively high altitude and long distance feeding habit makes them susceptible to collisions with wind turbines.

Western yellow bat (*Lasiurus xanthinus*)

A suspected non-colonial roosting species, the western yellow bat is uncommon in California, but has been observed below 2,000 feet in elevation in desert habitats including desert riparian, desert wash, and palm oasis habitats (CDFG 2010; WBWG 2005). This bat is an aerial forager, and is found in desert wash and riparian habitats where they solitarily roost and raise their pups in trees, with a particular association with palms (WBWG 2005). Preferred roosting habitat is present in several drainages within the West Chocolate Mountains REEA. Western yellow bats have been observed in the West Chocolate Mountains, and have a moderate potential of occurring in the West Chocolate Mountains REEA.

4.8.4.1 Alternative 1: No Action/No CDCA Plan Amendment

Because geothermal, solar, and wind development could still occur under the No Action/No CDCA Plan Amendment alternative, impacts to special status species would be expected to be similar to those detailed in Section 4.8.4.3 for Alternative 3. However, development under the No Action/No CDCA Plan Amendment alternative may occur at a slower rate because an individual plan amendment process would be necessary for each geothermal and solar or wind authorization; thus, impacts may occur at a slower rate, as well.

No renewable energy development cap or other protective stipulations/measures pertaining to the east side of the Coachella Canal would be adopted under this alternative. Thus, there would be no restrictions on development east of the Coachella Canal, and special status species impacts that would not occur under Alternative 3 east of the Coachella Canal could occur under Alternative 1.

4.8.4.2 Alternative 2: No Development /CDCA Plan Amendment to Identify Areas as Closed to and Unsuitable for Geothermal, Solar, and Wind Energy Development

There would be no new construction or operation of geothermal power plants, or solar or wind energy projects, except those which are currently approved or operating. Special status species would not be affected by new geothermal, wind, or solar projects; however, the closure of these lands for renewable energy development would represent an opportunity cost. The energy that could have been supplied by development of this area for geothermal, solar, and/or

wind energy would have to be filled by other fossil fuel or renewable energy generating facilities constructed elsewhere.

No renewable energy development cap or other protective stipulations/measures pertaining to the east side of the Coachella Canal would be adopted under this alternative. Thus, there would be no restrictions on development east of the Coachella Canal, and special status species impacts that would not occur under Alternative 3 east of the Coachella Canal could occur under Alternative 2.

4.8.4.3 Alternative 3: Renewable Energy Development Emphasis

Under Alternative 3, geothermal, solar, and wind could be developed to the maximum extent as defined in the geothermal, solar, and wind RFD scenarios. Up to 1,026 acres could be disturbed for development of geothermal power plants; up to 29,758 acres could be disturbed for development of solar PV projects; up to 6,637 acres could be disturbed for development of CSP projects; and up to 76 acres could be disturbed for wind energy projects, although lands acquired by BLM with LWCF funds would be managed as avoidance areas. Solar development could occur through the development of a 50-MW solar PV project and a 500-MW CSP project.

Direct Impacts to Special Status Species from Geothermal Energy Development

Geothermal energy development in the West Chocolate Mountains REEA could result in habitat loss for special status species. Surface-disturbing activities associated with exploration and construction would remove plants, excavate soils, and grade areas for development of geothermal facilities. These activities could reduce the amount of available habitat for special status species in the West Chocolate Mountains REEA for the short and long term. If project sites are selected that contain important habitat for any of the special status species listed in Tables 3.8-1 and 3.8-2 (Chapter 3, Affected Environment), these effects could be substantial.

Development under the geothermal RFD scenario estimates that three power plants could be constructed across the West Chocolate Mountains REEA. Each power plant would require the facility, itself, access roads, transmission lines, and drilling wells. Each geothermal power plant facility would require approximately 30 acres for development, which could result in the direct, long-term loss of 90 acres of habitat in the REEA. This loss of habitat could displace or kill special status species present in the selected 90 acres. Access roads could also displace or kill special status species through loss of habitat. The geothermal RFD scenario states that 3.6 acres of road would be required per power plant; therefore, 10.8 acres of long-term habitat loss could occur. Each 50-MW power plant would require approximately 36.3 acres to be disturbed for transmission lines, resulting in 108.9 acres of habitat loss that could affect special status species if habitat along the transmission line route is utilized. Restoration of a majority of the disturbed areas for transmission lines could drastically lower the acreage of long-term habitat loss. After restoration is complete, the estimated habitat loss from transmission lines for a 50-MW power plant could be 7.2 acres; therefore, only 21.6 acres of habitat could be lost long term from transmission lines.

Two types of drilling wells could be used for geothermal energy development: TG wells and FD wells. Approximately 30 TG wells could be drilled for geothermal exploration drilling, resulting in a total habitat loss of 95 acres; however, most exploratory wells would be removed

after a short time and habitat could be restored. Thus, loss of habitat from TG wells could be short-term.

Direct effects to the following federally listed plant species could occur from geothermal exploration. These effects would be limited to 95 acres within the West Chocolate Mountains REEA:

- Peirson's milk vetch (*Astragalus magdalenae* vat. *peirsonii*);
- Triple-ribbed milkvetch (*Astragalus tricarinatus*);
- San Diego button celery (*Eryngium aristulatum*); and
- Mexican flannel bush (*Fremontodendron mexicanum*).

Direct effects from exploration could also occur to BLM sensitive species and species listed under the CESA including those found in the creosote bush scrub vegetation community, including: pygmy lotus (*Acmispon haydonii* (*Lotus haydonii*)), watson's amaranth (*Amaranthus watsonii),* desert sand-parsley (*Ammoselinum giganteum),* Salton milk-vetch (*Astragalus crotalariae),* Borrego milk-vetch (*Astragalus lentiginosus* var. *borreganus),* Providence Mountains milk-vetch (*Astragalus nutans),* California ayenia (*Ayenia compacta),* little-leaf elephant tree (*Bursera microphylla),* pink fairy-duster (*Calliandra eriophylla),* sand evening-primrose (*Camissonia arenaria),* white pygmy-poppy (*Canbya candida),* saguaro (*Carnegiea gigantean),* Peirson's pincushion (*Chaenactus carphoclinia* var. *peirsonii),* Abram's spurge (*Chamaesyce abramsiana),* Arizona spurge (*Chamaesyce arizonica),* Las Animas colubrine (*Colubrina californica),* spiny abrojo (*Condalia globosa* var. *pubescens),* foxtail cactus (*Coryphantha alversonii),* winged cryptantha (*Cryptantha holoptera),* Munz's cholla (*Cylindropuntia munzii* (*Opuntia munzii*)), Wolf's cholla (*Cylindropuntia wolfii),* Colorado Desert larkspur (*Delphinium parishii* ssp. *subglobosum),* Arizona cottontop (*Digitaria californica),* glandular ditaxis (*Ditaxis claryana),* California ditaxis (*Ditaxis serrata* var. *californica),* annual rock-nettle (*Eucnide rupestris),* Utah vine milkweed (*Funastrum utahense* (*Cynanchum utahense*)), Parish's club-cholla (*Grusonia parishii),* curly herissantia (*Herissantia crispa),* pink velvet-mallow (*Horsfordia alata),* Newberry's velvet-mallow (*Horsfordia newberryi),* slender-leaved ipomopsis (*Ipomopsis tenuifolia),* Santa Rosa Mountains leptosiphon (*Leptosiphon floribundus* ssp. *Hallii).* Mountain Springs bush lupine (*Lupinus excubitus* var. *medius),* Parish's desert-thorn (*Lycium parishii),* Palmer's lyrepod (*Lyrocarpa coulteri* var. *palmeri),* brown turbans (*Malperia tenuis),* spearleaf (*Matelea parvifolia),* hairy stickleaf (*Mentzelia hirsutissima),* Darlington's blazing star (*Mentzelia puberula),* creamy blazing star (*Mentzelia tridentate),* low bush monkeyflower (*Mimulus aridus),* slender-lobed four o'clock (*Mirabilis tenuiloba),* Wiggins' cholla (*Opuntia wigginsii),* San Jacinto beardtongue (*Penstemon clevelandii* var. *conatus),* Thurber's beardtongue (*Penstemon thurberi),* slender-stem bean (*Phaseolus filiformis),* Arizona pholistoma (*Pholistoma auritum* var. *arizonicum),* Thurber's pilostyles (*Pilostyles thurberi),* desert unicorn-plant (*Proboscidea althaeifolia),* orocopia sage (*Salvia greatae),* desert spike-moss (*Selaginella eremophila),* Coves' cassia (*Senna covesii),* mesquite neststraw (*Stylocline sonorensis),* Hall's tetracoccus (*Tetracoccus hallii),* mecca-aster (*Xylorhiza cognate*), and Orcutt's woody-aster (*Xylorhiza orcuttii).*

Additionally, direct effects from exploration could occur to some plant species may also be found in other, less dominant vegetation communities.

Saltbush Scrub Community: Emory's crucifixion thorn (*Castela emoryi),* Southwestern spiny rush *(Juncus acutus* ssp. *Leopoldii),* Cooper's rush (*Juncus cooperi*) Owens Valley checkerbloom (*Sidalcea covillei*), dwarf germander (*Teucrium cubense* spp. *depressum*), Palmer's jackass clover (*Wislizenia refracta* spp. *palmeri*), and jackass clover (*Wislizenia refracta* spp. *refracta*).

Desert Wash Vegetation Community: the Baja California ipomopsis (*Ipompsis effusa*) and Latimer's woodland-gilia (*Saltugilia latmier*).

Wetland Vegetation Communities: California saw-grass (*Cladium californicum*), California satintail (*Imperata brevifolia*), bitter hymenoxys (*Hymenoxys odorata*), Southwestern spiny rush (*Juncus acutus* spp. *leopoldii*), Cooper's rush (*Juncus cooperi*), slender-spined all thorn (*Keoberlinia spinosa* spp. *tenuispina*), mud nama (*Nama stenocarpum*), Owen's Valley checkerbloom (*Sidalcea covillei*), and San Bernardino aster (*Symphyotrichum defoliatum*).

Desert Dunes Vegetation Community: chaparral sand verbena (*Abronia villosa* var. *aurita* (*Abronia umbellata*)), Harwood's milk-vetch (*Astragalus insularis* var. *harwoodii),* flat-seeded spurge (*Chamaesyce platysperma* (*Euphorbia platyspermum*), Wiggins' croton (*Croton wigginsii*), ribbed cryptantha (*Cryptantha costata*), Gander's cryptantha (*Cryptantha ganderi*), Harwood's woolystar (*Eriastrum harwoodii*), Algodones Dune sunflower (*Helianthus niveus* spp. *tephrodes*), slender cottonheads (*Nemacaulis denudata* var. *gracilis*), giant Spanish-needle (*Palafoxia arida* var. *gigantea*), sand food (*Pholisma sonorae*), dwarf germander (*Teucrium cubense* spp. *depressum*), Palmer's jackass clover, and jackass clover.

Direct effects to the following federally listed wildlife species could occur from geothermal exploration. These effects would be limited to 95 acres with the West Chocolate Mountains REEA:

- Flat-tailed horned lizard; and
- Palm Springs pocket mouse (*Perognathus longimembris bangsi*).

Many special status wildlife species could avoid exploratory well construction areas, but return to these areas after exploration has been completed and habitat has recovered. This is particularly true for bird, large mammal, and bat species such as burrowing owl, Nelson's bighorn sheep, and pallid bat.

Habitat loss could also result from FD wells. Each 50-MW power plant would require 80 acres for FD well pads, resulting in 240 acres of habitat loss in the West Chocolate Mountains REEA. FD well pads would also require access roads and pipelines. Approximately 40 miles of access roads would be required for each 50-MW power plant, which could result in the long-term habitat loss of 432 acres. Approximately 40 miles of pipeline would also be required for each power plant, which could result in long-term impacts to 144 acres of habitat. Therefore, FD wells could result in long-term habitat loss for a total of approximately 816 acres of wildlife habitat.

Habitat that may be utilized by special status species could be altered for portions of geothermal energy development areas within the perimeter fence and along access roads by mowing existing vegetation and introducing added water to the site for dust control on roads, soil

compaction and stabilization, facility washing, and miscellaneous other maintenance uses. Mowing could result in damage and direct mortality to any special status plants present in the West Chocolate Mountains REEA. Habitat could also be altered as mowing could cause a shift within the current composition of the local plant community. Habitat could be altered in these areas, as species that are more tolerant and able to reproduce under continual disturbance from mowing could become dominant. Altered wildlife habitat could be of less value to some special status species or more valuable to non-special status species in the REEA, which could lead to reduced population size of special status species, decreased fitness of individuals within the local population, or increased predation on special status species in the vicinity of mowed areas. This effect could be long-term and could cause some special status species to decline and, perhaps, die out in localized areas. The sudden introduction of additional water inputs could provide a competitive advantage to plant species that thrive in wetter conditions. The additional water source could also provide moisture for the germination of existing seeds. This alteration of the plant community could negatively affect habitat conditions for special status species.

Direct effects from the drilling of FD wells the and associated pipelines and infrastructure described above could occur to the same plant and animal species discussed previously that could be affected by geothermal exploration, due to the amount of habitat lost during well pad construction. These effects would be limited to 816 acres with the West Chocolate Mountains REEA.

Habitat could also be altered by invasive plant species in the vicinity of geothermal energy development, which could degrade habitat quality for special status species. Invasive species within the West Chocolate Mountains REEA may not be edible for native animal species and may not provide the same habitat value as native plant species. Birds are most affected by invasive plants, as their food source is often seeds from native grasses and shrubs (BLM 2008). The federally listed bird species that could be affected are listed below, and species status designations are abbreviated as follows: Federal Endangered (FE); State Endangered (SE); and State Threatened (ST):

- Southwestern willow flycatcher (*Empidonax traillii extimus*) – FE, SE
- Least Bell's vireo (*Vireo bellii pusillus*) – FE, SE
- California brown pelican (*Pelecanus occidentalis californicus*) – FE, SE
- Yuma clapper rail (*Rallus longirostris yumanensis*) – FE, ST

Birds account for 13 of the 28 special status wildlife species likely to occur in the REEA, and all native migratory birds are protected under the MBTA, as well; therefore, this impact could be substantial. Other non-federally listed sensitive birds include the following species, and species status designations are abbreviated as follows: State Endangered (SE); State Threatened (ST); California Species of Special Concern (SC); and BLM Sensitive Species (BLM Sensitive):

- California black rail (*Laterallus jamaicensis corturniculus*) – ST
- Burrowing owl (*Athene cunicularia*) – SC, BLM Sensitive
- Black skimmer (*Rynchops niger*) – SC

- Crissal thrasher (*Toxostoma crissale*) – SC
- Gila woodpecker (*Melanerpes uropygialis*) – SE
- Golden Eagle (*Aquila chrysaetos*) – SC
- Gull-billed tern (*Sterna nilotica*) – SC
- LeConte's thrasher (*Toxostoma lecontei*) – SC
- Merlin (*Falco columbarius*) – SC
- Mountain plover (*Charadrius montanus*) – SC
- Yellow warbler (*Dendroica petechia brewsteri*) – SC
- White-faced ibis (*Plegadis chihi*) – SC

Invasive plant species thrive in disturbed areas and can be introduced to new areas by surface-disturbing activities associated with geothermal construction along access roads and pipeline and transmission line routes, and adjacent to power plants and well pads. Changes within the current composition of the local plant community caused by mowing of vegetation would likely favor the propagation of invasive weed species, as well, while existing native plants would be least likely to tolerate this treatment and could be out-competed by the growth strategy of most invasive weed species. Invasive weed species could also benefit from the additional moisture associated with adding water to the site for construction and maintenance uses, potentially out-competing the native vegetation which thrives under xeric conditions.

Erosion from construction and operation of geothermal facilities could alter special status species habitat in the vicinity of development. Soil disturbance from clearing and grading could cause eroded material to collect in certain areas and degrade or alter terrestrial habitat in depositional areas by burying low lying plants, including the four federally listed plant species discussed above as well as the BLM sensitive and plants listed under the CESA that could occur in the West Chocolate Mountains REEA.

Erosion could also increase turbidity in aquatic habitat. Large amounts of suspended matter associated with high turbidity levels could clog the gills of desert pupfish (*Cyprinodon macularius*) and razorback sucker (*Xyrauchen texanus*) and cause direct mortality. Turbidity could also affect the ability of desert pupfish and razorback sucker downstream of the geothermal energy development by impairing their ability to find food.

The increased number of vehicles and equipment in the West Chocolate Mountains REEA associated with construction and operation of geothermal energy development could result in direct mortality and injury to special status species present in the area through collisions and crushing. Equipment used for clearing vegetation, roadways, well pads, and facility sites, and vehicles used during construction and operation could particularly affect species that are not mobile enough to avoid construction operations. The federally listed plants, reptiles, and small mammals discussed above that could be effected by construction of the wellpad would be the most susceptible. More mobile special status species such as burrowing owl, Nelson's bighorn sheep, and pallid bat could avoid the initial clearing activity by moving into habitats in adjacent

areas. Collisions with motorized vehicles have been cited as a direct threat to desert tortoises, as well.

Geothermal energy developments produce extensive noise, and prolonged noise from geothermal operations could adversely affect some special status lizards and small mammals. Hearing loss in small animals such as lizards occurs at around 100 dBA (BLM 2003). This level of noise could be apparent in the vicinity of geothermal facilities for the lifetime of the project. A list of species that are less mobile and would be the most susceptible to hearing loss, as they might not be able to quickly vacate the high noise levels, is provided below. Species status designations are also provided and are abbreviated as follows: State Threatened (ST); California Species of Special Concern (SC); and BLM Sensitive Species (BLM Sensitive).

- Barefoot banded gecko (*Coleonyx switaki*) – ST, BLM Sensitive
- Flat-tailed horned lizard (*Phrynosoma mcallii*) – SC, BLM Sensitive
- Couch's spadefoot toad (*Scaphiopus couchii*) – SC
- Colorado Desert fringe-toed lizard (*Uma notata notata*) – SC, BLM Sensitive
- San Sebastian leopard frog (*Rana yavapaiensis*) – SC
- Sonoran desert toad (*Bufo alvarius*) – SC
- American badger (*Taxidea taxus*) – SC
- California leaf-nosed bat (*Macrotus californicus*) – SC
- Pallid bat (*Antrozous pallidus*) – SC
- Palm Springs pocket mouse (*Perognathus longimembris bangsi*) – SC
- Pocketed free-tailed bat (*Nyctinomops femorosaccus*) – SC
- Western mastiff bat (*Eumops perotis californicus*) – SC
- Western yellow bat (*Lasiurus xanthinus*) – SC

Additionally, hearing loss could lead to mortality due to increased susceptibility to predation; however, exposure to noise by wildlife would be localized. Special status species present in the area, other than those specifically mentioned, would likely leave and move into habitats in adjacent areas.

Pipelines associated with geothermal energy development would be suspended less than 5 feet off the ground; therefore, larger wildlife species such as Nelson's bighorn sheep, could jump over pipelines, and small mammals, reptiles, and amphibians could travel under pipelines without ever coming into contact with the pipe.

Although BLM would require operators to implement practices to avoid or minimize potential soil contamination, accidental spills of construction related materials, such as oils, greases, and hydraulic fluids, could cause impacts to special status species. Depending on the concentration and extent of contamination, the growth, distribution, reproductive capacity, and survival of affected special status species could be inhibited and some direct mortality could occur in localized areas. In addition, the pollutants could be transported through groundwater or

surface water runoff to adjacent habitat, impacting special status species outside the immediate construction area. Impacts from potential fuels spills could be short- or long-term.

As discussed in Section 2.2.6.5, the BLM has imposed stipulations that would not permit surface use and occupancy a certain distance of hydrologic features on either side of the Coachella Canal. This would minimize impacts to riparian vegetation and washes. The BLM would impose stipulations to protect bald and golden eagles, specifically prohibiting surface occupancy and use within 1,500 feet of bald or golden eagle nest sites active within the past year. The BLM would also impose a 500-foot protection area around each cluster of Munz's cholla and prohibit surface occupancy within that area on public lands. A 10 percent development cap imposed on lands east of the Coachella Canal would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres) which would minimize the impact to all special status species east of the Canal.

Under this alternative, the pending geothermal lease application (640 acres) would be approved. Geothermal exploration would begin which would result in the impacts to special status species from geothermal exploration discussed earlier in this section. Currently, the size of the power plant is unknown since exploration has not begun; however, other power plants in the region are less than 50 MW so it would be anticipated that exploration would be consistent with that of a geothermal power plant as discussed in the geothermal RFD scenario.

Conclusion

Adverse impacts to special status species could include impacts from excavating, grading, and clearing activities associated with construction of the well field, power plants, and associated infrastructure. However, the total land disturbance for geothermal energy development would be only 938 acres, a small percentage of the total size of the planning area, and geothermal development could be sited away from special status species and their habitats. Thus, it would be consistent with the management goals for this resource and the long-term and short-term impacts could be minor and would not be of concern to the public.

Indirect Impacts to Special Status Species from Geothermal Energy Development

Geothermal energy development in the West Chocolate Mountains REEA could have indirect impacts. The development of three geothermal power plants could result in special status species habitat fragmentation within the REEA, which could prevent movement of individuals between patches of habitat or between habitat and geographically discrete resources such as water. Site selection for all three plants would determine the significance of the impact. Siting all three power plants close together, in riparian or wetland habitat, or in a location that blocks a critical foraging area or water supply would have the most substantial effects to special status species. However, as discussed in Section 2.2.6.5, the BLM would impost stipulations that would not permit surface use and occupancy a certain distance of hydrologic features on either side of the Coachella Canal.

Fragmentation of habitat could affect how special status wildlife utilize the habitat in areas near geothermal development. Fragmented habitat could separate larger wildlife populations into smaller populations which could limit genetic diversity within breeding groups.

Smaller populations of wildlife could be more vulnerable to predation, drought, and disease (BLM 2008).

Fragmentation of habitat could also disrupt any wildlife corridors in an area and affect migratory corridors for special status wildlife populations as described under Alternative 3. If special status wildlife species have to travel around geothermal energy developments to migrate to another habitat area or resources they depend on to survive, or if fish or less mobile wildlife species are blocked from an area, connections between areas that may be integral to maintaining regional biological diversity and population viability could be lost. Nelson's bighorn sheep would be most susceptible to habitat fragmentation. Radio telemetry studies of bighorn sheep in various southwestern deserts have found considerable movement of these sheep between mountain ranges (Wehausen 1999). Within individual mountain ranges, populations are often small. Levels of inbreeding could be high in such populations, but intermountain movements provide a genetic connection with a larger metapopulation which counteracts potential inbreeding problems (Wehausen 1999).

Intermountain movements are also the source of colonization of vacant habitat, which is fundamental to metapopulation dynamics and persistence. Consequently, intermountain areas of the desert floor that bighorn traverse between mountain ranges are as important to the long-term viability of populations as are the mountain ranges, themselves (Wehausen 1999). Nelson's bighorn sheep in the West Chocolate Mountains need to be able to migrate out of high elevations, and development that blocks this migration could be detrimental to the long-term viability of the population.

Special status species in areas surrounding geothermal energy development could be impacted by competition with fish and wildlife that are displaced from development areas. Wildlife occupying areas where geothermal energy development occurs that would be able to avoid direct mortality from construction equipment would likely move out of these areas and attempt to occupy nearby habitat, which could lead to increased competition for resources such as food and water. If habitat in these surrounding areas contains a given special status species, the displaced individuals from habitat that was lost to geothermal energy development could cause direct mortality, reduced population size, or decreased fitness of individuals within the local population over the long term.

During the past few decades, the population of the common raven has increased substantially in the California desert, primarily in response to human-provided subsidies of food, water, and nest sites. They are efficient hunters and scavengers. The common raven is a known predator of desert tortoise, particularly hatchlings and juveniles (USFWS 2008), and may prey on other special status species, as well. Therefore, if geothermal energy development facilitates a population expansion of the common raven in the West Chocolate Mountains REEA, special status species could be impacted by increased predation from common ravens.

Special status species could be affected indirectly by invasive plant species, as well, which not only thrive in disturbed areas, but can spread from disturbed areas into surrounding habitat. After being introduced by surface-disturbing activities associated with construction, invasive plant species tend to out-compete native species. Therefore, introductions in construction areas could indirectly lead to the spread of invasives from developed areas to

undeveloped areas over the long term and degrade habitat in areas outside of geothermal energy development that special status species depend on.

Riparian areas and wetlands would be avoided by geothermal energy development to the extent possible; however, water could be extracted from groundwater sources to support geothermal exploration, production, and operation. Water extraction could result in lowered groundwater tables, which could decrease the amount of water in baseline stream flows and shorten the duration of increased flows associated with precipitation. This could alter and degrade aquatic habitat for desert pupfish and razorback sucker if any were present in the area. Loss of surface water could be particularly detrimental to these fish species by decreasing the amount of available habitat and altering the hydrology of aquatic habitat. Water is a scarce resource in the desert and any loss of surface water could be detrimental to special status species that depend on surface water resources for survival. It could also degrade or alter habitat utilized by many of the special status bird species that depend on wetland and marsh habitat surrounding the Salton Sea. Changes in riparian and wetland hydrology could affect riparian and wetland habitat by altering vegetation species assemblages. If this occurs, fish and wildlife species compositions could be altered, as well, and this could be detrimental to special status species if changes to habitat and species compositions give non-special status species competitive advantages. However, as discussed in Section 2.2.6.5, the BLM has imposed stipulations that would not permit surface use and occupancy a certain distance of hydrologic features on either side of the Coachella Canal.

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 geothermal energy development, which could lead to an increase in impacts to vegetation from geothermal energy projects.

The development cap which would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres) would minimize the impact to special status species east of the Canal.

Direct Impacts to Special Status Species from Solar Energy Development

Under this alternative, up to 6,637 acres of CSP or up to 29,758 acres of solar PV power plants could be developed. Due to the wide range of solar development that could occur in the West Chocolate Mountains REEA, the activities that could occur during solar energy development have been based on the development of a 50-MW solar PV project and a 500-MW solar trough project. These sizes were selected based on the availability of data related to development of these types of projects. PV and solar trough are the two technologies that have been fielded most widely in the United States and throughout the world.

Solar development in the West Chocolate Mountains REEA could result in habitat loss for special status species. Surface-disturbing activities associated with construction could remove plants, excavate soils, and grade areas for development of solar facilities. These activities could reduce the amount of available habitat in the West Chocolate Mountains REEA for the short and long term. Both the 500-MW CSP power plants and the 50-MW solar PV power plants require solar arrays, access roads, transmission lines, an O&M building, a substation switchyard, a parking laydown area, and fencing and other discretionary facilities. For each 500-MW CSP

power plant, approximately 2,000 acres of habitat could be lost long term for development of the solar arrays in the REEA. Access roads could result in an additional 7 acres of habitat loss. Transmission lines would consist of both 230-kV lines and 33-kV collector lines. Approximately 200 acres of habitat could be lost due to the 230-kV lines for each 500-MW CSP project. An additional loss of 100 acres could be due to collector lines, resulting in a total loss of 300 acres of habitat from all transmission lines for each 500-MW CSP plant. Additional habitat loss could result from installation of the O&M building (0.06 acre), the substation switchyard (0.03 acre), the parking laydown area (50 acres), and fencing and other discretionary facilities (125 acres). Direct losses of habitat could be long–term, except for the parking laydown area. This area could be revegetated with native species; therefore, direct impacts could be short-term.

Some special status species, particularly plants, small mammals, and reptiles that are less mobile, could be injured or killed by the construction of the parking laydown area, but many individuals could avoid this area during construction and then return once construction has been completed and habitat has recovered. Overall, 2,482 acres of habitat loss could be caused by each 500-MW CSP plant. Full CSP development of the West Chocolate Mountains REEA, which could directly impact 6,637 acres of habitat.

The CSP power tower technology presents a unique threat to avian and bat species due to collision with structures, risk of heat-related injuries attributable to the reflected and focused beams of solar radiation between the heliostats, and the power towers (BLM 2010).

Diurnal birds could collide with tall structures, and could also be at risk of injury and fatality from burns if they flew into the reflected sunlight between the heliostats and the power towers. Although data are limited, one 79-acre solar facility with one 282-foot tall solar tower experienced 1.7 avian mortalities per week. The majority of avian mortalities were attributed to collisions, but approximately 20 percent were attributed to heat related injuries (ISEGS 2010). At the 10-MW Solar One (a 10-MW pilot power tower facility located in the Mojave Desert in San Bernardino County, California, that operated from 1982 to 1988), 70 bird fatalities involving 26 species were documented during a 40-week study (81% of the birds died from colliding with mirrored heliostats, while the rest died from burns received by flying through standby points) (DOE 2012). Nevertheless, data are insufficient to make definitive conclusions regarding the potential magnitude of these types of impacts.

For each 50-MW solar PV power plant, habitat loss would be less severe. The long-term loss of approximately 400 acres of habitat could be the result of development of the solar array in the West Chocolate Mountains REEA. Access roads could result in the loss of an additional 7 acres of habitat. Transmission lines would consist of both 230-kV lines and 33-kV collector lines. Approximately 20 acres of habitat could be lost due to the 230-kV lines for each 50-MW solar PV power plant. An additional 10 acres could be lost due to collector lines, resulting in a total of 30 acres of direct habitat loss from all transmission lines for each 50-MW solar PV power plant. Additional habitat loss could result from installation of the O&M building (0.006 acre), the substation switchyard (0.003 acre), the parking laydown area (0.5 acre), and fencing and other discretionary facilities (12.5 acres). Direct habitat loss could be long-term, except for the parking laydown area. This area could be revegetated with native species; therefore, direct impacts could be short-term. Overall, 450 acres of habitat could be lost due to each 50-MW solar

PV power plant. Full solar PV power development of the West Chocolate Mountains REEA could result in the loss of 29,758 acres of habitat.

Direct effects from solar energy development could occur to the same federally listed plant species, BLM sensitive species, and species listed under the CESA as those listed for geothermal energy development. Additionally, direct effects from solar energy development could occur to the same plant species found in less dominant vegetation communities as those listed for geothermal energy development.

Displacement of special status species could occur over a wider area for solar development than for geothermal development. The spatial scale of full solar development far exceeds the same for full geothermal development and, therefore, habitat loss could be much greater for special status species in areas of development. Some federally listed species, such as Nelson's bighorn sheep, utilize large areas of land during migration and foraging could be particularly affected, whereas others, such as burrowing owl, adapt and even thrive in disturbed areas and would be less affected. However, many special status wildlife species could avoid construction areas. This is particularly true for bird, large mammal, and bat species.

Solar development would remove desert tortoise habitat. If the removed habitat is high quality, it would force desert tortoise into a lower quality area where a population already exists, potentially causing a food shortage or die-off. Siting would be discouraged given anticipated high conflicts.

Habitat could be altered for portions of solar development areas within the perimeter fence and along access roads by mowing existing vegetation and introducing added water to the site for dust control on roads, soil compaction and stabilization, panel and mirror washing, and miscellaneous other maintenance uses. Mowing and the introduction of additional water inputs could affect special status species and their habitat in similar ways as those described for geothermal energy development. However, solar development typically requires more extensive mowing than geothermal energy development. Therefore, impacts from mowing would be more substantial for solar energy development. Impacts from additional water inputs would be similar in severity to geothermal. Impacts from mowing and additional water inputs would be more substantial for individual CSP projects than for individual solar PV projects due to the larger acreage required for development.

Habitat could also be altered by invasive plant species in the vicinity of solar developments, which could degrade habitat quality for wildlife in similar ways as those described for geothermal development. Impacts from invasive plant species would be more substantial for individual CSP projects than for individual solar PV projects due to the larger acreage required for development.

Erosion from construction and operation of solar facilities could alter habitat in the vicinity of development in similar ways as those described for geothermal development; however, up to one-third of solar PV projects developed in the West Chocolate Mountains REEA may be built in areas with slopes less than 5 percent. These projects could be located in steeper locations than geothermal or CSP projects and, therefore, erosion may be more severe for these solar PV projects.

The increased number of vehicles and equipment in the West Chocolate Mountains REEA associated with construction and operation of solar developments could result in direct mortality and injury to special status species through collisions and crushing. This is the same effect as for geothermal energy development. During operation of solar power plants, individual CSP projects could result in more substantial effects to special status wildlife species than individual solar PV projects or geothermal energy development because the number of people required for routine operations of CSP plants could be greater. According to the RFD scenario, approximately 90 people would be required for routine operations of CSP plants. For comparison, geothermal power plants require approximately 37 people and solar PV projects require five; therefore, the greatest amount of vehicle traffic and chance for impacts to special status wildlife species could result from CSP plants.

Although the BLM would require operators to implement practices to avoid or minimize potential soil contamination, there is a potential for impacts to special status fish and wildlife from accidental spills of construction related materials, such as oils, greases, and hydraulic fluids. For solar trough and power tower CSP technologies, accidental spills are more likely than for other solar technologies because both utilize HTFs throughout their solar arrays. Heat transfer fluids consist of hazardous materials that could impact fish and wildlife if leaks or spills were to occur.

Conclusion

Adverse impacts to special status species could include impacts from excavating, grading, and clearing activities associated with construction of the solar power plants and associated infrastructure. The total land disturbance for geothermal energy development would up to 29,758 acres of 50-MW PV projects and up to 6,637 acres of 500-MW CSP projects, up to half the size of the REEA. Special stipulations outlined in Section 2.2.6.5 and BMPs outlined in Appendices I-A and I-B would be imposed as required and would ensure the protection of special status species and their habitats which is consistent with the management goals for this resource. However, the long-term productivity of vegetation would be affected due to the amount of potential disturbance.

Indirect Impacts to Special Status Species from Solar Energy Development

Solar development in the West Chocolate Mountains REEA could have indirect impacts. Up to 29,758 acres could be disturbed for development of solar PV projects and up to 6,637 acres could be disturbed for development of CSP projects. This could result in substantial habitat fragmentation within the REEA. Fragmentation of habitat could affect how wildlife utilize the habitat in areas near development in similar ways as those described for geothermal. Strategic site selection for the large number of potential power plants planned for the West Chocolate Mountains REEA will be essential in determining impact significance. Siting many power plants close together, in riparian or wetland habitat, or in a location that blocks a critical foraging area, migration corridor, or water supply, could have the most substantial effects to special status species.

Indirect impacts would include fragmentation and degradation of habitat. Clearing may destroy tortoise burrows. Construction would create noise and would likely push the tortoise away from the development temporarily or permanently.

Fish and wildlife in areas surrounding solar developments could be impacted by competition with fish and wildlife that were displaced from development areas in similar ways as those described for geothermal development. These effects would be more substantial for solar if multiple power plants were clustered in one particular area and special status species were present.

Special status species in areas surrounding solar developments could be impacted by common ravens in similar ways as those described for geothermal development. These effects would be more substantial for solar energy development if multiple power plants were clustered in one particular area and this led to a population expansion of common ravens. Additionally, effects would be more severe for solar developments as a result of the large number of potential new power plants that could be developed in the West Chocolate Mountains REEA. It is likely that common raven populations could expand in more locations with solar energy development than with geothermal energy development and, thus, could impact a larger portion of the West Chocolate Mountains REEA.

Special status wildlife species could be affected indirectly by invasive species, as well, which not only thrive in disturbed areas, but can spread from disturbed areas into surrounding habitat in similar ways as those described for geothermal development. These effects would be more severe for solar developments as a result of the large number of potential new power plants that could be developed in the West Chocolate Mountains REEA. It is likely that invasive plant species could be introduced to more new areas with solar energy development than with geothermal energy development and, thus, could impact a larger portion of the REEA.

The development cap which would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres) would minimize the impact to special status species east of the Canal.

Direct Impacts to Special Status Species from Wind Energy Development

Under this alternative, one wind farm with a capacity of approximately 45 MW could be developed in the West Chocolate Mountains REEA. Wind development in the REEA could result in habitat loss for special status species. Surface-disturbing activities associated with construction could remove plants, excavate soils, and grade areas for development of wind facilities. Preparation of tower and infrastructure construction, utility corridors and access roads, assembly of turbines and towers, and construction of transmission line towers would all require surface-disturbing activities. These activities could reduce the amount of available habitat for special status species in the West Chocolate Mountains REEA for the short and long term. Seventy-six acres of habitat could be lost due to development, and restoration would be implemented within disturbed areas to the extent possible. Some special status species, particularly plants, small mammals, and reptiles that are less mobile, could be injured or killed by construction activities within the disturbed habitat, but many individuals could avoid this area during construction and then return once construction has been completed and habitat has recovered. After restoration, the remaining wind turbines could result in the direct, long-term loss of 40 acres of habitat. Additionally, 6 miles of roads would be required to access individual wind turbines which could result in the loss of 9 acres of habitat.

Habitat could be altered for portions of the wind development area along access roads by mowing existing vegetation and introducing added water to the site for dust control on roads, soil compaction and stabilization, and miscellaneous other maintenance uses. Mowing and the introduction of additional water inputs could affect special status species and their habitat in similar ways as those described for geothermal development. However, wind developments typically require only limited mowing; therefore, impacts would be less substantial than for geothermal energy development. Impacts from additional water inputs would be similar in severity to geothermal and solar.

Direct effects from wind energy development could occur to the same plant and animal species discussed above that could be affected by geothermal exploration. These effects would be limited to 76 acres with the West Chocolate Mountains REEA, although lands acquired by BLM with LWCF funds would be managed as avoidance areas.

Habitat could also be altered by invasive plant species in the vicinity of wind energy developments, which could degrade habitat quality for special status species in similar ways as those described for geothermal development. However, because only one wind project could be built in the West Chocolate Mountains REEA, invasive plant impacts would be much less severe than for geothermal or solar developments.

Erosion from construction of wind facilities could alter habitat in the vicinity of development in similar ways as those described for geothermal development; however, because wind turbines have a small footprint and only one wind project could be built in the West Chocolate Mountains REEA, erosion would be much less severe than for solar or geothermal energy development.

The increased number of vehicles and equipment in the West Chocolate Mountains REEA associated with construction and operation of wind developments could result in direct mortality and injury to special status species present in the area through collisions with vehicles and wind turbines or by being crushed by vehicles. Vehicle collisions with wildlife would be much less substantial at the wind development when compared to CSP and geothermal energy development due to the low number of people required for routine operations of the wind power plant. Only four people would be required for routine operations.

This is the same effect as described for geothermal energy development; however, operation of the wind power plant could result in more substantial effects to wildlife than individual solar or geothermal energy development because direct mortality for birds and bats through collision due to wind turbine operation is likely to occur. A list of federally listed bird species that could be affected is provided below. Species status designations are also provided and are abbreviated as follows: Federal Endangered (FE); State Endangered (SE); and State Threatened (ST).

- Southwestern willow flycatcher – FE, SE
- Least Bell’s vireo – FE, SE
- California brown pelican – FE, SE
- Yuma clapper rail – FE, ST

Birds account for 13 of the 28 special status wildlife species likely to occur in the REEA, and all native migratory birds are protected under the MBTA, as well; therefore, this impact could be substantial. A list of other non-federally listed sensitive bird species is provided below. Species status designations are also provided and are abbreviated as follows: State Endangered (SE); State Threatened (ST); California Species of Special Concern (SC); and BLM Sensitive Species (BLM Sensitive).

- California black rail – ST
- Burrowing owl – SC, BLM Sensitive
- Black skimmer – SC
- Crissal thrasher – SC
- Gila woodpecker – SE
- Golden Eagle – SC
- Gull-billed tern – SC
- LeConte's thrasher – SC
- Merlin – SC
- Mountain plover – SC
- Yellow warbler – SC
- White-faced ibis – SC

Also, wind turbines could cause direct mortality and injury to bats as an effect of drastic drops in air pressure near the turbine blades, causing a condition known as barotrauma (Baerwald et al. 2008). Around the spinning blades of a turbine exist areas of high and low air pressure, particularly near the tip of each blade. In these areas, the air pressure difference is significant enough that the lungs expand rapidly causing small blood vessels to break open producing internal bleeding (Baerwald et al. 2008). The noncontact injuries due to barotrauma are thought to be fatal (Baerwald et al. 2008; Cryan and Barclay 2009).

Widespread and higher than expected bat fatalities have increased concern regarding the impacts of wind energy development on bats. Bat fatalities at wind facilities received little attention until 2003 when 1,400 to 4,000 bats were estimated to have been killed at the Mountaineer Wind Energy Center in West Virginia (Kerns and Kerlinger 2004). Documentation indicating bat fatalities at other wind energy generating facilities is continuing to increase, and post-construction monitoring has provided the most information on bat fatalities at wind farms. In a review of 21 studies from 19 North American wind facilities, Arnett et al. (2008) estimated the average rate of bat fatalities to be 20.8 to 69.6 bats per turbine per year (14.9 to 53.3 bats per MW per year). It should be noted that fatality estimates can be biased based on differences in field methodology, study period, and the presence or absence of field bias correction trials.

In general, bat mortality at wind farms is highest along forested ridge tops in the eastern United States, but high mortality has also been documented in Canadian prairie habitat and in agricultural areas of the upper Midwest (Arnett et al. 2008). In addition, data indicate that more

bat fatalities occur on low wind nights, especially after a passing storm front (Arnett et al. 2008, 2010; Baerwald and Barclay 2009). Fatality of migratory tree-roosting species, such as the hoary bat (*Lasiurus cinereus*) and silver-haired bat (*Lasionycteris noctivagans*), has been consistently documented, with peak mortality occurring during the fall migration period (Arnett et al. 2008; Kunz et al. 2007).

The development and operation of a wind farm in the West Chocolate Mountains REEA could result in direct mortalities to bat species including several listed California species of special concern: pallid bat, pocketed free-tailed bat, western mastiff bat, and western yellow bat. In particular, the relatively high altitude feeding habit of the western mastiff bat makes them susceptible to collisions with wind turbines. To date, no fatalities of the listed special concern species have been reported as a result of a collision with a wind turbine.

The ability to generate reliable risk assessments before constructing wind facilities is difficult without baseline data on bat population distribution and abundance in the West Chocolate Mountains REEA; therefore, pre-construction surveys are generally warranted where bat populations and/or habitat exists. Pre-construction surveys at wind facilities have commonly been conducted, and most of the surveys employ acoustic detectors to assess the presence and activity of bat species at project sites during migration (spring and fall) and summer residency. The current knowledge base does not allow using estimates of bat activity from pre-construction surveys to reliably estimate post-construction fatalities (Wind Turbine Guidelines Advisory Committee 2010).

Under this alternative, the BLM would impose stipulations that would not permit surface use and occupancy within 100 feet of the 25-year floodplain of a riparian or wetland feature or 300 feet of artificial surface waters and associated wetlands and within 300 feet of any hydrologic feature east of the Coachella Canal. This would minimize impacts to riparian vegetation and washes. The BLM would impose stipulations to protect bald and golden eagles, specifically prohibiting surface occupancy and use within 1,500 feet of bald or golden eagle nest sites active within the past year. The BLM would also impose a 500-foot protection area around each cluster of Munz's cholla and prohibit surface occupancy within that area on public lands. A 10 percent development cap imposed on lands east of the Coachella Canal would limit wind energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres) which would minimize the impact to all special status species east of the Canal.

Conclusion

Adverse impacts to special status avian and bat species could occur from collisions with wind turbines. BMPs outlined in Appendices I-A and I-B specific to prevention of avian and bat mortality would be imposed as required and would ensure the protection of avian and bat species as well as other special status species, which is consistent with the management goals for this resource.

Indirect Special Status Species Impacts from Wind Energy Development

Wind energy development in the West Chocolate Mountains REEA could have indirect impacts. If wind turbine and access road siting affects how wildlife or fish could utilize habitat in

areas near development, impacts would be similar to those described for geothermal energy development. It is likely that habitat fragmentation would be less severe for wind because only one power plant could be developed.

Special status species in areas surrounding wind development could be impacted by competition with fish and wildlife that were displaced from development areas in similar ways as those described for geothermal energy development. These effects would be less substantial for wind because only one wind power plant could be developed.

Special status species in areas surrounding wind development could be impacted by common ravens in similar ways as those described for geothermal energy development. These effects would be less severe for wind development because only one wind power plant could be developed.

Special status species could be affected indirectly by invasive species as well, which not only thrive in disturbed areas, but can spread from disturbed areas into surrounding habitat in similar ways as those described for geothermal energy development. These effects would be less severe for wind energy development because only one wind power plant could be developed.

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 geothermal energy development, which could lead to an increase in impacts to special status species from geothermal energy projects, although the development cap would limit wind energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

4.8.4.4 Alternative 4: Geothermal Development Only

Under this alternative, geothermal energy could be developed to the achievement of levels of geothermal energy development consistent with the geothermal RFD scenario; there would be no solar or wind energy development. Under this alternative, the following impacts would be the same as Alternative 3:

- Direct and indirect special status species impacts from geothermal energy development;
- Acquired lands; and
- Existing noncompetitive lease application.

Geothermal impacts would the same as Alternative 3. Under this alternative, the West Chocolate Mountains REEA would not be designated as an SEZ and solar or wind energy development would not be allowed. Additionally, the development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). This alternative would not conform to the CDCA goal to identify potential sites for wind energy development.

4.8.4.5 Alternative 5: Solar Energy Development Emphasis with Moderate Geothermal Development and No Wind Development

Under Alternative 5, solar energy could be developed to the achievement of levels of development consistent with the maximum extent as defined in the solar RFD scenario. Geothermal energy could be developed to the achievement of levels of geothermal energy development consistent with a moderate level (50 MW) as defined in geothermal RFD scenario.

Under this alternative, the following would be the same as Alternative 3:

- Acquired lands;
- Existing noncompetitive lease application; and
- Direct and indirect special status species impacts from solar development.

Impacts from solar energy development would be the same as those described for Alternative 3.

Direct Special Status Species Impacts from Geothermal Energy Development

Under this alternative, one 50-MW geothermal power plant would be constructed and could replace up to 50 MW of energy supplied by fossil fuel power facilities. A total of 95 acres of land could be disturbed during the exploration phase. The potential land that could be disturbed during construction would be about 272 acres of the REEA. Approximately 40 wells (40 wells per 50-MW power plant) could be drilled for this alternative. Well drilling and operation during the exploration and construction phases could result in the net addition of access roads and well pads.

Conclusion

Adverse impacts to special status species could include all of the same impacts discussed under Alternative 3, but would be less severe because they could only affect one-third of the area.

Indirect Impacts to Special Status Species from Geothermal Energy Development

Indirect impacts to special status species could include all of the same impacts discussed under Alternative 3, but would be less severe because they could only affect one-third of the area.

4.8.4.6 Alternative 6: Geothermal Development Emphasis with Moderate Solar Development and No Wind Development

Under this alternative, it is assumed that achievement of levels of development consistent with the maximum development defined in the geothermal RFD scenario would take place (the same as discussed for Alternative 3) and that the level of achievement consistent with partial development of the solar RFD scenario would be realized. There would be no wind energy development. Lands within the West Chocolate Mountains REEA that lie east of the Coachella Canal would not be considered for an SEZ, modified or otherwise. Lands west of the canal

would be identified as an SEZ, allowing other compatible renewable energy developments to occur.

Under this alternative, the following would be the same as Alternative 3:

- Acquired lands;
- Existing noncompetitive lease application;
- Direct and indirect special status species impacts from geothermal development; and
- Direct and indirect special status species impacts from CSP (dish engine only) and PV solar development.

Impacts from geothermal energy development would be the same as Alternative 3.

Direct Impacts to Special Status Species from Solar Energy Development

Impacts from solar energy development, CSP dish engine only, and PV would be the same as Alternative 3. There would be no solar trough of power tower CSP development. Adverse impacts to special status species could include all of the same impacts discussed under Alternative 3; however, they could affect only 6,637 acres of BLM and other land if three CSP projects were developed. Additionally, CSP projects could only utilize dish engine technology which uses no water. Therefore, water sources utilized by special status species would not be affected by CSP development under this alternative. While effects from this alternative would be less severe since the amount of disturbance would be less than the amount experienced under Alternative 3, the effects could still be long-term and adverse. Under this alternative, the same amount of land could be developed for solar PV power and the effects would be the same as Alternative 3. However, as discussed in Section 2.2.6.5, the BLM has imposed stipulations that would protect certain special status species and would not permit surface use and occupancy a certain distance of hydrologic features on either side of the Coachella Canal.

Indirect Impacts to Special Status Species from Solar Energy Development

Solar development in the West Chocolate Mountains REEA could have indirect impacts. Full solar development could include up to 29,758 acres of disturbance for development of solar PV projects and up to 6,637 acres of disturbance for development of CSP projects, dish engine only. Indirect impacts would be the same as those under Alternative 3. In addition, the development cap which would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

4.9 Cultural Resources

This section discusses the effects to cultural resources that could occur with implementation of the alternatives. First, the management goals are provided; second, the impact indicators used to identify and analyze effects are presented; third, typical impacts are discussed for geothermal, solar and wind energy; and last, impacts are analyzed by alternative.

4.9.1 Management Goals

The following are management goals from the CDCA Plan of 1980, as amended:

- Broaden the archaeological and historic knowledge of the CDCA through continuing inventory efforts and the use of existing data;
- Continue the effort to identify the full array of the CDCA's cultural resources;
- Preserve and protect representative samples of the full array of the CDCA's cultural resources;
- Ensure that cultural resources are given full consideration in land use planning and management decisions, and ensure that BLM authorized actions avoid inadvertent impacts; and
- Ensure proper data recovery of significant (National Register quality) cultural resources where adverse impacts can be avoided.

4.9.2 Impact Criteria

Potentially sensitive locations for cultural resources in the West Chocolate Mountains REEA are determined by their proximity to ancient Lake Cahuilla shoreline, the amount of hospitable terrain, and ground surface stability. Typical impacts from any renewable energy development or exploration could occur from any ground-disturbing activities, including the development of wells sites, access road and facility grading, pipeline and transmission line construction, any underground conduits or infrastructure, and at power plant locations. Impacts could occur at staging and equipment storage areas. The potential for impacts to previously unknown buried sites could be at cut-and-fill operations, trenching, or foundation drilling (i.e., water impoundments, cable trenching, road construction, pad placement). Disturbance from uncontrolled water runoff could also occur at test wells if a site is located downslope from the drill site.

Direct and Indirect Impacts under NEPA

As defined in the NEPA Regulations at 40 CFR 1508.8, impacts under NEPA include:

(a) Direct effects, which are caused by the action and occur at the same time and place.

(b) Indirect effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.

Adverse Effects under Section 106

In accordance with the Advisory Council on Historic Preservation's implementing regulations 36 CFR Part 800.5, which describes criteria for adverse effects, impacts on historic properties are considered significant when the undertaking may alter the characteristics of the property for inclusion in the National Register of Historic Places (NRHP), and if the undertaking is considered to have an adverse effect that diminishes the integrity of the properties location, design, setting, materials, workmanship feeling, or association. Adverse effects on historic properties include (but are not limited to):

1. Physical destruction, damage, or alteration of all or part of that property
2. Isolation of the property from or alteration of the character of the property's setting when that character contributes to the property's qualification for listing in the NRHP
3. Introduction of visual, audible, or atmospheric elements that are out of character with the property or that alter its setting
4. Neglect of the property, resulting in its deterioration or destruction
5. Transfer, lease, or sale of the property

4.9.3 Typical Cultural Resources Impacts from Energy Development

Approximately five percent of the West Chocolate Mountains REEA has been previously surveyed by 30 cultural resource management investigations since 1974.Prior to this date, various academic and vocational projects were undertaken, but the extent of this work is unknown. The site patterning shows a definite correlation with the infilling and receding of Lake Cahuilla.

Direct impacts to cultural resources could occur wherever there are ground-disturbing activities, such as the types specified in Section 2.1.3-5. These impacts are most substantial during the exploration and development phases, such as during construction of the power plant, well sites, access roads, pipeline routes, and transmission lines. These disturbances include the well sites as well as the access roads and pipeline routes that accompany each well. Direct impacts could occur within a two-acre area around each well site as a result of grading, equipment and vehicular staging, and drilling operations. Impacts could also occur during the decommissioning phase due to additional ground disturbance from plant removal and rehabilitation.

Cultural resources located downslope from well sites from geothermal energy development could also receive impacts from erosion or siltation from water runoff. These activities could damage surface and subsurface artifacts, compromise the original spatial relationships of artifacts that archaeologists use to reconstruct prehistoric cultural patterns, destroy stratigraphic relationships of buried deposits, contaminate radiocarbon samples and paleo-ecological data, and damage the integrity of buried archaeological features such as hearths and cooking pits, house pits, fish traps, and cremation burials. Native American spiritual values and sensitivities could also be profoundly affected by disturbance of archaeological sites, especially burials or ceremonial features. From the research conducted as part of this document, it is likely that the project could impact cultural resources associated with ancient Lake Cahuilla.

These resources range from habitation sites, flaking stations, temporary campsites, fishing weirs or traps, ceramic scatters, and rock cairns.

Renewable energy development could impact a variety of cultural resources. It is possible to abate some of the disturbance by moving the location of the wells, turbines, structures, and access roads to avoid impacting sites. If avoidance is not possible, archaeological testing and data recovery may be considered to mitigate adverse effects to resources. Due to the high density of archaeological sites within the West Chocolate Mountains REEA, monitoring should be implemented for all ground-disturbing activities

Sensitivity values for resources were assigned to each land unit (Section, Township, and Range). Sensitivity values were derived from locations of known resources, proximity to ancient Lake Cahuilla, and concentrations of known sites not associated with the maximum extend of ancient Lake Cahuilla. Of the 42 land units evaluated for the REEA, six were assigned a low sensitivity value, 11 were assigned a moderate sensitivity value, and 25 were assigned a high sensitivity value.

4.9.3.1 Typical Cultural Resources Impacts from Geothermal Energy Development

The Geothermal PEIS identified typical impacts on cultural resources associated with geothermal energy development. The impacts are incorporated by reference and summarized in Table 4.9-1.

Table 4.9-1 Typical Impacts to Cultural Resources from Geothermal Energy Development

Project Phase	Activity	Impact	Time Frame
Site Evaluation/ Exploration	– Surveying and well drilling. – Access road and well pad construction. – Staging equipment – Vehicular traffic.	– Increased disturbances within a resource's boundaries or within a resource's historic landscape. – Increased illegal collecting and vandalism. – Any permanent construction or ground disturbances within a resource's boundaries or within its historic landscape. – Changes to historic landscape.	Physical impacts to cultural resources are permanent. Once the site is disturbed the research potential is permanently degraded.
Construction	– Drilling. – Construction of injection wells, sump pits, and transmission lines.	– Any cultural resources or historic landscapes of cultural resources could be directly impacted by the ground disturbance.	Physical impacts to cultural resources are permanent. Once the site is disturbed the research potential is permanently degraded.

Table 4.9-1 Typical Impacts to Cultural Resources from Geothermal Energy Development

Project Phase	Activity	Impact	Time Frame
Operation and Maintenance	– Transformer, power house, and cooling tower.	– Ground disturbance from the transmission line. – The power plant, the towers, and lines, themselves, could represent a large modern development on a historic landscape or within the viewshed of historic structures and buildings.	Physical impacts to cultural resources are permanent. Once the site is disturbed the research potential is permanently degraded. Visual impacts to cultural resources are long-term. Once the project has been decommissioned the visual impact would be removed.
Decommissioning	– Vehicular traffic. – Equipment staging. – Facility removal. – Breaking up concrete pads and foundations. – Removal of access roads that are not maintained for other uses. – Recontouring the surface. – Revegetation.	– Impacts on archaeological sites from previous phases could remain. – Additional impacts could occur if reclamation and abandonment activities extend beyond previously disturbed areas.	Physical impacts to cultural resources are permanent. Once the site is disturbed the research potential is permanently degraded.

Geothermal energy development could impact cultural resources as a result of drilling for exploration, extraction, and re-injection wells, geotechnical investigations, and construction of access roads, transmission lines, work areas, and facilities. Indirect impacts to cultural resources could be increased erosion from water run-off or increased artifact collection and site vandalism as a result of more people in an area than normally present. The actual impacts to any existing sites would depend on the condition of the site before disturbance. Impacts to archaeological sites are generally permanent. Once a site is disturbed or destroyed, that impact cannot be reversed. Visual impacts to sacred areas, traditional cultural properties, historic structures, or historic districts could represent long-term impacts but, once the development has been decommissioned, the facilities creating the impact would be removed

4.9.3.2 Typical Cultural Resources Impacts from Solar Energy Development

Based on a review of environmental documentation for other solar energy projects, typical impacts for solar energy projects have been identified. Typical impacts on cultural resources associated with solar energy development are summarized in Table 4.9-2.

Table 4.9-2 Typical Impacts to Cultural Resources from Solar Energy Development

Project Phase	Activity	Impact	Time Frame
Site Evaluation/ Exploration	– Geotechnical investigations. – Access road construction. – Increased human presence. – Drilling and other sampling methods.	– Cultural material present on the surface could be disturbed by vehicular traffic, ground disturbances, and pedestrian activity (including collection of artifacts). – Cultural resources buried below the surface could be affected by drilling and other sampling methods.	Physical impacts to cultural resources are permanent. Once the site is disturbed the research potential is permanently degraded.
Construction	– Ground clearing and vegetation removal. – Grading. – Excavation and trenching. – Vehicular and pedestrian traffic. – Construction and installation of facilities.	– Complete destruction of the resource if present in areas undergoing surface disturbance or excavation. – Degradation or destruction of near-surface cultural resources on- and off-site resulting from topographic or hydrological pattern changes, or from soil movement (removal, erosion, sedimentation). – Unauthorized removal or collection of artifacts. – Vandalism to the site where cultural resources are present. – Visual impacts resulting from vegetation clearing, increases in dust, and the presence of large-scale equipment, machinery, and vehicles – Visual impacts resulting from the presence of large solar facilities and transmission lines could affect some cultural resources, such as sacred landscapes or historic trails.	Physical impacts to cultural resources are permanent. Once the site is disturbed the research potential is permanently degraded. Visual impacts to cultural resources are long-term. Once the project has been decommissioned the facilities causing the visual impact would be removed.
Operation and Maintenance	– Increased human use of surrounding areas.	– Continued visual impacts resulting from the presence of large solar facilities and transmission lines could affect some cultural resources, such as sacred landscapes or historic trails. – Increased human activities may impact cultural resources in neighboring areas from site looting.	Visual impacts to cultural resources are long-term. Once the project has been decommissioned the visual impact would be removed. Physical impacts to cultural resources are permanent. Once the site is disturbed the research potential is permanently degraded.
Decommissioning	– Any disturbance of areas not	– Despite the physical removal	Physical impacts to

Table 4.9-2 Typical Impacts to Cultural Resources from Solar Energy Development

Project Phase	Activity	Impact	Time Frame
	previously disturbed during previous phases of construction.	of the development, the impact of a scarred landscape on an area considered sacred to Native Americans would likely remain.	cultural resources are permanent. Once the site is disturbed the research potential is permanently degraded. Visual impacts to cultural resources are long-term. Once the project has been decommissioned the facility causing the visual impact would be removed.

Solar development could impact cultural resources as a result of geotechnical investigations, installation of the array and ancillary facilities, trenching for subsurface conduits, and the construction of access roads, transmission lines, work areas, and facilities. Indirect impacts to cultural resources could be increased erosion from water run-off and increased artifact collection and site vandalism as a result of more people in an area than normally present. The actual impacts to any existing sites would depend on the condition of the site before disturbance. Impacts to archaeological sites are generally permanent. Once a site is disturbed or destroyed, that impact cannot be reversed. Visual impacts to sacred areas, traditional cultural properties, historic structures, or historic districts may represent long-term impacts but, once the development has been decommissioned, the facilities causing the impact would be removed.

4.9.3.3 Typical Cultural Resources Impacts from Wind Energy Development

The Wind PEIS identified typical impacts on wind associated with wind energy development. The impacts are incorporated by reference and summarized in Table 4.9-3.

Table 4.9-3 Typical Impacts to Cultural Resources from Wind Energy Development

Project Phase	Activity	Impact	Time Frame
Site Monitoring/ Testing	– Vegetation clearing. – Access road grading. – Monitoring tower and equipment enclosure installation. – Construction equipment vehicular traffic.	– Cultural material present on the surface and within the subsurface could be disturbed by vehicular traffic, ground clearing, and pedestrian activity (including collection of artifacts). – Monitoring and testing activities could affect areas of interest to Native Americans depending on their physical placement and/or level of visual intrusion. – Grading and clearing of	Physical impacts to cultural resources are permanent. Once the site is disturbed the research potential is permanently degraded.

Table 4.9-3 Typical Impacts to Cultural Resources from Wind Energy Development

Project Phase	Activity	Impact	Time Frame
		vegetation can increase soil erosion on site which can be an indirect impact to cultural resources.	
Construction	– Grading of access roads. – Construction of turbines and transmission lines. – Increased human traffic in the area.	– Complete destruction of the resource if present in areas undergoing surface disturbance or excavation. – Degradation or destruction of sub-surface cultural resources on- and off-site resulting from topographic or hydrological pattern changes, or from soil movement (removal, erosion, sedimentation). – Unauthorized removal of artifacts or vandalism at the site could occur as a result of increases in human access to previously inaccessible areas, if significant cultural resources are present. – Visual impacts resulting from vegetation clearing, increases in dust, and the presence of large-scale equipment, machinery, and vehicles.	Physical impacts to cultural resources are permanent. Once the site is disturbed the research potential is permanently degraded. Visual impacts to cultural resources are long-term. Once the project has been decommissioned the visual impact would be removed.
Operation and Maintenance	– Increased human presence in the area.	– Unauthorized collection of artifacts and inadvertent destruction and vandalism. – Visual impacts resulting from the presence of large wind turbines and associated facilities and transmission lines could affect some cultural resources, such as sacred landscapes or historic trails.	Physical impacts to cultural resources are permanent. Once the site is disturbed the research potential is permanently degraded. Visual impacts to cultural resources are long-term. Once the project has been decommissioned the facilities causing the visual impact would be removed.

Table 4.9-3 Typical Impacts to Cultural Resources from Wind Energy Development

Project Phase	Activity	Impact	Time Frame
Decommissioning	– Any disturbance of areas not already disturbed during previous phases of construction.	– Collection of artifacts in adjacent areas could be a problem if access roads were left in place and the area was not monitored. – Visual impacts of the wind development could be mitigated if the site were restored to its preconstruction state. – Despite the physical removal of the development, the impact of a scarred landscape on an area considered sacred to Native Americans would likely remain.	Physical impacts to cultural resources are permanent. Once the site is disturbed the research potential is permanently degraded. Visual impacts to cultural resources are long-term. Once the project has been decommissioned the facilities causing the visual impact would be removed.

Wind development could impact cultural resources as a result of geotechnical studies, installation of turbines, and the construction of access roads, transmission lines, work areas, and facilities. Indirect impacts to cultural resources could be increased erosion from water run-off and increased artifact collection and site vandalism from more people in an area than normally present. The actual impacts to any existing sites would depend on the condition of the site before disturbance. Once a site is disturbed or destroyed, that impact cannot be reversed. Visual impacts to sacred areas, traditional cultural properties, historic structures, or historic districts could represent long-term impacts but, once the development has been decommissioned, the facilities causing the impact would be removed.

4.9.4 Cultural Resources Impacts by Alternative

This section describes the effects under each alternative using the respective methodology prescribed under NEPA. To compare effects, this analysis defines the temporal scale (time), spatial extent (area), and intensity of effects for each alternative. All effects discussed in this section are direct.

4.9.4.1 Alternative 1: No Action/No CDCA Plan Amendment

Because geothermal, wind, and solar development could still occur under the No Action/No CDCA Plan Amendment alternative, impacts to cultural resources would be expected to be similar to those detailed in Section 4.9.4.3 for Alternative 3. However, development under the No Action/No CDCA Plan Amendment alternative may occur at a slower rate because an individual plan amendment process would be necessary for each solar or wind authorization; thus, impacts may occur at a slower rate, as well.

No renewable energy development cap or other protective stipulations/measures pertaining to the east side of the Coachella Canal would be adopted under this alternative. Thus,

there would be no restrictions on development east of the Coachella Canal, and impacts to cultural resources that would not occur under Alternative 3 east of the Coachella Canal could occur under Alternative 1.

4.9.4.2 Alternative 2: No Development/CDCA Plan Amendment to Identify Areas as Closed to and Unsuitable for Geothermal, Solar, and Wind Energy Development

There would be no new construction or operation of geothermal power plants, or solar or wind energy projects, except those which are currently approved or operating. Cultural resources would not be affected by new geothermal, wind, or solar projects; however, the closure of these lands for renewable energy development would represent an opportunity cost. The energy that could have been supplied by development of this area for geothermal, solar, and/or wind energy would have to be filled by other fossil fuel or renewable energy generating facilities constructed elsewhere.

No renewable energy development cap or other protective stipulations/measures pertaining to the east side of the Coachella Canal would be adopted under this alternative. Thus, there would be no restrictions on development east of the Coachella Canal, and impacts to cultural resources that would not occur under Alternative 3 east of the Coachella Canal could occur under Alternative 2.

4.9.4.3 Alternative 3: Renewable Energy Development Emphasis

Under Alternative 3, geothermal, solar, and wind could be developed to the maximum extent as defined in the geothermal, solar, and wind RFD scenarios. Up to 1,026 acres of land could be disturbed for development of geothermal power plants; up to 29,758 acres of land could be disturbed for development of solar PV projects; up to 6,637 acres could be disturbed for development of CSP projects; and up to 76 acres of land could be disturbed for wind energy projects, although lands acquired by BLM with LWCF funds would be managed as avoidance areas. Solar development could occur through the development of a 50-MW solar PV project and a 500-MW CSP project.

Under this alternative, the pending geothermal lease application (640 acres) would be approved. Geothermal exploration would begin, which would result in the impacts to cultural resources from geothermal exploration discussed earlier in this section. Currently, the size of the power plant is unknown since exploration has not begun; however, other power plants in the region are less than 50 MW, so it would be anticipated that exploration would be consistent with that of a geothermal power plant as discussed in the geothermal RFD scenario.

Cultural resources are well documented throughout the West Chocolate Mountains REEA. Based on previous investigations and known site locations, a preliminary assessment of potential sensitivity for historic properties can be made for each section (see Table 4.9-1). Of the 42 sections of BLM land considered for leasing or ROW, 25 sections (60 percent) have been assessed as having high potential for the presence of cultural resources, 11 sections (26 percent) have been assessed as having moderate potential, and six sections (14 percent) have been assessed as having low potential. It should be noted that only approximately five percent of the REEA has been surveyed. The sensitivity potential given above has been extrapolated from that

data and is subject to revision with the addition of further survey results. Predictive models are often prone to bias resulting from a bias in the locations and acreages of areas surveyed for the presence of cultural resources. Even so, a strong pattern of settlement and land use coinciding with the maximum stands of ancient Lake Cahuilla has been well documented throughout the Imperial Valley (Laylander 2010). Sections assigned a high probability implies that ground-disturbing activities would likely impact cultural resources. In sections where the probability for encountering cultural resources is high, mitigation and construction monitoring programs should be implemented.

The type of potential impacts from implementation of Alternative 3 would be similar to the typical impacts from geothermal, solar, and wind development described in Section 4.9.3.1. Mitigation of impacts would follow the Secretary of the Interior's Guidelines for the Treatment of Cultural Properties and for implementation of Section 106 of the National Historic Preservation Act (NHPA).

Direct Impacts to Cultural Resources from Geothermal Energy Development

Under this alternative, up to three 50-MW geothermal power plants could be constructed. Long-term, direct impacts to cultural resources could occur during exploration on a total of 95 acres, and during construction and operation of the geothermal projects on a total of up to 1,026 acres on BLM and other land, although lands acquired by BLM with LWCF funds would be managed as avoidance areas. Visual impacts to historic or prehistoric resources from wind energy development could be long-term and direct. While these impacts could be initiated during the construction phase of the projects, the impacts could remain until project decommissioning, with all improvements and facilities removed from the site and the property returned to its original character. These impacts could be adverse.

Direct impacts on significant cultural resources could occur in the West Chocolate Mountains REEA; however, as stated in Section 3.9.3.4, further investigation is needed in the REEA. A cultural resource survey of the entire area of potential effect (APE) including the construction footprint, staging areas, areas of anticipated erosion, access routes, and locations for transmission, water, and communication lines would first need to be conducted to identify archaeological sites, historic structures and features, and traditional cultural properties, and an evaluation would need to follow to determine whether any recorded resources meet the criteria for eligibility for listing in the NRHP. Section 4.9.3 discusses the types of impacts that could occur on any significant cultural resources found to be present within the REEA. Possible impacts from geothermal energy development on cultural resources that are encountered within the REEA or along related ROWs, as well as general mitigation measures, are described in more detail in Chapter 2. Impacts would be minimized through the implementation of required mitigation measures and BMPs described in Appendix I-A3. Mitigation measures and BMPs assume that the necessary surveys, evaluations, and consultations will occur.

Consultation with the California State Historic Preservation Office (SHPO), Native American governments, and other identified consulting parties would be conducted for any geothermal energy development projects in the West Chocolate Mountains REEA.

Conclusion

If adverse effects (whether direct or indirect) to historic properties could not be avoided through BMPs, project redesign, or other means, consultation for the resolution of such effects would be initiated to determine what appropriate measures would be required to resolve adverse effects. They would not be a concern to the public. This would be consistent with the management goals for this resource.

Indirect Impacts to Cultural Resources from Geothermal Energy Development

Indirect impacts on cultural resources resulting from erosion outside of the potential project boundaries (including along leases) would be unlikely, assuming mitigation measures and BMPs to reduce water runoff and sedimentation would be implemented (as described in Appendix I-A1). Indirect impacts on cultural resources could also occur from unauthorized surface collection, depending on the proximity of geothermal energy development and associated leases to the cultural resources site. No new road corridors have been assessed for the West Chocolate Mountains REEA. Assuming existing roads could be used and no new areas of potential cultural significance would be opened to increase access, there would be minimal impacts to cultural resources. However, impacts on cultural resources related to the creation of a new corridor would be evaluated at the project-specific level if new road construction were to occur.

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 geothermal energy development, which could lead to an increase in impacts to cultural resources from geothermal energy projects. In addition, the development cap which would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres) would minimize the impact to cultural resources east of the Canal.

Direct Impacts to Cultural Resources from Solar Energy Development

Under this alternative, up to 6,637 acres of CSP or up to 29,758 acres of PV power could be developed. It is assumed that either CSP or solar PV projects could be developed. Due to the wide range of solar development that could occur in the West Chocolate Mountains REEA, the activities that could occur during solar energy development have been based on the development of a 50-MW solar PV project and a 500-MW CSP project. These sizes were selected based on the availability of data related to development of these types of projects. PV and CSP are the two technologies that have been fielded most widely in the United States and throughout the world.

Direct impacts on significant cultural resources could occur in the West Chocolate Mountains REEA; however, as stated in Section 3.9.3.4, further investigation is needed in the REEA. A cultural resource survey of the entire APE including the construction footprint, staging areas, areas of anticipated erosion, access routes, and locations of ROWs for transmission, water, and communication lines would first need to be conducted to identify archaeological sites, historic structures and features, and traditional cultural properties, and an evaluation would need to follow to determine whether any recorded resources meet the criteria for eligibility for listing in the NRHP. Section 4.9.3 discusses the types of impacts that could occur on any significant cultural resources found to be present within the REEA. Possible impacts from solar energy

development on cultural resources that are encountered within the REEA or along related ROWs, as well as general mitigation measures, are described in more detail in Appendix I-A3. Impacts would be minimized through the implementation of required mitigation measures and BMPs described in Appendix I-A3. Mitigation measures and BMPs assume that the necessary surveys, evaluations, and consultations will occur.

Consultation with the California SHPO, Native American governments, and other identified consulting parties would be conducted for any geothermal energy development projects in the West Chocolate Mountains REEA.

Conclusion

If adverse effects (whether direct or indirect) to historic properties could not be avoided through BMPs, project redesign, or other means, consultation for the resolution of such effects would be initiated to determine what appropriate measures would be required to resolve adverse effects. They would not be a concern to the public. This would be consistent with the management goals for this resource.

Indirect Impacts to Cultural Resources from Solar Energy Development

Indirect impacts on cultural resources resulting from erosion outside of the potential project boundaries (including along ROWs) would be unlikely, assuming mitigation measures and BMPs to reduce water runoff and sedimentation would be implemented (as described in Appendix I-A3). Indirect impacts could also occur from unauthorized surface collection depending on the proximity of potential projects and associated lease to the site. No new road corridors have been assessed for the West Chocolate Mountains REEA. Assuming existing roads could be used and no new areas of potential cultural significance would be opened to increased access, there would be minimal impacts to cultural resources. However, impacts on cultural resources related to the creation of a new corridor would be evaluated at the project-specific level if new road construction were to occur.

The development cap which would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres) would minimize the impact to cultural resources east of the Canal.

Direct Impacts to Cultural Resources from Wind Energy Development

Under this alternative, 76 acres of BLM and other land could be initially disturbed and, after reclamation, 36 acres could be the final amount of surface disturbance, although lands acquired by BLM with LWCF funds would be managed as avoidance areas. Visual impacts to historic or prehistoric resources from wind energy development could be long-term and direct. While these impacts could be initiated during the construction phase of the projects, the impacts could remain until project decommissioning, with all improvements and facilities removed from the site and the property returned to its original character. These impacts could be adverse.

Direct impacts on significant cultural resources could occur in the West Chocolate Mountains REEA; however, as stated in Section 3.9.3.4, further investigation is needed in the REEA. A cultural resource survey of the entire APE including the construction footprint, staging areas, areas of anticipated erosion, access routes, and locations for ROWs for transmission,

water, and communication lines would first need to be conducted to identify archaeological sites, historic structures and features, and traditional cultural properties, and an evaluation would need to follow to determine whether any recorded resources meet the criteria for eligibility for listing in the NRHP. Section 4.9.3 discusses the types of impacts that could occur on any significant cultural resources found to be present within the REEA. Possible impacts from wind energy development on cultural resources that are encountered within the REEA or along related ROWs, as well as general mitigation measures, are described in more detail in Appendix I-A3. Impacts would be minimized through the implementation of required mitigation measures and BMPs described in Appendix I-A3 Mitigation measures and BMPs assume that the necessary surveys, evaluations, and consultations will occur.

Consultation with the California SHPO, Native American governments, and other identified consulting parties would be conducted for any geothermal energy development projects in the West Chocolate Mountains REEA.

Conclusion

If adverse effects (whether direct or indirect) to historic properties could not be avoided through BMPs, project redesign, or other means, consultation for the resolution of such effects would be initiated to determine what appropriate measures would be required to resolve adverse effects. They would not be a concern to the public. This would be consistent with the management goals for this resource.

Indirect Impacts to Cultural Resources from Wind Energy Development

Indirect impacts on cultural resources resulting from erosion outside of the potential project boundaries (including along ROWs) would be unlikely, assuming mitigation measures and BMPs to reduce water runoff and sedimentation would be implemented (as described in Section 2.2.7). Indirect impacts could also occur from unauthorized surface collection, depending on the proximity of potential projects and associated lease to the site. No new road corridors have been assessed for the West Chocolate Mountains REEA. Assuming existing roads could be used and no new areas of potential cultural significance would be opened to increased access, there could be minimal impacts to cultural resources. However, impacts on cultural resources related to the creation of a new corridor would be evaluated at the project-specific level if new road construction were to occur.

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 cultural resources from wind energy projects. In addition, the development cap which would limit wind energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres) would minimize the impact to fish and wildlife east of the Canal. Although reasonable protection would be provided for sensitive natural values and mitigation of impacts and rehabilitation of impacted areas would occur when possible, the goal would be to allow development to occur within this area.

4.9.4.4 Alternative 4: Geothermal Development Only

Under this alternative, geothermal energy could be developed to the achievement of levels of geothermal energy development consistent with the geothermal RFD scenario; there would be no solar or wind energy development. Under this alternative, the following impacts would be the same as Alternative 3:

- Direct and indirect cultural resource impacts from geothermal energy development;
- Acquired lands; and
- Existing noncompetitive lease application.

Under this alternative, the West Chocolate Mountains REEA would not be designated as an SEZ and solar or wind energy development would not be allowed. Additionally, the development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). This alternative would not conform to the CDCA goal to identify potential sites for wind energy development.

4.9.4.5 Alternative 5: Solar Energy Development Emphasis with Moderate Geothermal Development and No Wind Development

Under this alternative, solar energy could be developed to the achievement of levels of development consistent with the maximum extent as defined in the solar RFD scenario. Geothermal energy could be developed to the achievement of levels of geothermal energy development consistent with a moderate level (50 MW) as defined in geothermal RFD scenario.

Under this alternative, the following would be the same as Alternative 3:

- Acquired lands;
- Existing noncompetitive lease application; and
- Direct and indirect cultural resources impacts from solar development.

Impacts from solar energy development would be the same as Alternative 3.

Direct Impacts to Cultural Resources from Geothermal Energy Development

Geothermal impacts to cultural resources would be the same as Alternative 3; however, under this alternative, only one 50-MW geothermal power plant could be constructed. A total of 95 acres of land could be disturbed during the exploration phase within the West Chocolate Mountains REEA. The potential land that could be disturbed during construction could be 272 acres, although lands acquired by BLM with LWCF funds would be managed as avoidance areas. Approximately 40 wells (40 wells per 50-MW power plant) could be drilled for this alternative. Well drilling and operation during the exploration and construction phases could result in the net addition of access roads and well pads. Long-term effects could occur to any cultural resources within the area of disturbance. Visual impacts to historic or prehistoric resources from wind energy development could be long-term and direct. While these impacts could be initiated during the construction phase of the projects, the impacts could remain until

project decommissioning, with all improvements and facilities removed from the site and the property returned to its original character. These impacts could be adverse.

Conclusion

If adverse effects (whether direct or indirect) to historic properties could not be avoided through BMPs, project redesign, or other means, consultation for the resolution of such effects would be initiated to determine what appropriate measures would be required to resolve adverse effects. They would not be a concern to the public. This would be consistent with the management goals for this resource.

Indirect Impacts to Cultural Resources from Geothermal Energy Development

Indirect impacts on cultural resources would be the same as Alternative 3. 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 geothermal energy development, which could lead to an increase in impacts to cultural resources from geothermal energy projects. The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). A wide variety of uses, including energy and utility development would be allowed.

4.9.4.6 Alternative 6: Geothermal Development Emphasis with Moderate Solar Development and No Wind Development

Under this alternative, it is assumed that achievement of levels of development consistent with the maximum development defined in the geothermal RFD scenario would take place (the same as discussed for Alternative 3) and that the level of achievement consistent with partial development of the solar RFD scenario would be realized. Lands within the West Chocolate Mountains REEA that lie east of the Coachella Canal would not be considered for an SEZ, modified or otherwise. Lands west of the canal would be identified as an SEZ, allowing other compatible renewable energy developments to occur.

Under this alternative, the following would be the same as Alternative 3:

- Acquired lands;
- Existing noncompetitive lease application;
- Direct and indirect cultural resources impacts from geothermal development; and
- Direct and indirect cultural resources impacts from CSP (dish engine only) and PV solar development.

Direct and Indirect Impacts to Cultural Resources from Geothermal Energy Development

Under this alternative, the lands west of the Coachella Canal would be identified as an SEZ, a designation that would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments, including geothermal energy development, to occur within the West Chocolate Mountains SEZ. The lands east of the Coachella Canal would not be considered for an SEZ. In addition, all lands east of the Coachella Canal

would have a development cap that would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Direct Impacts to Cultural Resources from Solar Energy Development

Under this alternative, there could be up to 6,637 acres of CSP (dish engine technology only) or up to 29,758 acres of PV power developed. Long-term, direct impacts to cultural resources could occur during construction and operation of the CSP projects, dish engine only, on a total of up to 6,637 acres of BLM land. Impacts from solar energy development would be the same as Alternative 3.

Conclusion

If adverse effects (whether direct or indirect) to historic properties could not be avoided through BMPs, project redesign, or other means, consultation for the resolution of such effects would be initiated to determine what appropriate measures would be required to resolve adverse effects. They would not be a concern to the public. This would be consistent with the management goals for this resource.

Indirect Impacts to Cultural Resources from Solar Energy Development

Indirect impacts on cultural resources would be the same as Alternative 3.

4.10 Paleontological Resources

This section discusses the effects to paleontological resources that could occur with implementation of the alternatives. First, the management goals are provided; second, the impact indicators used to identify and analyze effects are presented; third, typical impacts are discussed for geothermal, solar and wind energy; and last, impacts are analyzed by alternative.

4.10.1 Management Goals

The CDCA Plan does not have any formal management goals for paleontological resources.

Planning and management actions for paleontological resources on BLM lands are implemented in accordance with the BLM Manual H-8270-1, General Procedural Guidance for Paleontological Resource Management (7/13/98); Management of Museum Collections (DM 411); the FLMPA; NEPA; and other specific federal regulations outlined in BLM Manual H-8270-1. BLM policy laid forth in these guidelines promotes the scientific, educational, and recreational uses of fossils on public lands, mitigates resource conflicts, and develops strategies to regularly monitor public lands where important paleontological localities have been identified. Additionally, the following CDCA management goals apply to the protection of paleontological resources:

- Ensure paleontological resources are given full consideration in land-use planning and management decisions;

- Preserve and protect a representative sample of the full array of the CDCA's paleontological resources; and
- Ensure proper data recovery of significant paleontological resources where adverse impacts cannot be avoided or otherwise mitigated.

In addition to the above requirements, in March 2009, the Paleontological Resources Preservation Act (PRPA) was enacted along with the Omnibus Public Land Management Act (OPLA). Title VI, Subtitle D: Paleontological Resources Preservation (OPLA-PRPA) sets forth the law pertaining to paleontological resources on all federally-administered lands. The OPLA-PRPA codifies the BLM practice of requiring that rare and scientifically significant fossils be collected only by qualified researchers who obtain a permit, and is consistent with paleontological guidelines outlined in the Paleontology Resources Management Manual and Handbook H-8270-1. As a result of the recent enactment of the OPLA-PRPA, federal agencies will begin developing appropriate plans for the management of paleontological resources and the implementation of the PRPA. Federal protection for significant paleontological resources applies to the West Chocolate Mountains REEA since construction and operations would occur on federally owned or managed lands.

4.10.2 Impact Criteria

The potential risk of impacts to paleontological resources is assessed with respect to the following criteria. Potential impacts on these resources could occur if actions:

- Isolate the property or alter the character of the property's paleontological setting when that character contributes to the property's paleontological qualifications for special status;
- Result in the transfer, lease, or sale of a property without adequate provisions to protect the property's paleontological integrity; or
- Result in the modification or destruction of significant paleontological resources as a result of any process of energy development.

The potential risk of indirect impacts affecting paleontological resources from exploration, development, production, and decommissioning is based on the PFYC scale that rates the paleontological sensitivity of each area from very high to very low, as was discussed in Section 3.10.3.2. Potential paleontological resources that may be present within the West Chocolate Mountains REEA could be at risk of indirect impacts from development. It should be noted that a low sensitivity area does not denote a geologic formation that is devoid of paleontological resources; rather, it refers to a formation that has not had many significant paleontological finds to date.

4.10.3 Typical Paleontological Impacts from Energy Development

As stated in Section 3.10, microfossils, shells, and plant fragments can be expected within the West Chocolate Mountains REEA. Ancient Lake Cahuilla shoreline is present on the western side of the REEA at elevations of about 40 feet above mean sea level (msl). Lake Cahuilla sedimentary deposits are considered to have a high paleontological sensitivity (PFYC 4). Vertebrate fossils have not been identified in the REEA, but are found in the Anza-Borrego

Desert State Park to the west. Given the nature and extent of these paleontological resources, impacts to potential fossil localities can be expected. Formations containing vertebrate fossils are considered more sensitive because vertebrate fossils tend to be rare and fragmentary and may provide important scientific data. Formations containing microfossils, plant casts, and invertebrate fossils also are more common. A significant fossil deposit is a rock unit or formation with contains significant, nonrenewable, paleontological resources. Significant, non-renewable, paleontological resources are fossils and fossiliferous deposits, here restricted to vertebrate fossils and their taphonomic and associated environmental indicators. Invertebrate and botanical fossils may be significant as environmental indicators associated with vertebrate fossils or may have scientific importance if they are rare or provide stratigraphic or tectonically important data.

The project could result in disturbance of geologic formations with paleontological resource potential throughout the West Chocolate Mountains REEA. A pre-work survey will be necessary at elevations less than 40 feet msl along the ancient Lake Cahuilla shorelines. Other pre-work surveys may be necessary to determine if paleontological resources could be encountered and if the sediments could be affected by the chosen alternative. A paleontological monitoring program would be implemented where surficial disturbance activities occur. No previous paleontological surveys are known to have occurred over the REEA.

4.10.3.1 Typical Paleontological Impacts from Geothermal Energy Development

For geothermal energy development, long-term impacts could occur where a high sensitivity exists for locating significant vertebrate fossils based on the geologic formations and terrain. The potential to impact paleontological resources is greatest where project infrastructure, such as buildings and pipelines, and where grading for access roads, well pads, and drilling sites, occur. Additional paleontological impacts could occur where expansion of the energy development footprint occurs for unforeseen project needs or upon decommissioning activities.

Indirect impacts to paleontological resources during geothermal energy development could occur through increased surface exposures and through potential development induced erosion.

The Geothermal PEIS identified typical impacts to paleontological resources associated with geothermal energy development. The impacts are incorporated by reference and summarized in Table 4.10-1.

Table 4.10-1 Typical Impacts to Paleontological Resources from Geothermal Energy Development

Project Phase	Activity	Impact	Time Frame
Site Evaluation/ Exploration	– Surveying and well drilling. – Access road and well pad construction. – Staging equipment. – Vehicular traffic.	– Increased illegal collecting and vandalism. – Any permanent construction or ground disturbances within a resource's boundaries.	Short-term. Minor, long-term impacts.
Construction	– Drilling. – Construction of injection wells and sump pits.	– Paleontological resources could be directly impacted by the ground disturbance.	Short-term. Minor, long-term impacts.

Table 4.10-1 Typical Impacts to Paleontological Resources from Geothermal Energy Development

Project Phase	Activity	Impact	Time Frame
Operation and Maintenance	– Transformer, power house, and cooling tower.	– Ground disturbance from the transmission line towers could impact paleontological resources within their footprint and adjacent areas. – A new pipeline could impact a previously undisturbed paleontological resource.	Impacts on those paleontological resources could be long-term if the developments remain after closeout, and short-term if they would be removed.
Decommissioning	– Vehicular traffic. – Staging equipment. – Facility removal. – Breaking up concrete pads and foundations. – Removing access roads that are not maintained for other uses. – Recontouring the surface. – Revegetation.	– Impacts on paleontological sites from previous phases could remain. – Additional impacts could occur if reclamation and abandonment activities extend beyond previously disturbed areas.	Short-term.

4.10.3.2 Typical Paleontological Impacts from Solar Energy Development

For solar energy development, long-term impacts could occur where a high potential exists for locating significant vertebrate fossils based on the geologic formations and terrain. The potential to impact paleontological resources would be greatest where project infrastructure, such as buildings, transmission lines, solar panels, and grading for access roads, would occur. Additional paleontological impacts could occur where expansion of the energy development footprint would occur for unforeseen project needs or upon site decommissioning activities.

Indirect impacts to paleontological resources during solar energy development could occur through increased surface exposures and through potential development induced erosion.

Based on a review of environmental documentation for other solar energy projects, typical impacts for solar energy projects have been developed. The typical impacts on paleontological resources associated with solar energy development are summarized in Table 4.10-2.

Table 4.10-2 Typical Impacts to Paleontological Resources from Solar Energy Development

Project Phase	Activity	Impact	Time Frame
Exploration	– Monitoring and site characterization. – Site evaluation activities, such as ground clearing (removal of vegetative cover), vehicular and pedestrian	– Increased illegal collecting and vandalism. – Any permanent construction or ground disturbances within a resource's boundaries.	Short-term. Minor, long-term impacts.

Table 4.10-2 Typical Impacts to Paleontological Resources from Solar Energy Development

Project Phase	Activity	Impact	Time Frame
	traffic, and drilling to characterize subsurface conditions (e.g., soils, depth to groundwater).		
Construction	– Pedestrian and vehicular traffic. – Excavation and blasting. – Altering drainage patterns.	– Paleontological resources could be directly impacted by the ground disturbance. – Ground disturbance from the transmission line towers could impact paleontological resources within their footprint and adjacent areas. – A new pipeline could impact a previously undisturbed paleontological resource.	Short-term. Minor, long-term impacts.
Operation and Maintenance	– Operation of the solar energy facility, power generation, and associated maintenance activities that would require vehicular access and heavy equipment operation when components are being replaced.	– Increased illegal collecting and vandalism.	Long-term (duration of project).
Decommissioning	– Facility removal. – Breaking up concrete pads and foundations. – Removing access and on-site roads, buildings, and other structures. – Heavy vehicular traffic. – Recontouring the surface. – Revegetation.	– Impacts on paleontological sites from previous phases could remain. – Additional impacts could occur if reclamation and abandonment activities extend beyond previously disturbed areas.	Short-term.

4.10.3.3 Typical Paleontological Impacts from Wind Energy Development

For wind energy development, long-term impacts could occur where a high potential exists for locating significant vertebrate fossils based on the geologic formations and terrain. The potential to impact paleontological resources is greatest where project infrastructure, such as buildings, wind towers, and transmission towers could be built, and where grading for access roads, METs, and turbine pads could occur. Additional paleontological impacts could occur where expansion of the energy development footprint occurs for unforeseen project needs or upon site decommissioning activities.

Indirect impacts to paleontological resources during wind energy development could occur through increased surface exposures and through potential development induced erosion.

The Wind PEIS identified typical impacts to paleontological resources associated with wind energy development. The impacts are incorporated by reference and summarized in Table 4.10-3.

Table 4.10-3 Typical Impacts to Paleontological Resources from Wind Energy Development

Project Phase	Activity	Impact	Time Frame
Exploration	– Limited excavation activities and road construction. – Clearing or grading. – Heavy vehicular traffic, recontouring the surface, and revegetation.	– Increased illegal collecting and vandalism. – Any permanent construction or ground disturbances within a resource's boundaries.	Short-term. Minor, long-term impacts.
Construction	– Clearing, excavation, blasting, trenching, grading, and heavy vehicle traffic.	– Paleontological resources could be directly impacted by the ground disturbance.	Short-term. Minor, long-term impacts.
Operation and Maintenance	– Pedestrian traffic and new subsurface disturbances.	– Ground disturbance from the transmission line towers could impact. – Paleontological resources within their footprint and adjacent areas.	Long-term (duration of the project).
Decommissioning	– Removal of all access roads, on-site roads, substations, buildings, and other structures.	– Impacts on paleontological sites from previous phases could remain. – Additional impacts could occur if reclamation and abandonment activities extend beyond previously disturbed areas.	Short-term.

4.10.4 Paleontological Resources Impacts by Alternative

This section describes the effects under each alternative using the respective methodology prescribed under NEPA. To compare effects, this analysis defines the temporal scale (time), spatial extent (area), and intensity of effects for each alternative. All effects discussed in this section are direct.

Effects on the existing ambient paleontological resources and vibration levels may arise from project construction, O&M, and decommissioning equipment and vehicles, as well as from the introduction of construction or O&M related traffic on local roads near the West Chocolate Mountains REEA. The following discussion analyzes the environmental consequences or impacts expected to occur as a result of anticipated future actions consistent with implementing the alternatives described in Chapter 2.

Under any of the development alternatives, construction of the geothermal wells and power plants would be subject to stormwater measures contained in a SWPPP and would include BMPs as required by a General Construction Activity Stormwater Permit issued by the California SWRCB. The SWPPP would be subject to the review and approval of the RWQCB.

BMPs implemented during all phases of construction within the West Chocolate Mountains REEA could include road maintenance, grading, culvert maintenance and installation, water runoff control, installation of storm drain inlet protection devices, traffic control in erosion-damaged areas, use of erosion control blankets and soil stabilizers, use of hay bales and sand bags, and mulching areas with a protective cover of organic material such as wood chips and vegetation. Because these alternatives would include implementation of erosion control measures, potential erosional impacts to paleontological sites could be negligible.

4.10.4.1 Alternative 1: No Action /No CDCA Plan Amendment

Because geothermal, wind, and solar development could still occur under the No Action/No CDCA Plan Amendment alternative, impacts to paleontological resources would be expected to be similar those detailed in Section 4.10.4.3 for Alternative 3. However, development under the No Action/No CDCA Plan Amendment alternative may occur at a slower rate because an individual plan amendment process would be necessary for each solar or wind authorization ; therefore, impacts would occur at a slower rate.

No renewable energy development cap or other protective stipulations/measures pertaining to the east side of the Coachella Canal would be adopted under this alternative. Under this alternative, the MUC designation would remain “unclassified” and an SEZ would not be designated. Thus, there would be no restrictions on development east of the Coachella Canal, and impacts to paleontological resources that would not occur under Alternative 3 east of the Coachella Canal could occur under Alternative 1.

4.10.4.2 Alternative 2: No Development /CDCA Plan Amendment to Identify Areas as Closed to and Unsuitable for Geothermal, Solar, and Wind Energy Development

There would be no new construction or operation of geothermal power plants, or solar or wind energy projects, except those which are currently approved or operating. Paleontological resources would not be affected by new geothermal, wind, or solar projects; however, the closure of these lands for renewable energy development would represent an opportunity cost. The energy that could have been supplied by development of this area for geothermal, solar, and/or wind energy would have to be filled by other fossil fuel or renewable energy generating facilities constructed elsewhere.

No renewable energy development cap or other protective stipulations/measures pertaining to the east side of the Coachella Canal would be adopted under this alternative. Thus, there would be no restrictions on development east of the Coachella Canal, and impacts to paleontological resources that would not occur under Alternative 3 east of the Coachella Canal could occur under Alternative 2.

4.10.4.3 Alternative 3: Renewable Energy Development Emphasis

Under this alternative, geothermal, solar, and wind could be developed to the maximum extent as defined in the geothermal, solar, and wind RFD scenarios. Up to 1,026 acres of land could be disturbed for development of geothermal power plants; up to 29,758 acres of land could be disturbed for development of solar PV projects; up to 6,637 acres could be disturbed for development of CSP projects; and up to 76 acres of land could be disturbed for wind energy

projects. Solar development could occur through the development of a 50-MW solar PV project and a 500-MW CSP project.

Direct Impacts to Paleontological Resources from Geothermal Energy Development

Under this alternative, long-term, direct impacts to paleontological resources could occur during exploration on a total of 95 acres, and during construction and operation of the geothermal projects on a total of up to 1,026 acres on BLM and other land, although lands acquired by BLM with LWCF funds would be managed as avoidance areas. While these impacts could be initiated during the construction phase of the project, the impacts could remain until project decommissioning, with all improvements and facilities removed from the site and the property returned to its original character. These impacts could be adverse.

Physical impacts to paleontological resources are adverse, permanent, and irreversible. Once a site has been disturbed, the research potential from that site is diminished or destroyed and cannot be returned. Paleontological resources are non-renewable resources that cannot be recreated. Current legislation attempts to mitigate impacts by allowing for the collection of a portion of the scientific data prior to site disturbance.

Conclusion

Impacts to paleontological resources could be mitigated with the implementation of preconstruction field surveys to determine the locations of paleontological resources and a Paleontological Resource Monitoring and Recovery Plan. A pre-work survey would be necessary at elevations less than 40 feet msl along the ancient Lake Cahuilla shorelines. Other pre-work surveys may be necessary to determine if paleontological resources could be encountered and if the sediments could be affected by the chosen alternative. A paleontological monitoring program would be implemented where surficial disturbance activities occur.

Indirect Impacts to Paleontological Resources from Geothermal Energy Development

Indirect impacts to paleontological resources during geothermal energy development could occur through increased surface exposures and through potential development-induced erosion which could result in damage to paleontological features. Implementation of BMPs and erosion control measures could mitigate erosion impacts. The designation as an SEZ would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments, including geothermal energy development, to occur within the West Chocolate Mountains SEZ, which could lead to an increase in impacts to paleontological resources from geothermal energy projects. The development cap which would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres) would minimize the impact to paleontological resources east of the Canal.

Stipulations would be imposed requiring any land development that would eventually require decommissioning, removal of infrastructure, and environmental rehabilitation to provide a guarantee of complete funds for decommissioning at the beginning of the project, e.g. trust fund or other protected source of funds. The projected cost of decommissioning should be recalculated annually and the guaranteed funds adjusted appropriately.

Direct Impacts to Paleontological Resources from Solar Energy Development

Under this alternative, up to 6,637 acres of CSP or up to 29,758 acres of solar PV power could be developed. It is assumed that either CSP or solar PV projects could be developed. Due to the wide range of solar development that could occur in the West Chocolate Mountains REEA, the activities that could occur during solar energy development have been based on the development of a 50-MW solar PV project and a 500-MW CSP project. These sizes were selected based on the availability of data related to development of these types of projects. PV and CSP are the two technologies that have been fielded most widely in the United States and throughout the world.

Solar development represents the largest amount of disturbance to paleontological resources. The nature of the technology requires large areas of land to be cleared and leveled for the development. Long-term, direct impacts to paleontological resources could occur during construction and operation of the CSP projects on a total of up to 6,637 acres of BLM and other land. Long-term, direct impacts to paleontological resources could occur during construction and operation of the solar PV projects on a total of up to 29,758 acres of BLM and other land. While these impacts could be initiated during the construction phase of the project, the impact could remain until project decommissioning, with all improvements and facilities removed from the site and the property returned to its original character. These impacts could be adverse.

Conclusion

Physical impacts to paleontological resources are adverse, permanent, and irreversible. Once a site has been disturbed, the research potential from that site is diminished or destroyed and cannot be returned. Paleontological resources are non-renewable resources that cannot be recreated. Current legislation attempts to mitigate impacts by allowing for the collection of a portion of the scientific data prior to site disturbance. Impacts to paleontological resources could be mitigated with the implementation of preconstruction field surveys to determine the locations of paleontological resources and a Paleontological Resource Monitoring and Recovery Plan.

Stipulations would be imposed requiring any land development that would eventually require decommissioning, removal of infrastructure, and environmental rehabilitation to provide a guarantee of complete funds for decommissioning at the beginning of the project, e.g., trust fund or other protected source of funds. The projected cost of decommissioning should be recalculated annually and the guaranteed funds adjusted appropriately. They would not be a concern to the public. There are no management goals in the CDCA Plan for this resource.

Indirect Impacts to Paleontological Resources from Solar Energy Development

Indirect impacts to paleontological resources during solar energy development could occur through increased surface exposures and through potential development-induced erosion which could result in damage to paleontological features. Impacts to paleontological resources could be reduced through Implementation of BMPs and erosion control measures.

The development cap which would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres) would minimize the impact to paleontological resources east of the Canal.

Direct Impacts to Paleontological Resources from Wind Energy Development

Under this alternative, 76 acres of BLM and other land could be initially disturbed and, after reclamation, 36 acres could be the final amount of surface disturbance. Long-term, direct impacts to paleontological resources could occur during construction and operation of the wind project. While these impacts could be initiated during the construction phase of the project, the impact could remain until project decommissioning, with all improvements and facilities removed from the site and the property returned to its original character. These impacts could be adverse.

Conclusion

Physical impacts to paleontological resources are adverse, permanent, and irreversible. Once a site has been disturbed, the research potential from that site is diminished or destroyed and cannot be returned. Paleontological resources are non-renewable resources that cannot be recreated. Current legislation attempts to mitigate impacts by allowing for the collection of a portion of the scientific data prior to site disturbance. Impacts to paleontological resources could be mitigated with the implementation of preconstruction field surveys to determine the locations of paleontological resources and a Paleontological Resource Monitoring and Recovery Plan.

Stipulations would be imposed requiring any land development that would eventually require decommissioning, removal of infrastructure, and environmental rehabilitation to provide a guarantee of complete funds for decommissioning at the beginning of the project, e.g., trust fund or other protected source of funds. The projected cost of decommissioning should be recalculated annually and the guaranteed funds adjusted appropriately. They would not be a concern to the public. There are no management goals in the CDCA Plan for this resource.

Indirect Impacts to Paleontological Resources from Wind Energy Development

Indirect impacts to paleontological resources during wind energy development could occur through increased surface exposures and through potential development-induced erosion which could result in damage to paleontological features. Impacts to paleontological resources could be reduced through Implementation of BMPs and erosion control measures.

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 paleontological resources from wind energy projects, although the development cap would limit wind energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

4.10.4.4 Alternative 4: Geothermal Development Only

Under this alternative, geothermal energy could be developed to the achievement of levels of geothermal energy development consistent with the geothermal RFD scenario; there would be no solar or wind energy development. Under this alternative, the following impacts would be the same as Alternative 3:

- Direct and indirect paleontological impacts from geothermal energy development;

- Acquired lands; and
- Existing noncompetitive lease application.

Impacts from geothermal energy development would be the same as Alternative 3. Under this alternative, the West Chocolate Mountains REEA would not be designated as an SEZ and solar or wind energy development would not be allowed. Additionally, the development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). This alternative would not conform to the CDCA goal to identify potential sites for wind energy development.

4.10.4.5 Alternative 5: Solar Energy Development Emphasis with Moderate Geothermal Development and No Wind Development

Under this alternative, solar energy could be developed to the achievement of levels of development consistent with the maximum extent as defined in the solar RFD scenario. Geothermal energy could be developed to the achievement of levels of geothermal energy development consistent with a moderate level (50 MW) as defined in geothermal RFD scenario.

Under this alternative, the following would be the same as Alternative 3:

- Acquired lands;
- Existing noncompetitive lease application; and
- Direct and indirect paleontological impacts from solar development.

<u>Direct Impacts to Paleontological Resources from Partial Geothermal Energy Development</u>

Minor long-term and short-term impacts to paleontological resources could occur during construction, with long-term impacts occurring during O&M. A total of 95 acres of land could be disturbed during the exploration phase within the West Chocolate Mountains REEA. The potential land that could be disturbed during construction could amount to about 272 acres of the REEA. Approximately 40 wells (40 wells per 50-MW power plant) could be drilled for this alternative. Well drilling and operation during the exploration and construction phases could result in the net addition of access roads and well pads. Approximately 110 acres could be permanently altered within the REEA under this alternative (80 acres of well pads and 30 acres for the power plant). The addition of impervious surfaces could increase the risk of potential increased erosion. Visual impacts to paleontological resources from this alternative could be long-term and direct. While these impacts could be initiated during the construction phase of the project, the impacts could remain until project decommissioning, with all improvements and facilities removed from the site and the property returned to its original character. These impacts could be adverse.

Conclusion

Physical impacts to paleontological resources are adverse, permanent, and irreversible. Current legislation attempts to mitigate impacts by allowing for the collection of a portion of the

scientific data prior to site disturbance. They would not be a concern to the public. There are no management goals in the CDCA Plan for this resource.

Indirect Impacts to Paleontological Resources from Geothermal Energy Development

Indirect impacts to paleontological resources during geothermal energy development could occur through increased surface exposures and through potential development-induced erosion which could result in damage to paleontological features. BMPs and erosion control measures would be implemented to reduce impacts. 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 geothermal energy development which could lead to an increase in impacts to paleontological resources from geothermal energy projects. In addition, the development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). A variety of uses, including energy and utility development would be allowed.

4.10.4.6 Alternative 6: Geothermal Development Emphasis with Moderate Solar Development and No Wind Development

Under this alternative, it is assumed that achievement of levels of development consistent with the maximum development defined in the geothermal RFD scenario would take place (the same as discussed for Alternative 3) and that the level of achievement consistent with partial development of the solar RFD scenario would be realized. Lands within the West Chocolate Mountains REEA that lie east of the Coachella Canal would not be considered for an SEZ, modified or otherwise. Lands west of the canal would be identified as an SEZ, allowing other compatible renewable energy developments to occur.

Under this alternative, the following would be the same as Alternative 3:

- Acquired lands;
- Existing noncompetitive lease application;
- Direct and indirect paleontological impacts from geothermal development; and
- Direct and indirect paleontological impacts from CSP (dish engine only) and PV solar development.

Direct and Indirect Impacts to Paleontological Resources from Geothermal Energy Development

Under this alternative, the lands west of the Coachella Canal would be identified as an SEZ, a designation that would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments, including geothermal energy development, to occur within the West Chocolate Mountains SEZ. The lands east of the Coachella Canal would not be considered for an SEZ. In addition, all lands east of the Coachella Canal would have a development cap that would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Direct Impacts to Paleontological Resources from Solar Energy Development

Under this alternative, there could be up to 6,637 acres of CSP or up to 29,758 acres of PV power developed. Long-term, direct impacts to paleontological resources could occur during construction and operation of the CSP projects on a total of up to 6,637 acres of BLM land. Long-term, direct impacts to paleontological resources could occur during construction and operation of the solar PV projects on a total of up to 29,758 acres of BLM and other land. While these impacts could be initiated during the construction phase of the projects, the impact could remain until project decommissioning, with all improvements and facilities removed from the site and the property returned to its original character. These impacts could be adverse.

Conclusion

Physical impacts to paleontological resources could be adverse, permanent, and irreversible. Current legislation attempts to mitigate impacts by allowing for the collection of a portion of the scientific data prior to site disturbance. They would not be a concern to the public. There are no management goals in the CDCA Plan for this resource.

Indirect Impacts to Paleontological Resources from Solar Energy Development

Indirect, adverse impacts to paleontological resources could result from increased erosion outside of the boundaries of the development which could result in damage to paleontological resource features. In addition, the development cap would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

4.11 Visual Resources

This section discusses the effects to visual resources that could occur with implementation of the alternatives. First, the management goals are provided; second the impact indicators used to identify and analyze effects are presented; third, typical impacts are discussed for geothermal, solar and wind energy; and last, impacts are analyzed by alternative.

4.11.1 Management Goals

From the CDCA Plan (BLM 1980):

"The CDCA has a superb variety of scenic values. The public considers these scenic values a significant resource. The Bureau recognizes these values as a definable resource and an important recreation experience. These visual resources will receive consideration in Bureau of Land Management resource management decisions.

Many management activities involve alteration of the natural character of the landscape to some degree; the Bureau will take the following actions to effectively manage for these activities:

- The appropriate levels of management, protection, and rehabilitation on all public lands in the CDCA will be identified, commensurate with visual resource management objectives in the multiple-use class guidelines.

- Proposed activities will be evaluated to determine the extent of change created in any given landscape and to specify appropriate design or mitigation measures using the Bureau's contrast rating process."

The CDCA Plan and subsequent plan updates and amendments do not contain Visual Resource Management (VRM) classes. As discussed in Section 3.11.1.5 of this document, in the absence of VRM classes, interim VRM (iVRM) classes were established. The BLM has designated the West Chocolate Mountains REEA, which falls within the CDCA Plan area, as iVRM Class IV. The objective of iVRM Class IV is to provide for management activities which require major modification of the existing character of the landscape, and high levels of changes to the landscape are allowed. High levels of change are defined as changes that may dominate the view and be the major focus of viewer attention. These changes should, nonetheless, adhere to basic design principles and repeat the basic visible elements in the existing landscape (BLM 1986).

4.11.2 Impact Criteria

The potential risks of direct impacts to visual resources are assessed with respect to the following criteria. Potential impacts to visual resources could occur if any of the following were to take place:

- Introduction of contrast into the environment that could alter the VRM classification; or
- Creation of visual contrasts which exceed the allowable levels associate with the corresponding iVRM class objectives.

Because specific projects are not being analyzed in this EIS, potential impacts on visual resources are assessed by describing the general visual changes that could be caused by each type of energy development. These general visual changes associated with each alternative are then assessed against the existing visual setting described in Section 3.11 of this document to determine the degree of change that could occur due to the development.

4.11.3 Typical Visual Impacts from Energy Development

All land-disturbing activities could directly affect the existing visual resource. The degree to which visual resources are affected depends on both the physical appearance of the development as characterized by form, line, color, and texture and the sensitivity of potential viewer or groups of viewers as characterized by number of viewers, duration of views, and viewer expectation. Among other factors, viewer expectation takes into consideration established VRM goals; as previously discussed, the West Chocolate Mountains REEA was assigned iVRM Class IV and is managed in keeping with the goal of partial retention of existing visual character. Distance zones are also considered in assessing potential impacts on visual resources. Potential viewer groups and their sensitivity ratings are listed in Table 3.11-2 in Chapter 3. Because the exact locations of projects in the West Chocolate Mountains REEA are unknown, all viewers considered in this analysis would be located within 5 miles of any potential projects; distances of 0 to 5 miles are considered be within the foreground-middleground distance zone.

4.11.3.1 Typical Visual Impacts from Geothermal Energy Development

The Geothermal PEIS identified typical impacts on visual resources associated with geothermal energy development. The impacts are incorporated by reference and summarized in Table 4.11-1.

Table 4.11-1 Typical Impacts to Visual Resources from Geothermal Energy Development

Project Phase	Activity	Impact	Time Frame
Site Exploration	– Creating or improving access roads. – Geophysical surveys. – Drilling TG wells. – Seismic testing.	– Vegetation clearing, where necessary, for access roads and testing sites. – Minor ground disturbance and exposure of bare soils for soil and seismic testing. – Presence of testing and drilling equipment including thumper trucks, cable, rotary rig, diamond coring rig, and auxiliary equipment.	Visible effects of exploration could be short-term, as drilling equipment would be removed and wells would be abandoned. If a well is maintained for temperature monitoring, it could appear as a small mound and would not be readily visible except at locations within the immediate vicinity. Access roads would remain for use during other phases of the project.
Construction	– Drilling of up to 40 FD wells per 50-MW project. – Improvement of access roads, if necessary, to deliver construction materials and equipment to the sites. – Construction of facilities and structures and installation of associated equipment.	– Vegetation clearing, where necessary, for access roads, well pads (up to 2 acres per well pad), and power plant (20 to 25 acres per power plant). – Alteration of the natural contours of the land. – Building of structures associated with a geothermal power plant. – Fugitive dust from grading and other construction activities.	Visible effects of construction could be short-term, as drilling rigs and other construction equipment would be removed from the site when construction is complete. All disturbed areas that are not required for the O&M phase of the project could be recontoured and revegetated. Areas where project features are located would not be restored, including the power plant location, well sites, and access roads that are required for O&M.
Operation and Maintenance	– Operation of the power plant including the condensers, cooling towers, and pipeline system. – Well maintenance.	– Presence of new structures within an undeveloped landscape. – Steam plumes. – Presence of well maintenance equipment including coiled-tubing units or drilling rigs. – Lighting.	Visible effects from O&M could occur for the lifetime of the project, although well maintenance could occur sporadically rather than continuously.

Table 4.11-1 Typical Impacts to Visual Resources from Geothermal Energy Development

Project Phase	Activity	Impact	Time Frame
Decommissioning	– Vehicular traffic associated with removal of structures and equipment. – Abandoning of wells. – Recontouring and revegetation of disturbed areas including the power plant location and access roads.	– Clutter and fugitive dust from demolition work. – Fugitive dust from truck trips to remove structures and equipment. – Regrading work. – Revegetation and restoration of site.	Visible effects could be short-term and could result in a beneficial effect, as the decommissioning process could restore disturbed areas to their pre-existing conditions.

4.11.3.2 Typical Visual Impacts from Solar Energy Development

Based on a review of environmental documentation for other solar energy projects, typical impacts for solar energy projects have been developed. The typical impacts on visual resources associated with solar energy development are summarized in Table 4.11-2. Where applicable, typical impacts associated with CSP technology and PV technology are described separately.

Table 4.11-2 Typical Impacts to Visual Resources from Solar Energy Development

Project Phase	Activity	Impact	Time Frame
Site Evaluation	– Installation of solar meters.	– Ground clearing (approximately 10 to 20 square feet). – Presence of solar meters. – Traffic and presence of equipment during the installation process.	Visible effects could be short-term, as solar meters would be removed after use and because the ground clearing could take place in a small area. Alteration to ground cover and contour would be visible only within the immediate vicinity of a solar meter location.
Construction	Concentrated Solar Technology: – Site clearing and grading. – Creation of or improvements to access roads. – Installation of underground piping and collection systems. – Assembly of solar collectors and power blocks. – Construction of evaporation and water retention ponds. – Construction of the transmission line to connect the CSP facility	– Vegetation loss or damage. – Exposed soils. – Alteration of the natural contours of the land. – Building of structures and infrastructure associated with a solar energy facility. – Fugitive dust from grading and other construction activities. – Fugitive dust related to truck trips associated with transporting equipment.	Visible effects of construction could be short-term, as construction equipment would be removed from the site when construction is complete. All disturbed areas that are not required for the O&M phase of the project could be recontoured and revegetated. Areas where project features are located would not be restored, including the location for solar panels and associated structures and access roads required for O&M.

Table 4.11-2 Typical Impacts to Visual Resources from Solar Energy Development

Project Phase	Activity	Impact	Time Frame
	to the transmission grid. – Construction of associated structures. Installation of fencing. Photovoltaic Technology: – Site clearing and grading. – Creation of or improvements to access roads. – Installation of underground conduit. – Assembly of inverters, step-up transformers, and switchyards. – Installation of stormwater and drainage systems, if necessary. – Construction of the transmission line to connect the PV facility to the transmission grid. – Construction of associated structures. – Installation of fencing.		
Operation and Maintenance	– Presence of solar facilities. – Maintenance of project, as needed. – Regular washing of solar panels.	Concentrated Solar Technology: – Approximately 4,500 acres of long-term land disturbance. – Presence of mirrors and other facility features in an undeveloped landscape. – Introduction of a new source of light and glare. – Fugitive dust from truck traffic and materials delivery for both scheduled and unscheduled maintenance activities. Photovoltaic Technology: – Approximately 500 acres of long-term land disturbance. – Presence of solar panels and other facility features in an undeveloped landscape. – Fugitive dust from truck traffic and materials delivery for both scheduled and	Visible effects from O&M could occur for the lifetime of the project. Panel washing could occur on a regular but infrequent basis. CSP technology would require approximately nine times as much land disturbance as PV technology. Additionally, CSP technology could introduce new long-term sources of glare due to the use of mirrors, whereas PV technology could use an anti-glare coating to minimize glare impacts.

Table 4.11-2 Typical Impacts to Visual Resources from Solar Energy Development

Project Phase	Activity	Impact	Time Frame
		unscheduled maintenance activities.	
Decommissioning	– Vehicular traffic. – Equipment and worker staging. – Removal of mirrors, solar panels, and associated infrastructure. – Breaking up concrete pads and foundations. – Removal of access roads that are not maintained for other uses. – Recontouring and revegetation of disturbed land.	– Clutter and fugitive dust from demolition work. – Fugitive dust from truck trips to remove structures and equipment. – Regrading work. – Revegetation work.	Visible effects could be short-term and could result in a beneficial effect as the decommissioning process could restore disturbed areas to their pre-existing conditions. However, because both solar technologies would require large amounts of clearing and potentially grading, recontouring and revegetation efforts may require multiple attempts, as restoration can be difficult in arid climates.

4.11.3.3 Typical Visual Impacts from Wind Energy Development

The Wind PEIS identified typical impacts on visual resources associated with wind energy development. The impacts are incorporated by reference and summarized in Table 4.11-3.

Table 4.11-3 Typical Impacts to Visual Resources from Wind Energy Development

Project Phase	Activity	Impact	Time Frame
Site Evaluation	– Installation of METs and other monitoring equipment.	– Ground clearing (less than one acre per site). – Presence of METs. – Fugitive dust from traffic and presence of equipment during the installation process.	Visible effects could be short-term, as MET would be removed after use and because the ground clearing could take place in a small area, alteration to ground cover and contour would be visible only within the immediate vicinity of a MET location.
Construction	– Worker and equipment staging. – Construction of access roads. – Excavation for turbine foundations and electrical conduit installation. – Construction of turbines, installation of electrical collection system, and construction of other	– Vegetation loss or damage. – Exposed soils where trenching has occurred for foundation and electrical distribution system installation. – Alteration of the natural contours of the land. – Building turbines and structures and infrastructure associated	Visible effects could be short-term, as construction equipment would be removed from the site when construction is complete. All disturbed areas not required for the O&M phase of the project could be recontoured and revegetated, and roads providing access to the turbines would not be reclaimed and could remain for the life of the project.

Table 4.11-3 Typical Impacts to Visual Resources from Wind Energy Development

Project Phase	Activity	Impact	Time Frame
	structures. – Truck traffic associated with delivery of turbine parts, conductors, and other materials.	with a wind facilities. – Fugitive dust from grading and other construction activities. – Fugitive dust from truck trips associated with transporting equipment.	
Operation and Maintenance	– Presence of wind turbine facilities, access roads, and structures associated with a wind energy project. – Maintenance of project components, as needed. – Inspection of project components.	– Presence of turbines, which could be highly visible in rural or natural landscapes. – Access roads may introduce new lines into the landscape. – Shadow flicker (strobe-like effects from flickering shadows cast by the moving rotors). – Blade glint from the sun reflecting off moving blades. – Visual contrasts from support facilities, and light pollution from the lighting on facilities and towers (which are required safety features). – Disassembly and repair of equipment may occur, producing the appearance of idle or missing rotors, "headless" towers (when nacelles are removed), and lowered towers.	Visible effects from O&M could be long-term. Visible effects resulting from repair or replacement of turbines could occur on an as-needed basis.
Decommissioning	– Vehicular traffic. – Equipment and worker staging. – Removal of wind turbines and associated infrastructure. – Breaking up concrete foundations. – Removal of access roads that are not maintained for other uses. – Recontouring and revegetation of disturbed land.	– Clutter and fugitive dust from demolition work. – Fugitive dust from truck trips to remove structures and equipment. – Regrading work. – Revegetation work.	Visible effects could be short-term and could result in a beneficial effect, as the decommissioning process could restore disturbed areas to their pre-existing conditions.

4.11.4 Visual Resources Impacts by Alternative

This section describes the effects under each alternative. To compare effects, this analysis defines the temporal scale (time), spatial extent (area), and intensity of effects for each alternative. All effects discussed in this section are direct. No indirect effects were identified for this resource area.

4.11.4.1 Alternative 1: No Action/No CDCA Plan Amendment

Because geothermal, wind, and solar development could still occur under the No Action/No CDCA Plan Amendment alternative, impacts to visual resources would be expected to be similar to those detailed in Section 4.11.4.3 for Alternative 3. However, development under the No Action/No CDCA Plan Amendment alternative may occur at a slower rate because an individual plan amendment process would be necessary for each solar or wind authorization; thus, impacts may occur at a slower rate, as well.

No renewable energy development cap or other protective stipulations/measures pertaining to the east side of the Coachella Canal would be adopted under this alternative. Thus, there would be no restrictions on development east of the Coachella Canal and impacts to visual resources that would not occur under Alternative 3 east of the Coachella Canal could occur under Alternative 1.

4.11.4.2 Alternative 2: No Development/CDCA Plan Amendment to Identify Areas as Closed to and Unsuitable for Geothermal, Solar, and Wind Energy Development

There would be no new construction or operation of geothermal power plants, or solar or wind energy projects, except those which are currently approved or operating. Visual resources would not be affected by new geothermal, wind, or solar projects; however, the closure of these lands for renewable energy development would represent an opportunity cost. The energy that could have been supplied by development of this area for geothermal, solar, and/or wind energy would have to be filled by other fossil fuel or renewable energy generating facilities constructed elsewhere.

No renewable energy development cap or other protective stipulations/measures pertaining to the east side of the Coachella Canal would be adopted under this alternative. Thus, there would be no restrictions on development east of the Coachella Canal and impacts to visual resources that would not occur under Alternative 3 east of the Coachella Canal could occur under Alternative 2.

4.11.4.3 Alternative 3: Renewable Energy Development Emphasis

Under this alternative, geothermal, solar, and wind could be developed to the maximum extent as defined in the geothermal, solar, and wind RFD scenarios. Up to 1,026 acres of land could be disturbed for development of geothermal power plants; up to 29,758 acres of land could be disturbed for development of solar PV projects; up to 6,637 acres could be disturbed for development of CSP projects; and up to 76 acres of land could be disturbed for wind energy projects. Solar development could occur through the development of a 50-MW solar PV project and a 500-MW CSP project.

Direct Visual Impacts from Geothermal Energy Development

Direct impacts from geothermal energy development could occur as a result of site exploration, construction, O&M, and decommissioning, as listed in Table 4.11-1. As stated in Section 3.11, visual quality for the West Chocolate Mountains REEA is low, and viewer expectation ranges from high for dispersed residences within the REEA, nearby communities, and motorists on SR 111 north of Bombay Beach, to moderate for temporary visitors to the area, including to the West Salton Sea, and motorists on SR 111 south of Bombay Beach and other roads within the REEA, including the road along the Coachella Canal.

Short-Term Effects

Short-term land disturbance for all three geothermal projects considered in this analysis could occur on approximately 328 acres of BLM land (1,026 acres BLM and private) within the West Chocolate Mountains REEA, although lands acquired by BLM with LWCF funds would be managed as avoidance areas. Short-term effects on visual resources include those effects that could occur only within a specific phase of the project, such as exploration or construction, where land would be restored upon completion of the activity.

Short-term, adverse impacts on visual resources resulting from site exploration activities could include vegetation clearing and grading, where necessary for access roads and testing sites, minor ground disturbance and exposure of bare soils for soil and seismic testing, and the presence of testing and drilling equipment including thumper trucks, cable, rotary rig, diamond coring rig, and auxiliary equipment.

Exploration for three 50-MW geothermal facilities could disturb approximately 95 acres of land within the West Chocolate Mountains REEA. Adverse visible effects of exploration could be short-term, as drilling equipment would be removed and wells would be abandoned. If a well is maintained for temperature monitoring, it would appear as a small mound and would not be readily visible except at locations within the immediate vicinity. Access roads could remain for use during other phases of the project.

Effects would be greatest for viewer groups with a high level of sensitivity, including some motorists on SR 111 and residents in the REEA and nearby communities, because these viewer groups would have the most frequent views and the longest duration of views. Although adverse visual effects could occur as a result of exploration activities, these effects could be minor because the REEA is already considered to have low visual quality; additionally, visual effects associated with exploration could be short-term.

Short-term visual effects associated with construction of geothermal facilities could include vegetation clearing, where necessary, for access roads, well pads (up to 2 acres per well pad), and power plants (20 to 25 acres per power plant), alteration of the natural contours of the land, building of structures associated with a geothermal power plant, fugitive dust from grading and other construction activities, and fugitive dust from truck trips associated with transporting equipment to well pad sites and power plant sites.

Approximately 40 FD wells could be drilled for each 50-MW geothermal project, for a total of 80 acres of disturbed land; the three power plants, together, would require the

disturbance of 60 to 75 acres of land. All land that is temporarily disturbed but not required for the O&M phase of the project could be recontoured and revegetated to restore it as near as possible to pre-existing conditions.

These visual effects would be similar to those previously described for the exploration phase of the project, but on a larger scale due to the increased number of truck trips, the greater amount of supplies required for constructing the geothermal plants and FD wells, and the greater amount of ground-disturbing activities; however, effects could still be minor as the visual quality of the West Chocolate Mountains REEA is considered low, and all visual effects associated with construction could be short-term.

Short-term visual effects associated with the decommissioning phase of geothermal projects could include demolition work, truck trips to remove structures and equipment, regrading work, revegetation work, and fugitive dust from demolition and other ground disturbing activities. Visible effects could be short-term and could result in a beneficial effect (as compared to the adverse visual effects of the other phases of a geothermal project), as the decommissioning process could restore disturbed areas to their pre-existing conditions.

Conclusion

All short-term visual effects resulting from exploration, construction, and decommissioning for geothermal energy development would be consistent with the iVRM Class IV designation for the West Chocolate Mountains REEA and would meet visual resource objectives to provide for management activities which require major modification of the existing character of the landscape.

Under this alternative, the pending geothermal lease application (640 acres) would be approved. Geothermal exploration would begin which would result in the impacts to visual resources from geothermal exploration discussed earlier in this section. Currently, the size of the power plant is unknown since exploration has not begun; however, other power plants in the region are less than 50 MW so it would be anticipated that exploration would be consistent with that of a geothermal power plant as discussed in the geothermal RFD scenario.

Long-Term Effects

Long-term visual effects could result from O&M activities required for geothermal projects and could include presence of new structures within an undeveloped landscape, steam plumes, presence of well maintenance equipment including coiled-tubing units or drilling rigs, and lighting. These visual effects could encroach on scenic views of the largely undeveloped desert area. Long-term land disturbance for three geothermal projects could occur on approximately 359 acres of BLM land (1,026 acres BLM and private) within the West Chocolate Mountains REEA. Visible effects from O&M could occur for the lifetime of the project, although well maintenance would occur sporadically rather than continuously.

Conclusion

Where possible, geothermal plants and associated infrastructure could be sited in areas where topography could obscure the facilities from viewer groups such as motorists, nearby residents, and nearby communities. If geothermal plants could not be sited in locations where topography could screen the facilities from view, visual effects could be moderate and long-term. Although the existing visual quality of the West Chocolate Mountains REEA is low, several viewer groups have high levels of sensitivity; therefore, long-term visual effects on these viewer groups could be moderate. However, moderate visual changes would be consistent with the VRM Class IV goals for the area and geothermal energy development would be consistent with visual resource objectives to provide for management activities which require major modification of the existing character of the landscape.

Indirect Visual Impacts from Geothermal Energy Development

Visual effects associated with geothermal energy development could occur as a direct result of exploration, construction, O&M, and decommissioning activities. No indirect visual effects would occur.

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 geothermal energy development, which could result in the development of geothermal energy projects and impacts to visual resources from construction and O&M.

The development cap which would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres) would minimize the impact to visual resources east of the Canal.

Direct Visual Impacts from Solar Energy Development

Direct impacts from solar energy development could occur as a result of site construction, O&M, and decommissioning, as listed in Table 4.11-2. Visual quality and viewer sensitivity is the same as described above for geothermal energy development. It is assumed that either CSP or solar PV projects could be developed. Due to the wide range of solar development that could occur in the West Chocolate Mountains REEA, the activities that could occur during solar energy development have been based on the development of a 50-MW solar PV project and a 500-MW CSP project. These sizes were selected based on the availability of data related to development of these types of projects. PV and CSP are the two technologies that have been fielded most widely in the United States and throughout the world.

Short-Term Effects

Short-term effects on visual resources include those effects that could occur only within a specific phase of the project, such as site evaluation or construction, where land could be restored upon completion of the activity. Short-term effects on visual resources would be similar for both CSP and PV technologies; however, because a 500-MW CSP project would be about five times the size of a 50-MW solar PV project, visual impacts would be greater for a CSP project than a PV project.

Short-term, adverse effects on visual resources resulting from site exploration could include ground clearing (approximately 10 to 20 square feet), the presence of solar meters, and traffic and clutter from equipment during the solar meter installation process. Solar meters would be installed along existing roadways or at locations reachable on foot; therefore, new access roads would not be required for the installation of solar meters.

Visible effects could be short-term, as solar meters would be removed after use and, because the ground clearing would take place in a small area, alteration to ground cover and contour would be visible only within the immediate vicinity of a solar meter location. Therefore, visual effects associated with site exploration for either a CSP or solar PV project could be negligible.

Short-term, adverse effects on visual resources resulting from construction could include vegetation loss or damage in areas where project components would be installed and in areas where access roads are created, exposed soils in areas where trenching has occurred to install underground electrical collection system and piping for CSP technology, alteration of the natural contours of the land, building of structures and infrastructure associated with a solar energy facility, fugitive dust from grading and other construction activities, and fugitive dust from truck trips associated with transporting equipment. Because a 500-MW CSP project would be approximately five times the size of a 50-MW solar PV project, effects for a CSP project would be greater than those of a solar PV project. Additionally, a CSP project could require installing larger structures, such as power towers, that would be required for a solar PV project.

Visible effects of construction could be short-term, as construction equipment would be removed from the site when construction is complete. All disturbed areas that are not required for the O&M phase of the project could be recontoured and revegetated, areas where the project features were located would not be restored, including the land where the solar panels and associated structures were located and access roads that are required for O&M.

Effects would be greatest for viewer groups with a high level of sensitivity, including some motorists on SR 111 and residents in the West Chocolate Mountains REEA, and nearby communities, because these viewer groups would have the most frequent views and the longest duration of views. Although adverse visual effects could occur as a result of construction activities, these effects could be moderate because the REEA is already considered to have low visual quality; moderate changes would be consistent with the iVRM Class IV designation. Additionally, visual effects associated with construction could be short-term.

Short-term, adverse effects on visual resources resulting from decommissioning of a CSP or solar PV project could include clutter and fugitive dust from demolition work and truck trips to remove structures and equipment, regrading work, and revegetation work. Visible effects could be short-term and could result in a beneficial effect as the decommissioning process would restore disturbed areas to their pre-existing conditions. However, because both solar technologies would require large amounts of clearing and potentially grading, recontouring and revegetation efforts could require multiple attempts as restoration could be difficult in the arid climate.

Conclusion

All short-term visual effects resulting from exploration, construction, and decommissioning for solar energy development would be consistent with the iVRM Class IV designation for the West Chocolate Mountains REEA and would meet visual resource objectives to provide for management activities which require major modification of the existing character of the landscape.

Long-Term Effects

Long-term visual effects that could result from O&M activities required for a CSP project include approximately 2,500 acres of long-term land disturbance, the presence of mirrors and other facility features in an undeveloped landscape, introduction of a new source of light and glare, and truck traffic and materials delivery for both scheduled and unscheduled maintenance activities. These visual effects could encroach on scenic views of a largely undeveloped desert area.

Although the West Chocolate Mountains REEA is considered to have low visual quality, 2,500 acres of land disturbance represents approximately 4 percent of the total land considered for development in the West Chocolate Mountains REEA. The majority of the 2,500 acres could be covered with mechanical components of the project and components for CSP technology with power towers that could be over 600 feet tall. Power towers may require Federal Aviation Administration (FAA) safety lighting due to their height, which could introduce a new long-term source of light. Mirrors used as part of the CSP technology could also introduce a new long-term source of glare.

Visual effects could also occur as a result of vehicular traffic for inspection and material delivery, including the quarterly mirror washings. For the most sensitive viewers in the REEA, including motorists on SR 111, dispersed residences, and communities within or adjacent to the REEA, a CSP project could result in a major adverse effect if sited within the foreground distance zone.

Long-term visual effects that could result from O&M activities required for a PV project include approximately 500 acres of long-term land disturbance, the presence of solar panels and other facility features in an undeveloped landscape, and truck traffic and materials delivery for both scheduled and unscheduled maintenance activities. The long-term land disturbance required for a 50-MW solar PV project is 500 acres. In addition to the fact that a PV project would require less land for project components than a CSP project, the components required for a solar PV project could be relatively low to the ground and the panels could be coated with an anti-reflective treatment to minimize the introduction of new sources of light and glare. Because the REEA is already considered to have low visual quality, the effect of a 50-MW solar PV project on visual resources could be moderate for the most sensitive viewer groups if the project was sited within the foreground distance zone. The effect on visual resources would decrease with distance. A moderate visual effect would be consistent with the iVRM Class IV designation established for the West Chocolate Mountains REEA.

Conclusion

However, major visual changes would be consistent with the VRM Class IV goals for the area, and solar energy development would be consistent with visual resource objectives to provide for management activities, which require major modification of the existing character of the landscape.

Indirect Visual Impacts from Solar Energy Development

All visual effects associated with solar energy development could occur as a direct result of site exploration, construction, O&M, and decommissioning activities. No indirect visual effects would occur.

Direct Visual Impacts from Wind Energy Development

Under this alternative, one 45-MW wind farm could be constructed.

Short-Term Effects

Short-term effects on visual resources due to site exploration could include ground clearing (less than one acre per site), the presence of METs, and traffic and clutter during the MET installation process. Visible effects could be short-term, as METs would be removed after use and because the ground clearing would take place in a small area, alteration to ground cover and contour would be visible only within the immediate vicinity of a solar meter location. Therefore, visual effects associated with site exploration for a wind energy project could be negligible.

Short-term effects on visual resources due to construction of a wind energy facility could include vegetation loss or damage, exposed soils where trenching has occurred for foundation and electrical distribution system installation, alteration of the natural contours of the land, building of turbines, structures, and infrastructure associated with a wind facilities, fugitive dust from grading and other construction activities, and fugitive dust from truck trips associated with transporting equipment. Visible effects of construction could be short-term, as construction equipment would be removed from the site when construction is complete. All disturbed areas that are not required for the O&M phase of the project would be recontoured and revegetated, roads providing access to the turbines would not be reclaimed and would remain for the life of the project. These effects could be minor, as the visual quality of the West Chocolate Mountains REEA is considered low, and all visual effects associated with construction could be short-term.

Short-term effects on visual resources as a result of decommissioning of a wind energy facility could include clutter and fugitive dust from demolition work and truck trips to remove structures and equipment, regrading work, and revegetation work. Visible effects could be short-term and could result in a beneficial effect (as compared to the adverse visual effects of the other phases of a wind project), as the decommissioning process would restore disturbed areas to their pre-existing conditions.

Conclusion

All short-term visual effects resulting from exploration, construction, and decommissioning for wind energy development would be consistent with the iVRM Class IV designation for the West Chocolate Mountains REEA and would meet visual resource objectives to provide for management activities which require major modification of the existing character of the landscape.

Long-Term Effects

Long-term effects on visual resources as a result of the O&M of a 45-MW wind energy facility could include the presence of turbines, which could be highly visible in rural or natural landscapes, access roads that could introduce new lines into the landscape, shadow flicker (strobe-like effects from flickering shadows cast by the moving rotors), blade glint from the sun reflecting off moving blades, visual contrasts from support facilities, and light pollution from the lighting on facilities and towers (which are FAA required safety features).

Disassembly and repair of equipment could occur, producing the appearance of idle or missing rotors, "headless" towers (when nacelles are removed), and lowered towers. Visible effects from the presence of turbines and associated structures could be long-term. Visible effects resulting from repair or replacement of turbines could occur on an as-needed basis. These visual effects could encroach on scenic views of a largely undeveloped desert area.

A 45-MW wind energy facility could comprise approximately 15 wind turbines and associated structures and infrastructure. A wind energy facility of this size could require long-term land disturbance for approximately 40 acres including approximately 9 acres of disturbance for access roads. The wind turbines would be over 400 feet tall, which could be highly visible in an undeveloped region. Additionally, due to the height of the turbines, the turbines may need to be painted a bright white color or permanently lit with flashing red lights due to FAA safety regulations. This could introduce a new source of light and glare into the viewshed.

Although the existing visual quality of the West Chocolate Mountains REEA is considered low, a 45-MW wind energy facility could result in a major impact if it were sited close to the most sensitive visual receptors in the area, (i.e., motorists on SR 111 north of Bombay, dispersed rural residences, and communities within and adjacent to the West Chocolate Mountains REEA); however, visual effects would decrease with distance.

Conclusion

If project components were set back to middleground distance zones from viewer groups considered to have a high degree of visual sensitivity or sited in a location where topography obstructs views of the project features, the visual effect could be moderate and consistent with the iVRM Class IV designation for the REEA.

Indirect Visual Impacts from Wind Energy Development

All visual effects associated with solar energy development could occur as a direct result of site exploration, construction, O&M, and decommissioning activities. No indirect visual effects would occur.

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 result in the development of wind energy projects and impacts to visual resources from construction and O&M.

The designation of all lands within the REEA with an MUC of "I" means these lands would be managed for concentrated use to meet human needs. Thus, intensive renewable energy development would be allowed, but the development cap which would limit wind energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres) would minimize the impact to visual resources east of the Canal.

Although reasonable protection would be provided for sensitive natural values and mitigation of impacts and rehabilitation of impacted areas would occur when possible, the goal would be to allow development to occur within this area.

4.11.4.4 Alternative 4: Geothermal Development Only

Under this alternative, geothermal energy could be developed to the achievement of levels of geothermal energy development consistent with the geothermal RFD scenario; there would be no solar or wind energy development. Under this alternative, the following impacts would be the same as Alternative 3:

- Direct and indirect visual impacts from geothermal energy development;
- Acquired lands; and
- Existing noncompetitive lease application.

Geothermal impacts would be the same as Alternative 3. Under this alternative, the West Chocolate Mountains REEA would not be designated as an SEZ and solar or wind energy development would not be allowed. Additionally, the development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). This alternative would not conform to the CDCA goal to identify potential sites for wind energy development.

4.11.4.5 Alternative 5: Solar Energy Development Emphasis with Moderate Geothermal Development and No Wind Development

Under this alternative, solar energy could be developed to the achievement of levels of development consistent with the maximum extent as defined in the solar RFD scenario. There would be no wind energy development. Geothermal energy could be developed to the achievement of levels of geothermal energy development consistent with a moderate level (50 MW) as defined in geothermal RFD scenario.

Under this alternative, the following would be the same as Alternative 3:

- Acquired lands;
- Existing noncompetitive lease application; and
- Direct and indirect visual impacts from solar development.

Direct Visual Impacts from Geothermal Energy Development

Under this alternative, only one geothermal power plant could be constructed. Adverse effects on visual resources could result from the same activities as described under Alternative 3, but could occur on a smaller scale because only one geothermal power plant could be constructed instead of three. The differences in effects on visual resources are described below.

Short-Term Effects

Because only one project could be constructed instead of three, all short-term effects on visual resources would be less for this alternative than Alternative 3. Short-term land disturbance for one geothermal project could occur on approximately 342 acres of land within the West Chocolate Mountains REEA.

Conclusion

Because Alternative 3 could result in short-term visual effects that would be consistent with the iVRM Class IV designation for the REEA, and the effect on visual resources for this alternative would be less than the effect of Alternative 3, the effect of this alternative would also be consistent with the iVRM Class IV designation.

Long-Term Effects

Similar to the short-term effects described above, long-term effects on visual resources for this alternative would be less than those described for Alternative 3 because one geothermal energy project could be constructed instead of three. One geothermal power plant and associated infrastructure could result in long-term disturbance to approximately 313 acres of land instead of 342 acres of land for three geothermal power plants.

Conclusion

Therefore, because the long-term effects of Alternative 3 would be consistent with the established iVRM Class, the long-term effects on visual resources for this alternative would also be consistent with iVRM Class IV designations.

Indirect Visual Impacts from Geothermal Energy Development

All visual effects associated with geothermal energy development could occur as a direct result of site exploration, construction, O&M, and decommissioning activities. No indirect visual effects would occur.

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 geothermal energy development, which could result in the development of geothermal energy projects and impacts to visual resources from the construction and O&M of geothermal power plants, although the development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

4.11.4.6 Alternative 6: Geothermal Development Emphasis with Moderate Solar Development and No Wind Development

Under this alternative, it is assumed that achievement of levels of development consistent with the maximum development defined in the geothermal RFD scenario would take place (the same as discussed for Alternative 3) and that the level of achievement consistent with partial development of the solar RFD scenario would be realized.

Lands within the West Chocolate Mountains REEA that lie east of the Coachella Canal would not be considered for an SEZ, modified or otherwise. Lands west of the canal would be identified as an SEZ, allowing other compatible renewable energy developments to occur.

Under this alternative, the following would be the same as Alternative 3:

- Acquired lands;
- Existing noncompetitive lease application;
- Direct and indirect visual impacts from geothermal development; and
- Direct and indirect visual impacts from CSP (dish engine only) and PV solar development.

Direct and Indirect Visual Impacts from Geothermal Energy Development

Under this alternative, the lands west of the Coachella Canal would be identified as an SEZ, a designation that would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments, including geothermal energy development, to occur within the West Chocolate Mountains SEZ. The lands east of the Coachella Canal would not be considered for an SEZ. In addition, all lands east of the Coachella Canal would have a development cap that would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Direct Visual Impacts from Solar Energy Development

The foreseeable development described here could occur on any land within the West Chocolate Mountains REEA. Under the partial solar RFD scenario, the trough and power tower technologies were eliminated, and dish engine would be the only technology developed. Adverse effects on visual resources could result from the same activities as described under Alternative 3, but would occur on a smaller scale because only dish engine CSP technology could be constructed.

Short-Term Effects

Because Alternative 3 could result in short-term visual effects that would be consistent with the iVRM Class IV designation for the West Chocolate Mountains REEA and the effect on visual resources for this alternative would be less than the effect of Alternative 3, the effect of this alternative would also be consistent with the iVRM Class IV designation.

Long-Term Effects

Similar to the short-term effects described above, long-term effects on visual resources for this alternative would be less than those described for Alternative 3. Partial solar development could result in a reduced effect on visual resources as compared to full development because solar dish technology would require less land than the solar trough technology used in the analysis for a 500-MW CSP project in Alternative 3. Additionally, there would be no power towers over 350 feet in height or require FAA safety lighting that could introduce a new long-term source of light.

Partial solar development could still result in long-term, adverse effects due to the amount of land disturbance required, and the use of mirrors could introduce a new long-term source of glare and visual effects from vehicular traffic used for inspection and material delivery, including the quarterly mirror washings. These visual effects could encroach on scenic views of a largely undeveloped desert area. For the most sensitive viewers in the West Chocolate Mountains REEA, including motorists on SR 111, dispersed residences, and communities within or adjacent to the REEA, a CSP project could result in a major adverse effect if sited within the foreground distance zone. A major adverse effect would be consistent with the iVRM Class IV designation established for the West Chocolate Mountains REEA.

The effect on visual resources for solar PV projects under this alternative would be the same as for those described under Alternative 3.

Indirect Visual Impacts from Solar Energy Development

All visual effects associated with solar energy development could occur as a direct result of site exploration, construction, O&M, and decommissioning activities. No indirect visual effects would occur. In addition, the development cap would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

4.12 Lands and Realty

This section discusses the effects to lands and realty that could occur with implementation of the alternatives. First, the management goals are provided; second, the impact indicators used to identify and analyze effects are presented; third, typical impacts are discussed for geothermal, solar and wind energy; and last, impacts are analyzed by alternative.

4.12.1 Management Goals

The CDCA Plan and WECO Plan Amendment do not have any formal management goals for lands and realty.

4.12.2 Impact Criteria

The potential risk of direct impacts on lands and realty are assessed with respect to the following criteria. Potential impacts on land uses could occur if the any of the following were to take place:

- A conflict with existing federal, state, and local land uses, plans, and policies;
- A conflict with existing BLM land use authorizations;
- Changes in public land disposition;
- Restriction of the land use authorizations of the BLM;
- Restriction of land tenure adjustments; or
- Imposed restrictions on livestock and grazing management.

4.12.3 Typical Lands and Realty Impacts from Energy Development

Geothermal, solar, and wind energy impacts on BLM lands and realty are managed to create a network of compatible land uses across the entirety of public lands. During site evaluation and exploration for geothermal energy, surveying activities could cause short-term impacts to land use if additional roads or routes are developed to survey the potential geothermal sites and could also impact recreational land uses by interrupting open routes of travel through additional traffic from construction and O&M, unusual uses such as the transportation of oversize objects like wind turbine blades and generators, or breaks in the continuous use of the route due to construction activities.

If a route is intersected by a project that could close that route for a prolonged length of time, an attempt would be made to provide an alternate route that would provide the same level of access. Subsurface mineral exploration could also be interrupted. These short-term impacts would be similar during geotechnical testing, MET installation and operation (for wind energy only), and construction periods for solar and wind energy. Other short-term impacts could include solar energy testing and air quality monitoring.

Due to the potential changes in solar energy testing technologies, the presence of large-scale solar facilities present potential NAAQS, CAAQS, and ICAPCD particulate matter exceedances (PM_{10}; see Section 4.1). PM_{10} monitoring is a BMP that may be required. During operation, the impacts would remain the same, but include a larger footprint and become long-term. Following decommissioning, land uses would likely revert to their previous state before energy development, which would result in no impact. Collocation of energy development could include directionally drilled oil and gas wells, underground mining, and geothermal or solar energy development.

During construction and operation of wind energy facilities, short-term impacts to aviation could be possible if the project is located within 20,000 feet or less of an existing public or military airport, or if construction involves objects greater than 200 feet in height, which is the case for wind turbines and possibly transmission towers. The FAA would be responsible for determining if the project could adversely affect commercial, military, or personal air navigation

safety. Similarly, impacts to military operations could occur if a project was located near a military facility, if that facility conducts low-altitude military testing and training activities.

4.12.3.1 Typical Lands and Realty Impacts from Geothermal Energy Development

The Geothermal PEIS identified typical impacts on lands and realty associated with geothermal energy development. The impacts are incorporated by reference and summarized in Table 4.12-1.

Table 4.12-1 Typical Impacts to Lands and Realty from Geothermal Energy Development

Project Phase	Activity	Impact	Time Frame
Site Evaluation/ Exploration	– Surveying and well drilling. – Access road and well pad construction. – Staging equipment. – Vehicular traffic.	– Land used for footprint of MET and any guy wire anchors is generally unavailable for other uses. – Conflicts with land use activities such as grazing and recreation. – Mineral exploration interrupted.	Short-term.
Construction	– Vehicular traffic. – Drilling. – Construction of injection wells and sump pits. – Drilling production and injection wells. – Constructing fluid sump pits and access roads.	– Land under the well pad could be impacted, eliminating all other potential uses.	Short-term.
Operation and Maintenance	– Transformer, power house, and cooling tower operation. – Vehicular traffic.	– Development of solar energy facilities could be subject to the rights of holders of existing ROWs, and the BLM may not force changes in existing ROW authorizations. However, if a holder of a ROW agrees to modify an existing ROW, the solar energy project developer likely would be financially responsible for the cost of any modifications. Once a solar facility is authorized, the area could be excluded from use for other lands and realty purposes inconsistent with operation of the solar facility. Due to the potentially large size of utility-scale solar facilities, these exclusions could serve as substantial barriers to other lands and realty uses.	Long-term.

Table 4.12-1 Typical Impacts to Lands and Realty from Geothermal Energy Development

Project Phase	Activity	Impact	Time Frame
Decommissioning	– Vehicular traffic. – Staging equipment. – Facility removal. – Breaking up concrete pads and foundations. – Removing access roads that are not maintained for other uses. – Recontouring the surface. – Revegetation.	– Land would no longer be excluded from use for other lands and realty purposes. Land would be available for use in accordance with the RMP.	Short-term.

4.12.3.2 Typical Lands and Realty Impacts from Solar Energy Development

Based on a review of environmental documentation for other solar energy projects, typical impacts for solar energy projects have been developed. The typical impacts on lands and realty associated with solar energy development are summarized in Table 4.12-2.

Table 4.12-2 Typical Impacts to Lands and Realty from Solar Energy Development

Project Phase	Activity	Impact	Effect
Site Evaluation	– Geotechnical testing. – Vehicular traffic.	– Less land available due to new road ROWs. – Conflicts with land use activities such as grazing and recreation. – Mineral exploration interrupted.	Short-term.
Construction	– Construction of solar facility. – Access road construction. – Construction worker and equipment vehicular traffic.	– Land under the solar arrays and ancillary facilities could be impacted, eliminating all other potential uses.	Long-term.
Operation and Maintenance	– Solar energy generation.	– Development of solar energy facilities could be subject to the rights of holders of existing ROWs, and the BLM may not force changes in existing ROW authorizations. However, if a holder of a ROW agreed to modify an existing ROW, the solar energy project developer likely would be financially responsible for the cost of any modifications. Once a solar facility is authorized, the area could be excluded from use for other lands and realty	Long-term.

Table 4.12-2 Typical Impacts to Lands and Realty from Solar Energy Development

Project Phase	Activity	Impact	Effect
		purposes inconsistent with operation of the solar facility. Due to the potentially large size of utility-scale solar facilities, these exclusions could serve as substantial barriers to other lands and realty uses.	
Decommissioning	– Vehicular traffic. – Staging equipment. – Facility removal. – Breaking up concrete pads and foundations. – Removing access roads that are not maintained for other uses. – Recontouring the surface. – Revegetation.	– Land would no longer be excluded from use for other lands and realty purposes. Land would be available for use in accordance with the RMP.	Long-term.

4.12.3.3 Typical Lands and Realty Impacts from Wind Energy Development

The Wind PEIS identified typical impacts on lands and realty associated with wind energy development. The impacts are incorporated by reference and summarized in Table 4.12-3.

Table 4.12-3 Typical Impacts to Lands and Realty from Wind Energy Development

Project Phase	Activity	Impact	Effect
Site Evaluation	– MET installation and maintenance. – Geotechnical testing.	– Land used for METs unavailable for other uses.	Short-term.
Construction	– Construction of wind turbines and ancillary facilities.	– Conflicts with existing land use plans and community goals. – Conflicts with existing recreational, educational, religious, scientific, or other use areas. – Conversion of the existing commercial land use for the area (e.g., mineral extraction).	Long-term.

Table 4.12-3 Typical Impacts to Lands and Realty from Wind Energy Development

Project Phase	Activity	Impact	Effect
Operation and Maintenance	– Wind energy O&M.	– Development of solar energy facilities could be subject to the rights of holders of existing ROWs, and the BLM may not force changes in existing ROW authorizations. However, if a holder of a ROW agreed to modify an existing ROW, the solar energy project developer likely would be financially responsible for the cost of any modifications. Once a solar facility is authorized, the area could be excluded from use for other lands and realty purposes inconsistent with operation of the solar facility. Due to the potentially large size of utility-scale solar facilities, these exclusions could serve as substantial barriers to other lands and realty uses.	Long-term.
Decommissioning	– Vehicular traffic. – Staging equipment. – Facility removal. – Breaking up concrete pads and foundations. – Removing access roads that are not maintained for other uses. – Recontouring the surface. – Revegetation.	– Land would no longer be excluded from use for other lands and realty purposes. Land would be available for use in accordance with the RMP.	Long-term.

4.12.4 Lands and Realty Resources Impacts by Alternative

This section describes the effects under each alternative using the respective methodology prescribed under NEPA. To compare effects, this analysis defines the temporal scale (time), spatial extent (area), and intensity of effects for each alternative.

This EIS analyzes impacts to all resources, including habitat and protected species, to the extent necessary for a programmatic document, subject to existing data availability. Site-specific analyses, based on data compiled from detailed studies, will be conducted for site-specific proposals. If the constraints discussed in Section 2.1 are discovered during project planning or following further future studies, as determined necessary by an authorized officer, portions of the West Chocolate Mountains REEA may be determined to be closed to and unsuitable for geothermal, solar, and wind energy development.

Effects on lands and realty could arise from project construction, O&M, and decommissioning equipment and vehicles, as well as from the introduction of construction or O&M related traffic on local roads near the project. The following discussion analyzes the environmental consequences or impacts expected to occur as a result of anticipated future actions consistent with implementing the alternatives described in Chapter 2.

4.12.4.1 Alternative 1: No Action/No CDCA Plan Amendment

Because geothermal, wind, and solar development could still occur under the No Action/No CDCA Plan Amendment alternative, impacts to lands and realty would be expected to be similar to those detailed in Section 4.12.4.3 for Alternative 3However, development under the No Action/No CDCA Plan Amendment alternative may occur at a slower rate because an individual plan amendment process would be necessary for each solar or wind authorization; thus, impacts may occur at a slower rate, as well.

No renewable energy development cap or other protective stipulations/measures pertaining to the east side of the Coachella Canal would be adopted under this alternative. Thus, there would be no restrictions on development east of the Coachella Canal and impacts to lands and realty that would not occur under Alternative 3 east of the Coachella Canal could occur under Alternative 1.

4.12.4.2 Alternative 2: No Development/CDCA Plan Amendment to Identify Areas as Closed to and Unsuitable for Geothermal, Solar, and Wind Energy Development

There would be no new construction or operation of geothermal power plants, or solar or wind energy projects, except those which are currently approved or operating. Lands and realty would not be affected by new geothermal, wind, or solar projects; however, the closure of these lands for renewable energy development would represent an opportunity cost. The energy that could have been supplied by development of this area for geothermal, solar, and/or wind energy would have to be filled by other fossil fuel or renewable energy generating facilities constructed elsewhere.

No renewable energy development cap or other protective stipulations/measures pertaining to the east side of the Coachella Canal would be adopted under this alternative. Thus, there would be no restrictions on development east of the Coachella Canal, and impacts to lands and realty that would not occur under Alternative 3 east of the Coachella Canal could occur under Alternative 2.

4.12.4.3 Alternative 3: Renewable Energy Development Emphasis

Under this alternative, geothermal, solar, and wind could be developed to the maximum extent as defined in the geothermal, solar, and wind RFD scenarios. Up to 1,026 acres of land could be disturbed for development of geothermal power plants; up to 29,758 acres of land could be disturbed for development of solar PV projects; up to 6,637 acres could be disturbed for development of CSP projects; and up to 76 acres of land could be disturbed for wind energy projects. Solar development could occur through the development of a 50-MW solar PV power plant and 500-MW CSP project.

Under this alternative, the REEA would be designated as an SEZ. An SEZ would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments, including geothermal and wind energy development, to occur within the West Chocolate Mountains SEZ.

Direct Lands and Realty Impacts from Geothermal Energy Development

BLM lands within the CDCA have been designated geographically into four multiple use classes: C (controlled), L (limited use), M (moderate use), and I (intensive use). Lands within the West Chocolate Mountains REEA are unclassified. 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 geothermal energy development, which could lead to an increase in impacts to lands and realty from an increase in the development of geothermal energy projects.

The development cap which would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres) would minimize the impact to lands and realty east of the Canal.

There are currently 34 BLM land use authorizations present in the area (Table 3.12-2, Chapter 3). Long-term, direct effects to the lands and realty program could occur if development of the three 50-MW geothermal power plants interfered with the operation of the existing BLM land use authorizations or the facilities currently authorized on private land within the West Chocolate Mountains REEA. However, given the small amount of land (1,026 acres on BLM and private land) that could be developed within the REEA from three geothermal projects, leasing the subsurface geothermal resources would not affect existing realty agreements. Long-term effects to the lands and realty program could occur on future development within the West Chocolate Mountains REEA by converting undeveloped BLM or other lands to geothermal energy use. This effect would not be adverse. Development of geothermal facilities would require new leases. The existing BLM lands and realty program could accommodate the need for additional leases, but would not allow development that could affect existing ROWs. Future land use authorizations and land tenure adjustments would not be affected.

The construction of the three 50-MW geothermal power plants and the height of ancillary facilities such as cooling towers could conflict with FAA regulations that address potential aircraft obstruction for structures taller than 200 feet or within 20,000 feet of an airport. Consultation with the FAA may be necessary based on the distance of equipment from an airport. If an aeronautical study is required, the FAA would review the project prior to construction. Form 7460-1 would be prepared for the project and submitted to the FAA to notify them that the construction improvements would exceed 200 feet in height (or less, depending on proximity to an airport). This action would result in a determination by the FAA as to whether or not the project would constitute an obstruction or safety hazard to air navigation. The construction of the three 50-MW geothermal power plants could also impact the use of designated utility corridors within the West Chocolate Mountains REEA. A corridor conflict analysis would be required for any project with the potential to impact these corridors.

Conclusion

Geothermal energy development would not conflict with BLM's multiple-use management objectives. This alternative would also conform to the CDCA goal to identify potential sites for geothermal development. Private lands and lands owned by the California State Lands Commission (CSLC) would be developed in accordance with the CSLC guidance for developing mineral resources and with the Imperial County General Plan.

Indirect Lands and Realty Impacts from Geothermal Energy Development

Indirect effects to lands and realty could occur if the development of the three 50-MW geothermal power plants affected surrounding land uses such as the ISDRA, Chocolate Mountains Aerial Gunnery Range (CMAGR), or the Wister Unit of the Imperial Wildlife Area. Due to the small amount of land (1,026 acres on BLM and private land) that could be developed, these projects could be sited away from these land uses and no effect would occur. Currently, private lands in the West Chocolate Mountains REEA are undergoing geothermal energy development.

Direct Lands and Realty Impacts from Solar Energy Development

Direct effects to the lands and realty program could occur if up to 6,637 acres of CSP or up to 29,758 acres of solar PV power would be developed, although lands acquired by BLM with LWCF funds would be managed as avoidance areas. There are currently 34 BLM land use authorizations present in the West Chocolate Mountains REEA (Table 3.12-2).

Because this action could encompass most of the REEA, there could be long-term, adverse effects to the operation of the existing land use authorizations present on BLM land or the land use authorizations on other lands within the REEA. Direct effects to lands and realty could occur to future development within the REEA by converting up to 6,637 acres for CSP or 29,758 acres for solar PV projects of undeveloped BLM or private land to solar energy use. This could prevent the REEA from being developed for other uses and result in long-term, adverse effects to any other type of land use. Development of solar facilities would require that new ROWs be granted. The large number of ROWs that may be required could constrain the BLM lands and realty program and could affect the BLM's ability to address other lands and realty issues. Future land use authorizations and land tenure adjustments could be affected by the amount of potential development.

The construction of 50-MW solar PV projects and 500-MW CSP projects could conflict with FAA regulations that address potential aircraft obstruction for structures taller than 200 feet or within 20,000 feet of an airport. This is particularly true if a power tower project were developed, since these structures typically have a height of 600 feet. Consultation with the FAA may be necessary on the distance of equipment from an airport. If an aeronautical study is required, the FAA would review the project prior to construction. Form 7460-1 would be prepared for the project and would be submitted to the FAA to notify them that the construction improvements would exceed 200 feet in height (or less, depending on proximity to an airport). This action would result in a determination by the FAA as to whether or not the project would constitute an obstruction or safety hazard to air navigation. The construction of 50-MW solar PV projects and 500-MW CSP projects could also impact the use of designated utility corridors

within the West Chocolate Mountains REEA. A corridor conflict analysis would be required for any project with the potential to impact these corridors.

Conclusion

Solar development would not conflict with BLM's multiple-use management objectives. Private lands and lands owned by the CSLC would be developed in accordance with the CSLC guidance for developing energy facilities and with the County of Imperial General Plan.

Indirect Lands and Realty Impacts from Solar Energy Development

Indirect effects to lands and realty could occur if the development of up to 6,637 acres of CSP or up to 29,758 acres of solar PV power affected surrounding land uses such as the ISDRA, CMAGR, or the Wister Unit of the Imperial Wildlife Area. Due to the amount of land (6,637 acres for CSP or 29,758 acres for PV) that could be developed under this alternative, it would not be possible to site the project clear of these land uses. However, there would be no effect to the operation of these land use authorizations. Currently, private lands around the West Chocolate Mountains REEA are undergoing geothermal energy development. The development cap, which would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres), would minimize the impacts to lands and realty resources east of the canal.

Direct Lands and Realty Impacts from Wind Energy Development

Under Alternative 3, one 45-MW wind project could be developed. There are currently 34 BLM land use authorizations present in the area (Table 3.12-2, Chapter 3, Affected Environment). Direct effects to the lands and realty program could occur if development of the one 45-MW wind energy project interfered with the operation of the existing BLM land use authorizations or the land use authorizations on other land within the West Chocolate Mountains REEA. However, given the small size of a 45-MW wind energy project (14 acres on BLM land and 40 total), granting a wind energy ROW would not affect existing realty agreements, nor would it affect future realty agreements. Long-term effects to lands and realty could occur to future development within the REEA by converting undeveloped BLM or private land to wind energy use. This effect could be long- term, but not adverse. Development of wind energy facilities would require new ROWs. The existing BLM lands and realty program could accommodate the need for additional ROWs and would not allow development that could affect existing ROWs. Future land use authorizations and land tenure adjustments would not be affected.

The construction of one 45-MW wind project could conflict with FAA regulations that address potential aircraft obstruction for structures taller than 200 feet or within 20,000 feet of an airport because the wind turbines would be more than 200 feet in height. Consultation with the FAA may be necessary depending on the distance of equipment from an airport. If an aeronautical study is required, the FAA would review the project prior to construction. Form 7460-1 would be prepared for the project and submitted to the FAA to notify them that the construction improvements would exceed 200 feet in height (or less, depending on proximity to an airport). This action would result in a determination by the FAA as to whether or not the project would constitute an obstruction or safety hazard to air navigation.

Development of a 45-MW wind energy facility, including ROWs, would require a new ROW grant. The existing BLM lands and realty program could accommodate the need for an additional ROW grant and would not allow development that could affect existing ROWs. The construction of a 45-MW wind project could also impact use of the designated utility corridors within the West Chocolate Mountains REEA. A corridor conflict analysis would be required for any project with the potential to impact these corridors.

Conclusion

Wind energy development would not conflict with BLM's multiple-use management objectives. This alternative would also conform to the CDCA goal to identify potential sites for wind energy development. Private lands and lands owned by the CSLC would be developed in accordance with the CSLC guidance for developing mineral resources and with the County of Imperial General Plan.

Indirect Lands and Realty Impacts from Wind Energy Development

Indirect effects to lands and realty could occur if the development of the one 45-MW wind energy facility affected surrounding land uses such as the CMAGR, ISDRA, or the Wister Unit of the Imperial Wildlife Area. Wind turbines pose a particular impact to airspace within the West Chocolate Mountains REEA. Private pilots utilize numerous small airports within the Imperial Valley, none of which are within the REEA; therefore, there would be no short- or long-term impacts to civilian air traffic. Conversely, the CMAGR operated by the DOD borders the REEA immediately to the east, and wind energy facilities located near that boundary could cause long-term impacts to the mission at that military installation. Consultation with the DOD is recommended during the site evaluation phase to ensure impacts to military airspace are mitigated to a level of insignificance. Currently, private lands in the REEA are undergoing geothermal energy development.

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 lands and realty from an increase in the development of wind energy projects, however, the development cap would limit wind energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

4.12.4.4 Alternative 4: Geothermal Development Only

Under this alternative, geothermal energy could be developed to the achievement of levels of geothermal energy development consistent with the geothermal RFD scenario; there would be no solar or wind energy development. Under this alternative, the following impacts would be the same as Alternative 3:

- Direct and indirect lands and realty impacts from geothermal energy development;
- Acquired lands; and
- Existing noncompetitive lease application.

Impacts from geothermal energy development would be the same as Alternative 3. Under this alternative, the West Chocolate Mountains REEA would not be designated as an SEZ and solar or wind energy development would not be allowed. Additionally, the development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). This alternative would not conform to the CDCA goal to identify potential sites for wind energy development.

4.12.4.5 Alternative 5: Solar Energy Development Emphasis with Moderate Geothermal Development and No Wind Development

Under this alternative, solar energy could be developed to the achievement of levels of development consistent with the maximum extent as defined in the solar RFD scenario. Geothermal energy could be developed to a moderate level (50 MW) as defined in geothermal RFD scenario.

Under this alternative, the following would be the same as Alternative 3:

- Acquired lands;
- Existing noncompetitive lease application; and
- Direct and indirect lands and realty impacts from solar development.

Impacts from solar energy development would be the same as Alternative 3. All lands within the West Chocolate Mountains REEA would be designated as an SEZ, which would allow other compatible renewable energy developments to occur. An SEZ also would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments, including geothermal energy, to occur within the West Chocolate Mountains SEZ.

Direct Lands and Realty Impacts from Geothermal Energy Development

Under this alternative, only one geothermal power plant would be constructed and could replace up to 50 MW of energy supplied by fossil fuel power facilities. There are currently 34 BLM land use authorizations present in the area (Table 3.12-2, Chapter 3). Long-term, direct effects to the lands and realty program could occur if development of the one 50-MW geothermal power plant interfered with the operation of the existing BLM land use authorizations or the facilities currently authorized on private land within the West Chocolate Mountains REEA. However, given the small amount of land (100 acres on BLM land and 312 acres of BLM and other land) that could be developed within the REEA from one geothermal project, leasing the subsurface geothermal resources would not affect existing realty agreements. Long-term effects to lands and realty could occur on future development within the REEA by converting undeveloped BLM or private land to geothermal energy use. This effect could be long-term, but would not be adverse. Development of geothermal facilities would require new leases. The existing BLM realty program would be able to accommodate the need for additional leases and would not allow development that could affect existing ROWs. Future land use authorizations and land tenure adjustments would not be affected.

Impacts pertaining to the FAA would be the same as Alternative 3.

Conclusion

Geothermal energy development would not conflict with BLM's multiple-use management objectives. This alternative would also conform to the CDCA goal to identify potential sites for geothermal development. Private lands and lands owned by the CSLC could be developed in accordance with the CSLC guidance for developing mineral resources and with the County of Imperial General Plan.

Indirect Lands and Realty Impacts from Geothermal Energy Development

Indirect effects to lands and realty could occur if the development of one 50-MW geothermal power plant affected surrounding land uses such as the CMAGR, ISDRA, or the Wister Unit of the Imperial Wildlife Area. Due to the small amount of land that could be developed, the project could be sited away from these land uses. 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 geothermal energy development, which could lead to impacts to lands and realty from an increase in geothermal energy projects. The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). A wide variety of uses, including energy and utility development would be allowed. Any damage that permitted uses cause would be required to be mitigated.

4.12.4.6 Alternative 6: Geothermal Development Emphasis with Moderate Solar Development and No Wind Development

Under this alternative, it is assumed that achievement of levels of development consistent with the maximum development defined in the geothermal RFD scenario would take place (the same as discussed for Alternative 3) and that the level of achievement consistent with partial development of the solar RFD scenario would be realized. Lands within the West Chocolate Mountains REEA that lie east of the Coachella Canal would not be considered for an SEZ, modified or otherwise. Lands west of the canal would be identified as an SEZ, allowing other compatible renewable energy developments to occur. There would be no wind energy development.

Under this alternative, the following would be the same as Alternative 3:

- Acquired lands;
- Existing noncompetitive lease application;
- Direct and indirect lands and realty impacts from geothermal development; and
- Direct and indirect lands and realty impacts from CSP (dish engine only) and PV solar development.

Impacts from geothermal energy development would be the same as Alternative 3.

Direct Lands and Realty Impacts from Solar Energy Development

Direct effects to the lands and realty program could occur if up to 6,637 acres of CSP (dish engine technology only) or up to 29,758 acres of PV power were to be developed, although

lands acquired by BLM with LWCF funds would be managed as avoidance areas. There are currently 34 BLM land use authorizations present in the area (Table 3.12-2, Chapter 3). Direct effects to lands and realty could occur to future development within the REEA by converting up to 6,637 acres for CSP or up to 29,758 acres for solar PV energy of undeveloped BLM or private land to solar energy use. This could prevent portions of the West Chocolate Mountains REEA from being developed for other uses and result in long-term, adverse effects to any other type of land use. Development of solar facilities would require new ROWs to be granted. The large amount of ROWs that may be required could constrain the BLM lands and realty program and could affect their ability to address other lands and realty issues. Future land use authorizations and land tenure adjustments could be affected by the amount of potential development.

Since the power tower technology would not be used under this alternative, there would not be a need for consultation with the FAA unless the project was in proximity to an airport.

The construction of 50-MW solar PV projects and CSP projects could impact use of the designated utility corridors within the West Chocolate Mountains REEA. A corridor conflict analysis would be required for any project with the potential to impact these corridors.

Conclusion

Solar development would not conflict with the BLM's multiple-use management objectives. The CDCA Plan would be amended to allow solar energy development subject to certain constraints. Private lands and lands owned by the CSLC would continue to be developed in accordance with the CSLC guidance for developing mineral resources and with the County of Imperial General Plan.

Indirect Lands and Realty Impacts from Solar Energy Development

Indirect effects to lands and realty could occur if the development of up to 6,637 acres of CSP or up to 29,758 acres of solar PV energy could affect surrounding land uses such as the CMAGR, ISDRA, or the Wister Unit of the Imperial Wildlife Area. Due to the amount of land (6,637 acres for CSP or 29,758 acres for PV) that could be developed, it would not be possible to site the project away from these land uses; however, there would be no effect to the operation of these land use authorizations. Currently, private lands in the West Chocolate Mountains REEA are undergoing geothermal energy development. In addition, the development cap would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Conclusion

If the REEA were to see increased solar energy development, it could contribute to the development of surrounding lands for all types of renewable energy. This could be a long-term, adverse effect to lands and realty, as no other type of development would be compatible. This could also induce other energy development within the West Chocolate Mountains REEA and make development of other industries or other programs less attractive.

Direct and Indirect Lands and Realty Impacts from Wind Energy Development

Under this alternative, there would be no wind development in the West Chocolate Mountains REEA; therefore, there would be no direct or indirect impacts from wind energy sources.

4.13 Human Health and Safety/Hazardous Materials

This section discusses the effects to human health and safety and management of hazardous materials that could occur with implementation of the alternatives. First, the management goals are provided; second the impact indicators used to identify and analyze effects are presented; third, typical impacts are discussed for geothermal, solar and wind energy; and last, impacts are analyzed by alternative.

4.13.1 Management Goals

The CDCA Plan does not set out specific goals for human health and safety and management of hazardous materials; however, it is BLM's stated policy to reduce threats to public health, safety, and property. In addition, in accordance with the FLPMA, BLM is required to comply with state standards for public health and safety. Additionally, the CDCA multiple-use classifications do not allow hazardous or non-hazardous waste disposal sites on public lands, except where landfills are suitable; the public lands may be transferred to the appropriate owner/operator.

4.13.2 Impact Criteria

The potential risk of impacts involving human health and safety/hazardous materials is assessed with respect to three criteria. Potential impacts involving human health and safety/hazardous materials could occur if any of the following were to take place:

- Creation of a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials;
- Creation of a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment; or
- Exposure of people or structures to a significant risk of loss, injury, or death.

4.13.3 Typical Human Health and Safety Impacts from Energy Development

Impacts to human health and safety from renewable energy development (geothermal, solar, and wind) could include the introduction of hazardous materials and accidents/risks inherent in industrial facilities during exploration, construction, operation, and decommissioning.

4.13.3.1 Typical Human Health and Safety Impacts from Geothermal Energy Development

The BLM Geothermal PEIS identified typical impacts on health and safety/hazards associated with geothermal energy development. The impacts are incorporated by reference and summarized in Table 4.13-1.

Table 4.13-1 Typical Impacts to Human Health and Safety from Geothermal Energy Development

Project Phase	Activity	Impact	Time Frame
Site Evaluation/ Exploration	– Surveying and well drilling. – Access road and well pad construction. – Staging equipment. – Vehicular traffic.	– Spills involving hazardous materials used such as petroleum, oils, and lubricants. – Accidents inherent in drilling operations.	Short-term.
Construction	– Drilling. – Construction of injection wells and sump pits.	– Exposure to drilling mud and geothermal fluid or steam during exploration and development drilling activities. – Exposure to hydrogen sulfide contained in geothermal fluid or steam during exploration, development, and operation phases. – Spills involving hazardous materials used and stored at facilities, such as petroleum, oil, lubricants, paints, solvents, and herbicides. – Exposure of individuals to electrical fires or wildfires. – Exposure of individuals to electric shock involved in maintenance of transmission lines and substations. – Vehicular accidents due to increased traffic on local roads. – Accidents inherent in drilling operations.	Short-term.
Operation and Maintenance	– Transformer, power house, and cooling tower.	Exposure of individuals to: – Geothermal fluid or steam during system failures, maintenance activities, or well blowouts. – Hydrogen sulfide contained in geothermal steam emissions. – Spills involving hazardous materials used, such as petroleum, oils, lubricants, paints, solvents, and herbicides. – Electrical fires and wildfires	Long-term.

Table 4.13-1 Typical Impacts to Human Health and Safety from Geothermal Energy Development

Project Phase	Activity	Impact	Time Frame
		caused by project activities. – Electric shock involved in maintenance of transmission lines and substations. – Vehicular accidents due to increased traffic on local roads.	
Decommissioning	– Vehicular traffic. – Staging equipment. – Facility removal. – Breaking up concrete pads and foundations. – Removing access roads that are not maintained for other uses. – Recontouring the surface. – Revegetation.	Exposure of individuals to: – Heat and hydrogen sulfide from geothermal fluid or steam during well capping. – Hazardous materials used during dismantling of structures and reclamation of a site, such as petroleum, oils, and lubricants. – Electrical fires or wildfires. – Vehicular accidents. – A variety of potential accidents inherent to demolition activities.	Short-term.

4.13.3.2 Typical Human Health and Safety Impacts from Solar Energy Development

Based on a review of environmental documentation for other solar energy projects, typical impacts for solar energy projects have been developed. The typical impacts on health and safety/hazards associated with solar energy development are summarized in Table 4.13-2.

Table 4.13-2 Typical Impacts to Human Health and Safety from Solar Energy Development

Project Phase	Activity	Impact	Time Frame
Site Evaluation/ Exploration	– Geotechnical testing. – Equipment Installation.	– Improper use, storage, and disposal of hazardous materials. – Exposure to contaminants. – Accidents involving people and or equipment. – Chemical or hazardous material spills.	Short-term.
Construction	– Grading and site preparation. – Solar array installation. – Ancillary structure construction. – Construction traffic.	– Industrial wastes could include minor amounts of fuels, spent vehicle and equipment fluids (lubricating oils, hydraulic fluids, battery electrolytes, glycol coolants), and spent solvents. – Disposal of hazardous waste	Short-term.

Table 4.13-2 Typical Impacts to Human Health and Safety from Solar Energy Development

Project Phase	Activity	Impact	Time Frame
		and materials would be transported off site for disposal, but impacts could result if the wastes were not properly handled and were released to the environment.	
Operation and Maintenance	– Presence of solar power plant. – Facility lighting. – Operation traffic.	– Unique to PV technologies, some high-performance solar cells may contain small amounts of cadmium, selenium, and arsenic, and are only hazardous if the solar cell is broken. Damaged cells would need to be characterized and managed as hazardous waste. – CSP technologies (parabolic trough and power tower) may generate substantial amounts of HTFs and industrial solid wastes, such as lubricating oils, compressor oils, and hydraulic fluids. – Exposure to electromagnetic fields and accidental injury or death to workers during O&M activities.	Short-term.
Decommissioning	– Vehicular traffic. – Facility removal. – Removal of access roads that are not maintained for other uses. – Hazardous materials and waste management.	– Substantial amounts of solid and industrial waste could be generated during the decommissioning and dismantling of the facility. – Wastes not properly handled and released into the environment. – Handling of high-performance PV cells containing toxic metals would be required. – Accidents involving earthmoving, crushing, large equipment, and transportation of overweight and oversized materials.	Short-term.

4.13.3.3 Typical Human Health and Safety Impacts from Wind Energy Development

The BLM Wind PEIS identified typical impacts on health and safety associated with wind energy development. The impacts are incorporated by reference and summarized in Table 4.13-3.

Table 4.13-3 Typical Impacts to Human Health and Safety from Wind Energy Development

Project Phase	Activity	Impact	Time Frame
Site Evaluation/ Exploration	– Waste storage and disposal of hazardous materials and waste. – Occupational and public health and safety risks normally associated with construction and outdoor activities.	– Exposure to contaminants. – Accidents involving people and/or equipment. – Chemical or hazardous material spills.	Short-term.
Construction	– Solid and industrial waste generated during construction activities. – Hazardous materials would be stored on site and transported off site for disposal, but impacts could result if the wastes were not properly handled and were released to the environment. – Potential impacts to worker and public health and safety from wind energy earthmoving, large equipment, and the transportation of oversized materials. – Working at heights, working in potential weather extremes, and possible contact with natural hazards, such as uneven terrain.	– Exposure to contaminants. – Accidents involving people and/or equipment. – Chemical or hazardous material spills.	Short-term.
Operation and Maintenance	– Industrial and sanitary wastes are generated during routine operations. – Improper handling of wastes and accidental releases into the environment. – Releases could occur if individual turbine components or electrical equipment were to fail.	– Exposure to contaminants. – Accidents involving people and/or equipment. – Chemical or hazardous material spills.	Short-term.
Decommissioning	– Vehicular traffic. – Staging of workers and equipment. – Facility removal. – Breaking up concrete pads and foundations. – Removing access roads that are not maintained for other uses. – Recontouring the surface. – Revegetation.	– Exposure to contaminants. – Accidents involving people and/or equipment. – Chemical or hazardous material spills.	Short-term.

4.13.4 Human Health and Safety Impacts by Alternative

This section describes the effects under each alternative using the respective methodology prescribed under NEPA. To compare effects, this analysis defines the temporal scale (time), spatial extent (area), and intensity of effects for each alternative.

This EIS analyzes impacts to all resources, including habitat and protected species, to the extent necessary for a programmatic document, subject to existing data availability. Site-specific analyses, based on data compiled from detailed studies, will be conducted for site-specific proposals. If the constraints discussed in Section 2.1.2 are discovered during project planning or following further future studies, as determined necessary by an authorized officer, portions of the West Chocolate Mountains REEA may be determined to be closed to and unsuitable for geothermal, solar, and wind energy development.

Effects to the public's health and safety could arise from project construction, O&M, and decommissioning equipment and vehicles, as well as from the introduction of construction or O&M related traffic on local roads near the West Chocolate Mountains REEA. The following discussion analyzes the consequences or impacts expected to occur as a result of anticipated future actions consistent with implementing the alternatives described in Chapter 2.

4.13.4.1 Alternative 1: No Action/No CDCA Plan Amendment

Because geothermal, wind, and solar development could still occur under the No Action/No CDCA Plan Amendment alternative, impacts to human health and safety would be expected to be similar to those detailed in Section 4.13.4.3 for Alternative 3. However, development under the No Action/No CDCA Plan Amendment alternative may occur at a slower rate because an individual plan amendment process would be necessary for each geothermal and solar or wind authorization; thus, impacts may occur at a slower rate, as well.

No renewable energy development cap or other protective stipulations/measures pertaining to the east side of the Coachella Canal would be adopted under this alternative. Thus, there would be no restrictions on development east of the Coachella Canal and health and safety impacts that would not occur under Alternative 3 east of the Coachella Canal could occur under Alternative 1.

4.13.4.2 Alternative 2: No Development/CDCA Plan Amendment to Identify Areas as Closed to and Unsuitable for Geothermal, Solar, and Wind Energy Development

There would be no new construction or operation of geothermal power plants, or solar or wind energy projects, except those which are currently approved or operating. Human health and safety would not be affected by new geothermal, wind, or solar projects; however, the closure of these lands for renewable energy development would represent an opportunity cost. The energy that could have been supplied by development of this area for geothermal, solar, and/or wind energy would have to be filled by other fossil fuel or renewable energy generating facilities constructed elsewhere.

No renewable energy development cap or other protective stipulations/measures pertaining to the east side of the Coachella Canal would be adopted under this alternative. Thus,

there would be no restrictions on development east of the Coachella Canal and health and safety impacts to that would not occur under Alternative 3 east of the Coachella Canal could occur under Alternative 2.

4.13.4.3 Alternative 3: Renewable Energy Development Emphasis

Under Alternative 3, geothermal, solar, and wind could be developed to the maximum extent as defined in the geothermal, solar, and wind RFD scenarios. Up to 1,026 acres of land could be disturbed for development of geothermal power plants; up to 29,758 acres of land could be disturbed for development of solar PV projects; up to 6,637 acres could be disturbed for development of CSP projects; and up to 76 acres of land could be disturbed for wind energy projects. Solar development could occur through the development of a 50-MW solar PV power plant and 500-MW CSP power plant.

Under this alternative the REEA would be designated as an SEZ. An SEZ would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments, including geothermal and wind energy development, to occur within the West Chocolate Mountains SEZ.

Direct Health and Safety Impacts from Geothermal Energy Development

Construction of the three 50-MW geothermal power plants could occur anywhere within the West Chocolate Mountains REEA. Short- and long-term, adverse health and safety impacts could occur from routine transport, use, or disposal of hazardous materials during exploration, drilling, construction, operation, and decommissioning. Individuals could be exposed to well blow-outs, drilling mud, heat, hydrogen sulfide contained in geothermal fluid or steam, and hazardous materials (e.g., petroleum, oil, lubricants, paints, solvents, and herbicides) that could be used and stored at facilities during operations. Mitigation measures could reduce potential hazards associated with exposure of people and the environment:

Short-term, adverse impacts to the public or the environment involving the release of hazardous materials into the environment could occur during construction and operation; however, mitigation measures would reduce contamination/hazards associated with spills of hazardous materials.

There are three sites within the West Chocolate Mountains REEA that may contain chemical or hazardous materials. One site is an abandoned military training camp (Camp Dunlap, also known as Slab City) located on state land and managed by the CSLC; it contains remnants of a sewage treatment plant and four underground storage tanks. The Hot Spa Waste Management Facility is a land disposal site that has actively tested groundwater monitoring wells at the site. Salvation Mountain consists of a mud hill and hay bales with years of layered paint that may contain large amounts of lead. If any of these sites were disturbed as a result of construction of geothermal energy development, there could be short-term, adverse health impacts for workers. These impacts could result from exposure to contaminated soils due to pesticides, underground tanks, or hazardous materials within the REEA. Mitigation measures would reduce exposure of workers and the environment to potential hazardous materials and/or contamination.

Under this alternative, the pending geothermal lease application (640 acres) would be approved and geothermal exploration could begin which could result in short term impacts to human health and safety from geothermal exploration discussed earlier in this section. Currently, the size of the power plant is unknown since exploration has not begun; however, other power plants in the region are less than 50 MW so it would be anticipated that exploration would be consistent with that of a geothermal power plant as discussed in the geothermal RFD scenario.

Conclusion

Long-term, adverse safety impacts for workers and equipment could occur during construction, operation, and decommissioning activities if a project were located adjacent to the CMAGR. The Navy Special Warfare activities that take place in the CMAGR include live fire on established military owned ranges, land navigation, tactical ground mobility, and aviation operations. However, BMPs outlined in Appendices I-A and I-B would reduce potential safety hazards associated with military operations. Short-term, adverse impacts related to the accidental release of fuel or potential explosions could occur if fuel pipelines in the West Chocolate Mountains REEA were disrupted as a result of drilling, grading, and construction activities. However, BMPs outlined in Appendix I-A and I-B would reduce potential hazards associated with disruption of a high pressure fuel lines. In addition, fires could be caused by combustion of native materials due to smoking, refueling, or operating vehicles and other equipment off roadways, welding, electrical arcing, or fallen transmission lines during construction, operation, and decommissioning. However, BMPs outlined in Appendices I-A and I-B would reduce potential hazards associated with disruption fire. They would not be a concern to the public. There are no management goals for this resource.

Indirect Health and Safety Impacts from Geothermal Energy Development

Accidents involving worker and equipment could be increased during peak construction periods where there would be an increase in activity, equipment, and traffic on local roads and specific project sites. In addition, the Navy's activities at CMAGR could present a public danger both to workers during construction and operation and to the public who could have greater access to the land due to the additional roads that could be developed in association with new geothermal energy development.

The designation as an SEZ would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments, including geothermal energy development, to occur within the West Chocolate Mountains SEZ, which could lead to an increase in impacts to human health and safety from the construction and O&M of geothermal energy projects. The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). Thus, intensive renewable energy development would be allowed.

Direct Health and Safety Impacts from Solar Energy Development

Direct effects to health and safety could occur if up to 6,637 acres of CSP or up to 29,758 acres of solar PV power could be developed. It is assumed that either CSP or PV projects could be developed. Due to the wide range of solar development that could occur in the West Chocolate Mountains REEA, the activities that could occur during solar energy development have been based on the development of a 50-MW PV project and a 500-MW CSP project. These

sizes were selected based on the availability of data related to development of these types of projects.

Impacts to health and safety would be similar to the impacts described under geothermal development; however, impacts related to well blow-outs, drilling mud, heat, and hydrogen sulfide contained in geothermal fluid or steam would not be present since drilling to the depths required for geothermal would not be required for solar. Under this alternative, CSP technologies (parabolic trough) may generate substantial amounts of HTF and industrial solid wastes, such as lubricating oils, compressor oils, and hydraulic fluids. Gas for a small gas-fired HTF heater used for infrequent freeze protection of the HTF in the solar field would be supplied by truck.

PV panels could contain small amounts of cadmium, selenium, and arsenic, but would only be hazardous if the solar cell is broken. Short-term, adverse impacts could result if these wastes were not properly handled and were released to the environment. Damaged solar components (solar cells) would need to be characterized and managed as hazardous waste. However, BMPs outlined in Appendices I-A and I-B would reduce potential hazards associated with health and safety and potential hazards associated with spills and accidents or encounters with contaminated soils.

Conclusion

Long-term, adverse safety impacts for workers and equipment could occur during construction, operation, and decommissioning activities occurring near the CMAGR where the Navy Special Warfare activities take place (e.g., live fire on established military-owned ranges, land navigation, tactical ground mobility, and aviation operations). However, BMPs outlined in Appendices I-A and I-B would reduce conflicts with military operations and fires. They would not be a concern to the public.

Power failure and/or explosions could occur during construction due to disruption of infrastructure such as gas pipelines that are buried below the surface; however, BMPs outlined in Appendices I-A and I-B would reduce potential hazards associated with disruption of a high pressure gas line and fires. They would not be a concern to the public.

Short-term, adverse impacts from fires could be caused by combustion of native materials due to smoking, refueling, or operating vehicles and other equipment off roadways, or from welding, electrical arcing, or fallen transmission lines during construction operation and decommissioning; however, BMPs outlined in Appendices I-A and I-B could reduce potential hazards associated with fires. They would not be a concern to the public.

Indirect Health and Safety Impacts from Solar Energy Development

Accidents involving workers and equipment may be increased during peak construction periods where there would be an increase in activity, equipment, and traffic on local roads and specific project sites. In addition, the Navy's activities at CMAGR could present a public danger both to workers during construction and operation and to the public who would have greater access to the land due to the additional roads associated with new solar energy development. The development cap would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Direct Health and Safety Impacts from Wind Energy Development

Under this alternative, the permanent footprint on BLM land could be 14 acres. Impacts to health and safety would be similar to the impacts described under solar and geothermal development; however, impacts related to well blow-outs, drilling mud, heat, and hydrogen sulfide contained in geothermal fluid or steam would not be present since drilling to the depths required for geothermal would not be required for solar. Unlike CSP development, there would be no HTF generated, nor would there be small amounts of cadmium, selenium, and arsenic, found in solar PV development.

Short–term, adverse impacts to worker health and safety could involve risks associated with working at heights, working around energized equipment, working around rotating mechanized equipment, and increased potential for fires from electrical discharges from energized equipment. Other risks could involve tower failures, interference with electromagnetic signals including radar, radio communication, and television and microwave transmission. The presence of wind turbines and the potential for turbines obstructing aircraft/airspace conflicts are addressed in Section 4.12, Lands and Realty. However, BMPs outlined in Appendices I-A and I-B would reduce potential hazards associated with health and safety and potential hazards associated with spills and accidents or encounters with contaminated soils.

Conclusion

Long-term, adverse impacts for worker and equipment safety could occur during construction, operation, and decommissioning activities that would be near the CMAGR where the Navy Special Warfare activities take place, including live fire on established military owned ranges, land navigation, tactical ground mobility, and aviation operations. Turbines could also cause interference with electromagnetic signals including radar, radio communication, and television and microwave transmission/radar. However, BMPs outlined in Appendices I-A and I-B would reduce conflicts associated with development near military operations. They would not be a concern to the public.

Power failure and/or explosions could occur during construction due to disruption of infrastructure, such as gas pipelines that are buried below the surface. However, BMPs outlined in Appendices I-A and I-B would reduce potential hazards associated with disruption of a high-pressure gas line and fires. They would not be a concern to the public.

Short-term, adverse impacts from fires could be caused by combustion of native materials due to smoking, refueling, or operating vehicles and other equipment off roadways, or from welding, electrical arcing, or fallen transmission lines during construction, operation, and decommissioning. However, BMPs outlined in Appendices I-A and I-B would reduce potential hazards associated with disruption from fires. They would not be a concern to the public.

Indirect Health and Safety Impacts from Wind Energy Development

Accidents involving workers and equipment could be increased during peak construction periods where there would be an increase in activity, equipment, and traffic on local roads and specific project sites. In addition, the Navy's activities at CMAGR could present a public danger both to workers during construction and operation and to the public who would have greater access to the land due to the additional roads associated with new wind energy development. 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 human health and safety from construction and O&M of wind energy projects, although the development cap would limit wind energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

4.13.4.4 Alternative 4: Geothermal Development Only

Under this alternative, geothermal energy could be developed to the achievement of levels of geothermal energy development consistent with the geothermal RFD scenario; there would be no solar or wind energy development. Under this alternative, the following impacts would be the same as Alternative 3:

- Direct and indirect human health and safety impacts from geothermal energy development;
- Acquired lands; and
- Existing noncompetitive lease application.

Impacts from geothermal energy development would be the same as Alternative 3. Under this alternative, the West Chocolate Mountains REEA would not be designated as an SEZ and solar or wind energy development would not be allowed. Additionally, the development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). This alternative would not conform to the CDCA goal to identify potential sites for wind energy development.

4.13.4.5 Alternative 5: Solar Energy Development Emphasis with Moderate Geothermal Development and No Wind Development

Under this alternative, solar energy could be developed to the achievement of levels of development consistent with the maximum extent as defined in the solar RFD scenario. Geothermal energy could be developed to the achievement of levels of geothermal energy development consistent with a moderate level (50 MW) as defined in geothermal RFD scenario.

Under this alternative, the following would be the same as Alternative 3:

- Acquired lands;
- Existing noncompetitive lease application; and
- Direct and indirect human health and safety impacts from solar development.

Impacts from geothermal energy development would be the same as Alternative 3.

Direct and Indirect Health and Safety Impacts from Geothermal Energy Development

Under this alternative, direct and indirect impacts from geothermal energy development would be similar to the impacts described under Alternative 3. However, the potential impacts to health and safety are anticipated to be reduced since there would be a reduction in the total area

to be developed, and the amount of workers, equipment, and traffic, since only one 50-MW geothermal plant could be developed instead of three 50-MW geothermal plants, as proposed in Alternative 3.

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 geothermal energy development, which could lead to an increase in impacts to human health and safety from geothermal energy projects. The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). A wide variety of uses, including energy and utility development would be allowed. Any damage that permitted uses cause would be required to be mitigated.

4.13.4.6 Alternative 6: Geothermal Development Emphasis with Moderate Solar Development and No Wind Development

Under this alternative, it is assumed that achievement of levels of development consistent with the maximum development defined in the geothermal RFD scenario would take place (the same as discussed for Alternative 3) and that the level of achievement consistent with partial development of the solar RFD scenario would be realized. Lands within the West Chocolate Mountains REEA that lie east of the Coachella Canal would not be considered for an SEZ, modified or otherwise. Lands west of the canal would be identified as an SEZ, allowing other compatible renewable energy developments to occur.

Under this alternative, the following would be the same as Alternative 3:

- Acquired lands;
- Existing noncompetitive lease application;
- Direct and indirect human health and safety impacts from geothermal development; and
- Direct and indirect human health and safety impacts from CSP (dish engine only) and PV solar development.

Impacts from geothermal energy development would be the same as Alternative 3.

Direct Health and Safety Impacts from Solar Energy Development

Under this alternative, direct and indirect impacts from solar energy development would be similar to the impacts for the solar PV plant as described under Alternative 3.

Under this alternative, there could be a CSP dish engine that would heat self-contained hydrogen gas in the power conversion unit, causing the gas to expand into the cylinders, moving the cylinders, and generating electricity. The CSP dish collector system requires no water, and the engine does not produce emissions, as no combustion takes place. Since the dish engine would be the only type of CSP project developed, and power tower would not be developed, there would be no potential conflicts with airspace. Additionally, hazardous materials, such as HTF, and industrial solid wastes, such as lubricating oils, compressor oils, and hydraulic fluids,

which could be present in the solar trough and power tower technologies would not be present with dish engine technology. Also, a small, gas-fired HTF heater used for infrequent freeze protection of the HTF in the solar field for the solar trough would not be present.

Conclusion

Long-term, adverse safety impacts for workers and equipment could occur during construction, operation, and decommissioning activities occurring near the CMAGR where the Navy Special Warfare activities take place (e.g., live fire on established military-owned ranges, land navigation, tactical ground mobility, and aviation operations). However, BMPs outlined in Appendices I-A and I-B would reduce conflicts with military operations and fires. They would not be a concern to the public.

Power failure and/or explosions could occur during construction due to disruption of infrastructure such as gas pipelines that are buried below the surface; however, BMPs outlined in Appendices I-A and I-B would reduce potential hazards associated with disruption of a high pressure gas line and fires. They would not be a concern to the public.

Short-term, adverse impacts from fires could be caused by combustion of native materials due to smoking, refueling, or operating vehicles and other equipment off roadways, or from welding, electrical arcing, or fallen transmission lines during construction operation and decommissioning; however, BMPs outlined in Appendices I-A and I-B could reduce potential hazards associated with fires. They would not be a concern to the public.

Indirect Health and Safety Impacts from Solar Energy Development

Under this alternative, direct and indirect impacts from solar energy development would be the same as the impacts described for Alternative 3. The development cap would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

4.14 Energy and Minerals

This section discusses the effects to energy and mineral resources that could occur with implementation of the alternatives. First, the management goals are provided; second the impact indicators used to identify and analyze effects are presented; third, typical impacts are discussed for geothermal, solar and wind energy; and last, impacts are analyzed by alternative.

4.14.1 Management Goals

The CDCA Plan states that a goal includes the identification of potential sites for development of geothermal, wind, and solar technology and power plants.

1. The general goals for geology, energy, and minerals (GEM) resources are to:
    a. Assure the availability of known mineral resource lands for exploration and development within the multiple-use management framework;

b. Encourage the development of mineral resources in a manner which satisfies national and local needs and provides for economically and environmentally sound exploration, extraction, and reclamation processes; and

c. Develop a mineral resource inventory, GEM database, and professional, technical, and managerial staff knowledgeable in mineral exploration and development.

The WECO Plan Amendment does not state any management goals for energy and minerals.

4.14.2 Impact Criteria

The potential risk of impacts to energy and mineral resources are assessed with respect to the following criteria. Potential impacts to energy and minerals could occur if any of the following were to take place:

- Loss of availability of a known mineral resource that could be of value to the region and the residents of the state;
- Loss or availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan; or
- Non-compliance with Management Goal Number 1 of the CDCA Plan for GEM resources.

4.14.3 Typical Energy and Mineral Resources Impacts from Energy Development

Typical impacts to energy and mineral resources from geothermal, solar, and wind energy development can be varied in duration and severity. Improving existing roads and constructing new roads for geothermal resource exploration or access to wind or solar energy related construction could have short-term, negligible to minor impacts on the exploration for other energy and mineral resources in the immediate area. The degree of impact would depend on the existing limits to access in the area and the distance of the roads to the other mineral resources. The cost of improving roads would be less for later developments because roads accessing the general area would have already been developed. These impacts would be reduced with increased distance from the new roads.

Drilling operations for geothermal energy would preclude developing any other energy or mineral resources on the same land. Introducing new transmission lines could encourage the development of other energy resources along the transmission line. Mineral resource developments could be encouraged due to the new availability of power for their operations. These impacts would be reduced with increased distance from the power plant, roads, and transmission lines.

During the operation phase, other energy and mineral operations in the immediate area of geothermal, solar, and wind energy facilities would not likely be interrupted. Therefore, operation of such facilities could have a long-term, minor to no impact on other energy or mineral resources.

Upon reclamation and abandonment of geothermal, solar, and wind energy operations, any other ongoing operations in the area would most likely take over maintenance of shared facilities (e.g., private roads, transmission lines, switchyards, substations). Reclamation and abandonment of geothermal, solar, and wind energy operations could have a short-term, minor to no impact on other energy or mineral resources as other forms of exploration and development would be allowed to recommence.

4.14.3.1 Typical Energy and Mineral Resources Impacts from Geothermal Energy Development

The Geothermal PEIS identified typical impacts on energy and minerals associated with geothermal energy development. The impacts are incorporated by reference and summarized in Table 4.14-1.

Table 4.14-1 Typical Impacts to Energy and Mineral Resources from Geothermal Energy Development

Project Phase	Activity	Impact	Time Frame
Site Evaluation/ Exploration	– Vehicular traffic. – Staging of workers and equipment.	– Access to adjacent energy and mineral resources.	Short-term.
Construction	– Vehicular traffic. – Staging of workers and equipment.	– Drilling operations would preclude developing any other energy or mineral resources on the same land.	Short-term.
Operation and Maintenance	– New infrastructure. – Vehicular traffic.	– New transmission lines could encourage development of other energy resources.	Long-term.
Decommissioning	– Vehicular traffic. – Staging of workers and equipment. – Facility removal. – Breaking up concrete pads and foundations. – Removing access roads that are not maintained for other uses. – Recontouring the surface. – Revegetation.	– Other ongoing energy and mineral operations in the area could have continued maintenance of shared facilities and roads.	Short-term.

4.14.3.2 Typical Energy and Mineral Resources Impacts from Solar Energy Development

Based on a review of environmental documentation for other solar energy projects, typical impacts for solar energy projects have been developed. The typical impacts associated with solar energy development are summarized in Table 4.14-2.

Table 4.14-2 Typical Impacts to Energy and Mineral Resources from Solar Energy Development

Project Phase	Activity	Impact	Time Frame
Site Evaluation	– Vehicular traffic. – Geotechnical testing.	– Access to energy and mineral resources.	Short-term.
Construction	– Vehicular traffic. – Staging of workers and equipment. – Ground clearing.	– Conversion of the existing land use for the area. – An expanded access road system could increase the number of visitors/traffic in the surrounding area.	Short-term.
Operation and Maintenance	– Vehicular traffic.	– Land use impacts would be similar to the construction phase.	Long-term.
Decommissioning	– Vehicular traffic. – Staging of workers and equipment. – Facility removal. – Breaking up concrete pads and foundations. – Removing access roads that are not maintained for other uses. – Recontouring the surface. – Revegetation.	– Once the facility is removed, the land would revert to an undeveloped state, available to other forms of energy and mineral resource exploration/ development.	Short-term.

4.14.3.3 Typical Energy and Mineral Resources Impacts from Wind Energy Development

The typical impacts associated with wind energy development are summarized in Table 4.14-3.

Table 4.14-3 Typical Impacts to Energy and Mineral Resources from Wind Energy Development

Project Phase	Activity	Impact	Time Frame
Site Evaluation	– Vehicular traffic. – Geotechnical testing.	– Access to energy and mineral resources.	Short-term.
Construction	– Erection of wind turbines. – Access road construction. – Staging of construction workers and equipment. – Vehicular traffic.	– Conversion of the existing land use for the area. – An expanded access road system could increase the number of visitors/traffic in the surrounding area.	Short-term.
Operation and Maintenance	– Vehicular traffic.	– Land use impacts would be similar to the construction phase.	Long-term.
Decommissioning	– Vehicular traffic. – Staging of workers and	– Once the facility is removed the land would revert to an	Short-term.

Table 4.14-3 Typical Impacts to Energy and Mineral Resources from Wind Energy Development

Project Phase	Activity	Impact	Time Frame
	equipment. – Facility removal – Breaking up concrete pads and foundations. – Removing access roads that are not maintained for other uses. – Recontouring the surface. – Revegetation. – Once the facility is removed, the land would revert to undeveloped	undeveloped state, available to other forms of energy and mineral resource exploration/development.	

4.14.4 Energy and Minerals Resources Impacts by Alternative

This section describes the effects under each alternative using the respective methodology prescribed under NEPA. To compare effects, this analysis defines the temporal scale (time), spatial extent (area), and intensity of effects for each alternative.

This EIS analyzes impacts to all resources, including habitat and protected species, to the extent necessary for a programmatic document, subject to existing data availability. Site-specific analyses, based on data compiled from detailed studies, will be conducted for site-specific proposals. If the constraints discussed in Section 2.1.2 are discovered during project planning or following further future studies, as determined necessary by an authorized officer, portions of the West Chocolate Mountains REEA may be determined to be closed to and unsuitable for geothermal, solar, or wind energy development.

Effects on the existing energy and mineral resources may arise from project construction, O&M, and decommissioning equipment and vehicles as well as from the introduction of construction or O&M related traffic on local roads near the West Chocolate Mountains REEA. The following discussion analyzes the environmental consequences or impacts expected to occur as a result of anticipated future actions consistent with implementing the alternatives described in Chapter 2.

Any new, relocated, upgraded, or reconstructed IID facilities required for and by the project (which can include but are not limited to electrical utility substations, electrical transmission and distribution lines, etc.) would be assessed as part of the project.

4.14.4.1 Alternative 1: No Action/No CDCA Plan Amendment

Because geothermal, wind, and solar development could still occur under the No Action/No CDCA Plan Amendment alternative, impacts to energy and minerals would be expected to be similar to those detailed in Section 4.14.4.3 for Alternative 3. However, development under the No Action/No CDCA Plan Amendment alternative may occur at a slower

rate because an individual plan amendment process would be necessary for each geothermal and solar or wind authorization; thus, impacts may occur at a slower rate, as well.

No renewable energy development cap or other protective stipulations/measures pertaining to the east side of the Coachella Canal would be adopted under this alternative. Thus, there would be no restrictions on development east of the Coachella Canal and impacts to energy and mineral resources that would not occur under Alternative 3 east of the Coachella Canal could occur under Alternative 1.

4.14.4.2 Alternative 2: No Development/No CDCA Plan Amendment to Identify Areas as Closed to and Unsuitable for Geothermal, Solar, and Wind Energy Development

There would be no new construction or operation of geothermal power plants, or solar or wind energy projects, except those which are currently approved or operating. Energy and minerals would not be affected by new geothermal, wind, or solar projects; however, the closure of these lands for renewable energy development would represent an opportunity cost. The energy that could have been supplied by development of this area for geothermal, solar, and/or wind energy would have to be filled by other fossil fuel or renewable energy generating facilities constructed elsewhere.

No renewable energy development cap or other protective stipulations/measures pertaining to the east side of the Coachella Canal would be adopted under this alternative. Thus, there would be no restrictions on development east of the Coachella Canal and impacts to energy and minerals resources that would not occur under Alternative 3 east of the Coachella Canal could occur under Alternative 2.

4.14.4.3 Alternative 3: Renewable Energy Development Emphasis

Under Alternative 3, geothermal, solar, and wind could be developed to the maximum extent as defined in the geothermal, solar, and wind RFD scenarios. Up to 1,026 acres of land could be disturbed for development of geothermal power plants; up to 29,758 acres of land could be disturbed for development of solar PV projects; up to 6,637 acres could be disturbed for development of CSP projects; and up to 76 acres of land could be disturbed for wind energy projects Solar development could occur through the development of a 50-MW solar PV power plant and 500-MW CSP power plant.

Under this alternative, the REEA would be designated as an SEZ. 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 geothermal and wind energy development.

<u>Direct Energy and Mineral Impacts from Geothermal Energy Development</u>

Direct impacts to energy and mineral resources 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 impacts during construction and decommissioning of geothermal facilities, depending on proximity to that mining operation. This same impact could also occur for maintenance and repair crews for existing transmission lines

within the West Chocolate Mountains REEA. During operation, the three geothermal power plants could result in the long-term loss of approximately 938 acres of land which could be used in other forms for energy and mineral resource development in the REEA.

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 geothermal energy development, which could lead to the extraction of energy and minerals from geothermal energy projects similar to those described above. The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). Although reasonable protection would be provided for sensitive natural values and mitigation of impacts and rehabilitation of impacted areas would occur when possible, the goal would be to allow development to occur within this area.

Under this alternative, the pending geothermal lease application (640 acres) would be approved. Geothermal exploration would begin which could result in the impacts to energy and minerals discussed earlier in this section. Currently, the size of the power plant is unknown since exploration has not begun; however, other power plants in the region are less than 50 MW so it would be anticipated that exploration would be consistent with that of a geothermal power plant as discussed in the geothermal RFD scenario.

Conclusion

This alternative would be consistent with the general goals in the CDCA Plan for GEM resources by encouraging the development of mineral resources in the West Chocolate Mountains REEA. It also would be consistent the National Energy Policy and would encourage domestic energy development.

Indirect Energy and Mineral Impacts from Geothermal Energy Development

One potential, beneficial, long-term, indirect impact from geothermal energy development could be that any transmission line infrastructure constructed to interconnect a power project to the existing grid could be used to connect additional renewable energy generation in the same or nearby locations at a savings when compared to developing new infrastructure at a later date. When the power project has served its useful life and is decommissioned, it could provide an opportunity for a new renewable energy project at that same location to use the interconnection infrastructure and possibly the transmission facilities previously used. This benefit is dependent on the maintenance of the facilities after the plant is decommissioned.

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 geothermal energy development which could lead to potential impacts energy and minerals from geothermal energy projects similar to those described above, although the development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). However, energy and mineral resources BMPs to be required for each project design are expected to reduce this contribution so that it would not be adverse.

Direct and Indirect Energy and Mineral Impacts from Solar Energy Development

Under this alternative, up to 6,637 acres of CSP or up to 29,758 acres of PV power could be developed. It is assumed that either CSP or solar PV projects could be developed. Due to the wide range of solar development that could occur in the West Chocolate Mountains REEA, the activities that could occur during solar energy development have been based on the development of a 50-MW solar PV project and a 500-MW CSP project. These sizes were selected based on the availability of data related to development of these types of projects. PV and CSP are the two technologies that have been fielded most widely in the United States and throughout the world.

Direct, adverse effects to energy and mineral resources 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 could 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.

One potential, beneficial, long-term, indirect impact from solar energy development could be that any transmission line infrastructure constructed to interconnect a power project to the existing grid could be used to connect additional renewable energy generation in the same or nearby locations at a savings when compared to developing new infrastructure at a later date. When the power project has served its useful life and is decommissioned, it could provide an opportunity for a new renewable energy project at that same location to use the interconnection infrastructure and possibly the transmission facilities previously used. This benefit is dependent on the maintenance of the facilities after the plant is decommissioned.

Because solar energy development could result in up to 29,758 acres of the West Chocolate Mountains REEA being covered in a large impervious surface, surrounding areas could be subject to long-term, adverse, downstream erosion due to increased runoff, however, the development cap would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Conclusion

The amount of land that could be developed for solar energy could preclude development of other renewable energy sources, such as geothermal. However, development of solar energy would be consistent the National Energy Policy and would encourage domestic energy development.

Direct and Indirect Energy and Mineral Impacts from Wind Energy Development

Under this alternative, one 45-MW wind project could be developed. Direct effects to energy and mineral resources 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 impacts during construction and decommissioning of wind energy facilities, depending on proximity to that mining operation. This same impact could also occur

for maintenance and repair crews for existing transmission lines within the West Chocolate Mountains REEA. During operation, each wind energy facility could result in the long-term loss of approximately 40 acres of BLM and other lands which could be used in other forms of energy and mineral resource development in the REEA.

One potential, beneficial, long-term, indirect impact from wind energy development could be that any transmission line infrastructure constructed to interconnect a power project to the existing grid could be used to connect additional renewable energy generation in the same or nearby locations at a savings when compared to developing new infrastructure at a later date. When the power project has served its useful life and is decommissioned, it could provide an opportunity for a new renewable energy project at that same location to use the interconnection infrastructure and possibly the transmission facilities previously used. This benefit is dependent on the maintenance of the facilities after the plant is decommissioned.

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 impact energy and minerals from the increased amount of wind development. However, the development cap would limit wind energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Conclusion

Development of wind energy would be consistent the National Energy Policy and would encourage domestic energy development.

4.14.4.4 Alternative 4: Geothermal Development Only

Under this alternative, geothermal energy could be developed to the achievement of levels of geothermal energy development consistent with the geothermal RFD scenario; there would be no solar or wind energy development. Under this alternative, the following impacts would be the same as Alternative 3:

- Direct and indirect energy and mineral impacts from geothermal energy development;
- Acquired lands; and
- Existing noncompetitive lease application.

Impacts from geothermal energy development would be the same as Alternative 3. Under this alternative, the West Chocolate Mountains REEA would not be designated as an SEZ and solar or wind energy development would not be allowed. Additionally, the development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). This alternative would not conform to the CDCA goal to identify potential sites for wind energy development.

4.14.4.5 Alternative 5: Solar Energy Development Emphasis with Moderate Geothermal Development and No Wind Development

Under this alternative, solar energy could be developed to the achievement of levels of development consistent with the maximum extent as defined in the solar RFD scenario. Geothermal energy could be developed to a moderate level (50 MW) as defined in geothermal RFD scenario.

Under this alternative, the following would be the same as Alternative 3:

- Acquired lands;
- Existing noncompetitive lease application; and
- Direct and indirect energy and minerals impacts from solar development.

Impacts from solar energy development would be the same as Alternative 3. All lands within the West Chocolate Mountains REEA would be designated as an SEZ, which would allow other compatible renewable energy developments to occur. An SEZ also would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments, including geothermal energy, to occur within the West Chocolate Mountains SEZ.

Direct and Indirect Energy and Mineral Impacts from Geothermal Energy Development

Direct impacts to energy and minerals could occur based on the criteria outlined in Section 4.14.2. The sand and gravel mining operation near Frink Spring mentioned in Section 3.14.4 (Steward 2010) could experience short-term access impacts during construction and decommissioning of geothermal 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, the development of one geothermal power plant could result in the long-term loss of approximately 313 acres of BLM and other land which could be used in other forms of energy and mineral resource development in the REEA.

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 geothermal energy development, which could lead to impacts to energy and minerals from an increase in geothermal energy projects, although the development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Conclusion

This alternative would be consistent with the general goals in the CDCA Plan for GEM resources by encouraging the development of mineral resources in the REEA. It would also be consistent the National Energy Policy and encourage domestic energy development.

4.14.4.6 Alternative 6: Geothermal Development Emphasis with Moderate Solar Development and No Wind Development

Under this alternative, it is assumed that the maximum development defined in the geothermal RFD scenario would take place (the same as discussed for Alternative 3) and a moderate amount of solar development would occur. Lands within the West Chocolate Mountains REEA that lie east of the Coachella Canal would not be considered for an SEZ, modified or otherwise. Lands west of the canal would be identified as an SEZ, allowing other compatible renewable energy developments to occur.

Under this alternative, the following would be the same as Alternative 3:

- Acquired lands;
- Existing noncompetitive lease application;
- Direct and indirect energy and minerals impacts from geothermal development; and
- Direct and indirect energy and minerals impacts from CSP (dish engine only) and PV solar development.

Impacts from geothermal energy development would be the same as Alternative 3.

Direct and Indirect Energy and Mineral Impacts from Solar Energy Development

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 development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Conclusion

Development of solar energy would be consistent the National Energy Policy and encourage domestic energy development.

4.15 Recreation Resources

This section discusses the effects to recreation resources that could occur with implementation of the alternatives. First, the management goals are provided; second, the impact indicators used to identify and analyze effects are presented; third, typical impacts are discussed for geothermal, solar, and wind energy; and last, impacts are analyzed by alternative.

4.15.1 Management Goals

The CDCA Plan provides overall management direction for all public lands in the CDCA. Both the CDCA Plan and the Recreation Element of the WECO Plan Amendment lists the following goals:

- Provide for a wide range of quality recreation opportunities and experiences emphasizing dispersed undeveloped use;
- Provide minimum use recreation facilities. These facilities should emphasize resource protection and visitor safety;
- Manage recreation use to minimize user conflicts, provide a safe recreation environment, and protect desert resources;
- Emphasize the use of public information and education techniques to increase public awareness, enjoyment, and sensitivity to desert resources;
- Adjust management approach to accommodate changing visitor use patterns and preferences; and
- Encourage the use and enjoyment of desert recreation opportunities by special populations, and provide facilities to meet the needs of these groups.

4.15.2 Impact Criteria

The potential risk of impacts to recreation resources is assessed with respect to the following criteria. Potential impacts on recreation could occur if the any of the following were to take place:

- Conflict with existing federal, state, and local recreation management plans and policies;
- Change in access to existing recreation areas or sites;
- Change in levels of use of existing recreation areas or sites;
- Substantial overcrowding caused by “spill over” effects to other recreation areas; or
- Noncompliance with Management Goals of the CDCA Plan, the NECO, the ISDRA Recreation Area Management Plan, and the Recreation Element of the WECO Plan.

4.15.3 Typical Recreation Resources Impacts from Energy Development

This section describes the typical impacts to recreational resources and programs expected as a result of potential development outlined in the Chapter 2. The potential risk of

these indirect impacts affecting recreation and recreational resources is assessed with respect to the goals of the Recreation Element of the WECO Plan Amendment outlined above.

In general, geothermal, solar, and wind energy development could result in a short-term reduction in the amount of land available for recreational use and in diminished experiences for recreational users on lands that remain open for recreation. Visual impacts, intermittent noise associated with construction, and the temporary loss of access for recreational use could result in a potentially significant and short-term impact on the recreational experiences available in the West Chocolate Mountains REEA; however, recreational opportunities within the REEA are not of great significance.

The construction of geothermal, solar, and wind energy facilities, transmission lines, roads used by heavy equipment, and other related infrastructure could create a short-term impact to the amount of land recreational users can use for hiking, wildlife viewing, camping, and off-highway vehicle (OHV) riding. During certain phases of construction (e.g., geothermal pipeline, solar array, or wind turbine assembly), access via designated trails near construction activity such as trenching or geotechnical testing could result in the need to use alternative routes for short periods of time. Information concerning temporary trail or route closures could help reduce conflicts with recreational users by directing them to areas unaffected during these construction periods.

There are many open routes of travel designated by the WECO Plan Amendment within the West Chocolate Mountains REEA (Figure 3.15-1, Chapter 3, Affected Environment). Geothermal, solar, and wind energy development in the area may significantly restrict or reduce access to these routes for OHV use during construction, operation, and decommissioning activities depending on individual project proximity to routes and frequency of use by OHV enthusiasts.

4.15.3.1 Typical Recreation Resources Impacts from Geothermal Energy Development

The Geothermal PEIS identified typical impacts on recreation resources associated with geothermal energy development. The impacts are incorporated by reference and summarized in Table 4.15-1.

Table 4.15-1 Typical Impacts to Recreation Resources from Geothermal Energy Development

Project Phase	Activity	Impact	Time Frame
Site Evaluation/ Exploration	– Surveying and well drilling. – Access road and well pad construction. – Staging equipment. – Vehicular traffic.	– Noise generation and visual interruption to nearby recreational users. – Access interruptions on BLM open routes.	Short-term.
Construction	– Drilling. – Construction of injection wells and sump pits. – Construction of power plant. – The drilling operations phase	– Noise and dust generation and visual interruption to nearby recreational users. – Access interruptions on BLM open routes.	Short-term.

Table 4.15-1 Typical Impacts to Recreation Resources from Geothermal Energy Development

Project Phase	Activity	Impact	Time Frame
	would require production wells and injection wells. – Fluid sump pits. – New access roads.		
Operation and Maintenance	– Vehicular traffic. – Staging of workers and equipment.	– Access interruptions on BLM open routes.	Long-term.
Decommissioning	– Vehicular traffic – Staging equipment. – Facility removal. – Breaking up concrete pads and foundations. – Removing access roads that are not maintained for other uses. – Recontouring the surface. – Revegetation.	– Noise generation and visual interruption to nearby recreational users.	Short-term.

4.15.3.2 Typical Recreation Resources Impacts from Solar Energy Development

Based on a review of environmental documentation for other solar energy projects, typical impacts for solar energy projects have been developed. The typical impacts on recreation resources associated with solar energy development are summarized in Table 4.15-2.

Table 4.15-2 Typical Impacts to Recreation Resources from Solar Energy Development

Project Phase	Activity	Impact	Effects
Site Evaluation	– Staging construction workers and equipment. – Vehicular traffic. – Geotechnical testing.	– Temporary disturbance to wildlife in the immediate vicinity (e.g., interruption in quality of wildlife viewing). – Visual impacts from the presence of equipment. – Access roads potentially impacting the recreational experience.	Short-term.
Construction	– Construction of solar facility. – Access road construction. – Construction worker and equipment vehicular traffic.	– Noise and dust generation and visual interruption to nearby recreational users. – Access interruptions on BLM open routes.	Short-term.
Operation and Maintenance	– Vehicular traffic.	– Access interruptions on BLM open routes.	Long-term.
Decommissioning	– Vehicular traffic. – Staging workers and equipment. – Facility removal.	– Noise and dust generation and visual interruption to nearby recreational users. – Access interruptions on BLM	Short-term.

Table 4.15-2 Typical Impacts to Recreation Resources from Solar Energy Development

Project Phase	Activity	Impact	Effects
	– Removing access roads that are not maintained for other uses. – Recontouring the surface. – Revegetation.	open routes.	

4.15.3.3 Typical Recreation Resources Impacts from Wind Energy Development

The Wind PEIS identified typical impacts on wind associated with wind energy development. The impacts are summarized in Table 4.15-3.

Table 4.15-3 Typical Impacts to Recreation Resources from Wind Energy Development

Project Phase	Activity	Impact	Effects
Site Evaluation/ Exploration	– Staging construction workers and equipment – Vehicular traffic. – Geotechnical testing. – MET installation.	– Temporary disturbance to wildlife in the immediate vicinity (e.g., interruption in quality of wildlife viewing). – Visual impacts from the presence of equipment. – Access roads potentially impacting the recreational experience.	Short-term.
Construction	– Construction of wind energy facility. – Access road construction. – Construction worker and equipment vehicular traffic.	– Noise and dust generation and visual interruption to nearby recreational users. – Access interruptions on BLM open routes.	Short-term.
Operation and Maintenance	– Vehicular traffic.	– Access interruptions on BLM open routes.	Long-term.
Decommissioning	– Vehicular traffic. – Staging workers and equipment. – Facility removal. – Removing access roads that are not maintained for other uses. – Recontouring the surface. – Revegetation.	– Noise and dust generation and visual interruption to nearby recreational users. – Access interruptions on BLM open routes.	Short-term.

4.15.4 Recreation Resources Impacts by Alternative

This section describes the impacts under each alternative using the respective methodology prescribed under NEPA. To compare impacts, this analysis defines the temporal scale (time), spatial extent (area), and intensity of effects for each alternative. All impacts discussed in this section are direct.

This EIS analyzes impacts to all resources, including habitat and protected species, to the extent necessary for a programmatic document, subject to existing data availability. Site-specific analyses, based on data compiled from detailed studies, will be conducted for site-specific proposals. If the constraints discussed in Section 2.1.2 are discovered during project planning or following further future studies, as determined necessary by an authorized officer, portions of the West Chocolate Mountains REEA may be determined to be closed to and unsuitable for geothermal, solar, or wind energy development.

Impacts on existing recreation resources could arise from project construction, O&M, and decommissioning equipment and vehicles, as well as from the introduction of construction or O&M related traffic on local roads near the project. The following discussion analyzes the environmental consequences or impacts expected to occur as a result of anticipated future actions consistent with implementing the alternatives described in Chapter 2.

4.15.4.1 Alternative 1: No Action/No CDCA Plan Amendment

Because geothermal, wind, and solar development could still occur under the No Action/No CDCA Plan Amendment alternative, impacts to recreation would be expected to be similar to those detailed in Section 4.15.4.3 for Alternative 3. However, development under the No Action/No CDCA Plan Amendment alternative may occur at a slower rate because an individual plan amendment process would be necessary for each geothermal and solar or wind authorization; thus, impacts may occur at a slower rate, as well.

No renewable energy development cap or other protective stipulations/measures pertaining to the east side of the Coachella Canal would be adopted under this alternative. Thus, there would be no restrictions on development east of the Coachella Canal and recreation impacts that would not occur under Alternative 3 east of the Coachella Canal could occur under Alternative 1.

4.15.4.2 Alternative 2: No Development/CDCA Plan Amendment to Identify Areas as Closed to and Unsuitable for Geothermal, Solar, and Wind Energy Development

There would be no new construction or operation of geothermal power plants, or solar or wind energy projects, except those which are currently approved or operating. Recreation would not be affected by new geothermal, wind, or solar projects; however, the closure of these lands for renewable energy development would represent an opportunity cost. The energy that could have been supplied by development of this area for geothermal, solar, and/or wind energy would have to be filled by other fossil fuel or renewable energy generating facilities constructed elsewhere.

No renewable energy development cap or other protective stipulations/measures pertaining to the east side of the Coachella Canal would be adopted under this alternative. Thus, there would be no restrictions on development east of the Coachella Canal and recreation impacts that would not occur under Alternative 3 east of the Coachella Canal could occur under Alternative 2.

4.15.4.3 Alternative 3: Renewable Energy Development Emphasis

Under Alternative 3, geothermal, solar, and wind could be developed to the maximum extent as defined in the geothermal, solar, and wind RFD scenarios. Up to 1,026 acres of land could be disturbed for development of geothermal power plants; up to 29,758 acres of land could be disturbed for development of solar PV projects; up to 6,637 acres could be disturbed for development of CSP projects; and up to 76 acres of land could be disturbed for wind energy projects. Solar development could occur through the development of a 50-MW solar PV power plant and 500-MW CSP power plant.

Under this alternative, the REEA would be designated as an SEZ. 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 geothermal and wind energy development.

Direct Recreation Impacts from Geothermal Energy Development

Construction of three 50-MW geothermal power plants could result in short-term effects for access to existing recreation areas or sites during construction and decommissioning of geothermal facilities. Recreational activities could be disrupted through the physical restriction of recreational areas and OHV trails, the blocking of facility entrances by construction activities and equipment, interference during the construction of pipelines, power lines, and power production facilities, and disruption of the users' enjoyment of the recreational experience. There is a common opinion that ecological concerns are limiting the space for OHV recreation, and further limitation as a result of short-term impacts associated with Alternative 3 could compound these views for OHV enthusiasts who use the local area. Similar opinions could be present among seasonal residents to the area, or "snowbirds," particularly if commonly used camping areas on public lands are transformed into alternative energy locations. Siting construction and operations away from open OHV routes and OHV interconnection routes between the Coachella Canal and East Highline Canal could minimize conflicts with other users of public lands, thereby minimizing the impacts that well site construction and operation could have on recreational resources.

Exploration and construction could initially restrict public access to small portions of the West Chocolate Mountains REEA that were previously accessible to the public during geothermal exploration; however, this could be a short-term impact, as geothermal exploration would be intermittent. This effect would only occur if these projects were constructed on or near existing routes of travel or within or near existing recreational sites such as the ISDRA, Niland Marina Park, Bashford's Hot Mineral Spa, and Fountain Youth Spa. Depending on where the project could be sited, some routes of travel could be rerouted. However, given the small amount of land (1,026 acres on BLM and other land) that could be developed for geothermal energy within the REEA, these projects could be sited away from these recreational resources and there would be no effect.

While well locations are not yet determined, well sites and infrastructure could be located away from designated open routes of travel to the maximum extent possible. It is possible that some existing trail segments may need to be re-routed to accommodate construction of geothermal energy infrastructure. Since cross-country travel is not permitted on BLM lands

within the West Chocolate Mountains REEA, only designated trails could be affected. However, if geothermal development were to occur within the ISDRA, OHV activity could be affected since cross-country travel is allowed.

Construction vehicles would be parked off-trail in designated vehicle staging areas to minimize any temporary loss of access that could occur during construction. Since these resources would not be affected, there would not be changes in levels of use for existing recreational areas or sites or spill over into other recreational areas or site. Recreation areas such as the ISDRA, Niland Marine Park, Bashford's Hot Mineral Spa, and Fountain Youth Spa would not be affected unless a geothermal project was sited adjacent to them.

Under this alternative, the pending geothermal lease application (640 acres) would be approved. Geothermal exploration would begin which could result in the impacts to recreation discussed earlier in this section. Currently, the size of the power plant is unknown since exploration has not begun; however, other power plants in the region are less than 50 MW so it would be anticipated that exploration would be consistent with that of a geothermal power plant as discussed in the geothermal RFD scenario.

Conclusion

Geothermal energy development would not conflict with the BLM's CDCA Plan, the WECO Plan Amendment's recreation management goals, the ISDRA Recreation Area Management Plan, and the NECO Plan's Routes of Travel Goals and Objectives.

Indirect Recreation Impacts from Geothermal Energy Development

Recreational users visiting the ISDRA and the Imperial Wildlife Area, Wister Unit (within 1 mile of the West Chocolate Mountains REEA western boundary), to bird watch, fish, or hunt could be affected by construction or decommissioning activities involved with geothermal development if a project is sited in proximity to these recreational areas or sites. Noise, vibration, dust, visual impacts, and odor from construction activities could disrupt users' enjoyment of the area. Similarly, views of construction equipment or the addition or change of industrial structures such as pipelines, power lines, and power production facilities conflict with the natural background of many of these recreational resources and could also disrupt an individual's enjoyment and recreational activities, which could lead to a minor to moderate, long-term aesthetic impact. However, since the total construction of the three geothermal power plants could encompass only 328 acres on BLM land and 1,076 acres on BLM and other land, these projects could be sited away from these recreational areas and indirect effects could be avoided. Each geothermal power plant could result in the long-term loss of approximately 350 acres of land which could be used for recreation in the West Chocolate Mountains REEA; however, the recreational draw of the area is not particularly high, making the overall effect to recreation minimal.

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 geothermal energy development, which could lead to potential impacts to recreation from geothermal energy projects similar to those described above, although the

development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Direct Recreation Impacts from Solar Energy Development

Under this alternative, up to 6,637 acres of CSP or up to 29,758 acres of PV power could be developed. It is assumed that either CSP or solar PV projects could be developed. Due to the wide range of solar development that could occur in the West Chocolate Mountains REEA, the activities that could occur during solar energy development have been based on the development of a 50-MW solar PV project and a 500-MW CSP project. These sizes were selected based on the availability of data related to development of these types of projects. PV and CSP are the two technologies that have been fielded most widely in the United States and throughout the world.

Ultimately, the surface disturbance could include 6,637 acres for CSP development and 29,758 acres for PV development. Access to existing recreational areas and sites could be adversely affected due to the magnitude (up to 6,637 acres of CSP or up to 29,758 acres of PV power within the West Chocolate Mountains REEA) of possible development. Recreational activities could be disrupted through the physical restriction of access to recreational areas, such as the ISDRA and Niland Marina Park, Bashford's Hot Mineral Spa, and Fountain Youth Spa, primitive campgrounds, and open OHV trails present in the area; the blocking of facility entrances by construction activities and equipment; interference during the construction of pipelines, power lines, and power production facilities; and disruption of the user's enjoyment of the recreational experience. Construction vehicles would be parked off-trail in designated vehicle staging areas to minimize any temporary loss of access that could occur during construction. However, recreation areas such as the ISDRA, Niland Marine Park, Bashford's Hot Mineral Spa, and Fountain Youth Spa could be affected if the projects were sited within the portion of the ISDRA that is adjacent to the West Chocolate Mountains REEA or if the projects were adjacent to these recreational resources.

There is a common opinion that ecological concerns are limiting the space for OHV recreation, and further limitation as a result of short-term impacts associated with Alternative 3 could compound these views for OHV enthusiasts who use the local area. Similar opinions could be present among seasonal residents to the area, or "snowbirds," particularly if commonly used camping areas on public lands are transformed into alternative energy locations. There is an interest in maintaining quiet (non-OHV) use experiences in the public lands estate. There is anecdotal evidence from public lands users that OHV recreation, itself, crowds out recreational activities such as hunting, fishing, wildlife viewing, and bird watching that depend on a setting influenced by these same ecological concerns. Recreational resources on BLM property are valued for the opportunity for participating in outdoor recreation activities in a natural, scenic setting. Noise, vibration, dust, visual impacts, and odor from construction activities could disrupt users' enjoyment of the ISDRA, hiking trails, and primitive campgrounds present in the area. Similarly, views of construction equipment or the addition or change of industrial structures such as power lines and power production facilities conflict with the natural background of many of these recreational resources and could also disrupt the users' enjoyment and recreational activities, which could lead to a minor to moderate, long-term aesthetic impact.

Conclusion

Long-term, adverse effects to recreation could occur based on the criteria outlined in Section 4.15.2. Due to the amount of potential development, implementation of this alternative would conflict with the management goals of the CDCA Plan, the WECO Plan Amendment, the ISDRA Recreation Area Management Plan, and the NECO Routes of Travel Goals and Objectives. Initially, the amount of potential development could restrict public access to large portions of public land within the West Chocolate Mountains REEA that were previously accessible to the public for recreational uses and could result in user conflicts for quality recreation opportunities. Given the magnitude of development (up to 6,637 acres of CSP or up to 29,758 acres of PV power), it could be difficult to site construction and operations away from open OHV routes and OHV interconnection routes between the Coachella Canal and East Highline Canal as well as the portion of the ISDRA which is adjacent to the REEA.

Indirect Recreation Impacts from Solar Energy Development

There is a common opinion that ecological concerns are limiting the space for OHV recreation, and further limitation as a result of short-term impacts associated with Alternative 3 could compound these views for OHV enthusiasts who use the local area. Similar opinions could be present among seasonal residents to the area, or “snowbirds,” particularly if commonly used camping areas on public lands are transformed into alternative energy locations. The amount of development could result in “spill over” effects to other recreation areas such as the ISDRA, Niland Marine Park, Imperial Wildlife Area, Wister Unit, and Niland Marina Park. The level of use of these areas could rise due to displacement of OHV users to other recreation geographies in the CDCA where non-OHV recreation is priority recreation. There could be long-term, adverse effects to the recreational experiences within these areas and county and state parks within Imperial County. However, the development cap would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Direct Recreation Impacts from Wind Energy Development

Construction of one 45-MW geothermal power plant could result in short-term effects for access to existing recreation areas or sites during construction and decommissioning. The siting of construction and operations away from designated trails could be designed to minimize conflicts with other users of public lands, thereby minimizing the impacts that construction and operation of wind turbines could have on recreational resources. Exploration and construction could initially restrict public access to small portions of the West Chocolate Mountains REEA that were previously accessible to the public during exploration; however, this could be a short-term impact as wind exploration could be intermittent. Depending on where the projects are sited, some routes of travel could be rerouted. This would only occur if the project was constructed on or near existing routes of travel or near existing recreational sites such as the ISDRA, Niland Marina Park, Bashford’s Hot Mineral Spa, and Fountain Youth Spa. However, given the small amount of land (27 acres on BLM land, 76 acres on BLM and other land) that could be developed within the REEA, the project could be sited away from open routes of travel and existing recreation areas, and there would be no effect. Since these resources would not be affected, there would not be changes in levels of use for existing recreational areas or sites or spill over into other recreational areas or sites. Recreation areas such as the ISDRA, Niland

Marine Park, Bashford's Hot Mineral Spa, and Fountain Youth Spa would not be affected unless the wind project was sited adjacent to them.

Conclusion

Wind energy development would not conflict with the CDCA Plan or WECO Plan Amendment's recreation management goals.

Indirect Recreation Impacts from Wind Energy Development

Recreational users visiting the ISDRA and the Imperial Wildlife Area, Wister Unit (within 1 mile of the West Chocolate Mountains REEA western boundary), to bird watch, fish, or hunt could be affected by construction or decommissioning activities involved with wind energy projects if the project were sited in proximity to these recreational areas or sites. However, since the total construction of one wind energy project could encompass only 27 acres on BLM land and 76 acres on BLM and other land, the projects could be sited away from these recreation areas and indirect effects could be avoided. Each wind project could result in the long-term loss of approximately 76 acres of land which could be used for recreation in the REEA; however, the recreational draw of the area is not particularly high, making the overall effect to recreation minimal.

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 potential impacts to recreation from wind energy projects similar to those described above. However, the development cap would limit wind energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

4.15.4.4 Alternative 4: Geothermal Development Only

Under this alternative, geothermal energy could be developed to the achievement of levels of geothermal energy development consistent with the geothermal RFD scenario; there would be no solar or wind energy development. Under this alternative, the following impacts would be the same as Alternative 3:

- Direct and indirect recreation resources impacts from geothermal energy development;
- Acquired lands; and
- Existing noncompetitive lease application.

Impacts from geothermal energy development would be the same as Alternative 3. Under this alternative, the West Chocolate Mountains REEA would not be designated as an SEZ and solar or wind energy development would not be allowed. Additionally, the development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). This alternative would not conform to the CDCA goal to identify potential sites for wind energy development.

4.15.4.5 Alternative 5: Solar Energy Development Emphasis with Moderate Geothermal Development and No Wind Development

Under this alternative, solar energy could be developed to the achievement of levels of development consistent with the maximum extent as defined in the solar RFD scenario. Geothermal energy could be developed to a moderate level (50 MW) as defined in the geothermal RFD scenario.

Under this alternative, the following would be the same as Alternative 3:

- Acquired lands;
- Existing noncompetitive lease application; and
- Direct and indirect recreation resources impacts from solar development.

Impacts from geothermal energy development would be the same as Alternative 3. All lands within the West Chocolate Mountains REEA would be designated as an SEZ, which would allow other compatible renewable energy developments to occur. An SEZ also would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments, including geothermal energy, to occur within the West Chocolate Mountains SEZ.

Direct and Indirect Recreation Impacts by Geothermal Energy Development

Under this alternative, there could be partial development of the geothermal RFD scenario. Direct and indirect impacts to recreation would be similar to the impacts described under Alternative 3; however, the total area disturbed could be reduced to 109 acres on BLM land and 312 acres on BLM and other land since there could be only one 50-MW geothermal plant developed instead of three. Direct impacts are anticipated to be short-term and are not expected to have a significant adverse impact to recreation. No indirect impacts to recreation are expected as a result of implementation of this alternative.

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 geothermal energy development, which could lead to potential impacts to recreation from geothermal energy projects similar to those described above. The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

4.15.4.6 Alternative 6: Geothermal Development Emphasis with Moderate Solar Development and No Wind Development

Under this alternative, it is assumed that achievement of levels of development consistent with the maximum development defined in the geothermal RFD scenario would take place (the same as discussed for Alternative 3) and that the level of achievement consistent with partial development of the solar RFD scenario would be realized. Lands within the West Chocolate Mountains REEA that lie east of the Coachella Canal would not be considered for an SEZ, modified or otherwise. Lands west of the canal would be identified as an SEZ, allowing other compatible renewable energy developments to occur.

Under this alternative, the following would be the same as Alternative 3:

- Acquired lands;
- Existing noncompetitive lease application;
- Direct and indirect recreation resources impacts from geothermal development; and
- Direct and indirect recreation resources impacts from CSP (dish engine only) and PV solar development.

Direct and Indirect Recreation Impacts from Geothermal Energy Development

Impacts from geothermal energy development would be the same as Alternative 3. Under Alternative 6, the lands west of the Coachella Canal would be identified as an SEZ, a designation that would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments, including geothermal energy development, to occur within the West Chocolate Mountains SEZ. The lands east of the Coachella Canal would not be considered for an SEZ. In addition, all lands east of the Coachella Canal would have a development cap which would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Direct Recreation Impacts from Solar Energy Development

Long-term, adverse, direct effects to recreation could occur if up to 6,637 acres of CSP (dish engine technology only) or 29,758 acres of PV power were developed. Due to the amount of potential development, implementation of this alternative could conflict with the management goals of the CDCA Plan and WECO Plan Amendment. Initially this alternative could restrict public access to portions of public land within the West Chocolate Mountains REEA that were previously accessible to the public. Specifically, there could be user conflicts and quality recreation opportunities could be diminished, thereby causing long-term effects. Conflicts with recreational users could occur when construction vehicles are traveling to and from construction sites. Ultimately, the surface disturbance could include approximately 6,637 acres for CSP development and 29,758 acres for solar PV development. Access to existing recreational areas and sites could be adversely affected. Recreational activities could be disrupted through the physical restriction of recreational areas and OHV trails, blocking facility entrances due to construction activities and with equipment, interference during the construction of pipelines, power lines, and power production facilities, and disruption of user enjoyment of the recreational experience. Recreational resources on BLM property are valued for the opportunity for participating in outdoor recreation activities in a natural, scenic setting. Noise, vibration, dust, visual impacts, and odor from construction activities could disrupt user enjoyment. Similarly, views of construction equipment or the addition or change of industrial structures such as pipelines, power lines, and power production facilities, conflict with the natural background of many of these recreational resources and could also disrupt an individual's enjoyment and recreational activities, which could lead to a minor to moderate, long-term aesthetic impact.

Conclusion

Long-term, adverse effects to recreation could occur based on the criteria outlined in Section 4.15.2. Due to the amount of potential development, implementation of this alternative

would conflict with the management goals of the CDCA Plan, the WECO Plan Amendment, the ISDRA Recreation Area Management Plan, and the NECO Routes of Travel Goals and Objectives. This action could cause a decrease in the level of use of existing recreation areas or sites. Routes of travel could be adversely affected by the volume of construction traffic and it could be difficult to open new areas to recreation. In the event that construction equipment illegally leaves designated access roads, recreational activities may be adversely affected.

Indirect Recreation Impacts from Solar Energy Development

Solar energy development could result in "spill over" effects to other recreation areas such as the ISDRA, Niland Marine Park, and the Imperial Wildlife Area, Wister Unit. The level of use of these areas could rise due to displacement of OHV users to other recreation geographies in the CDCA where non-OHV recreation is priority recreation. The level of use of these areas could rise and there could be long-term, adverse effects to the recreational experiences within these areas and county and state parks within Imperial County. In addition, the development cap would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

4.16 Special Management Areas

This section discusses the effects to special management areas (SMAs) that may occur with implementation of the alternatives. First, the management goals are provided; second, the impact indicators used to identify and analyze effects are presented; third, typical impacts are discussed for geothermal, solar, and wind energy; and last, impacts are analyzed by alternative.

4.16.1 Management Goals

The following are management goals from the CDCA Plan of 1980, as amended:

- Broaden the archaeological and historical knowledge of the CDCA through continuing inventory efforts and the use of existing data;
- Continue the effort to identify the full array of the CDCA's SMAs;
- Preserve and protect representative sample of the full array of the CDCA's SMAs;
- Ensure that SMAs are given full consideration in land use planning and management decisions, and ensure that BLM authorized actions avoid inadvertent impacts; and
- Ensure proper data recovery of significant (National Register quality) SMAs where adverse impacts can be avoided.

4.16.2 Impact Criteria

The potential risk of impacts to SMAs has been assessed with respect to the following criteria. Potential impacts on recreation could occur if the any of the following were to take place:

- Potential changes in air quality or other air clarity evaluations within SMAs due to construction and operation activities;

- Potential changes in ambient noise levels within SMAs due to construction and operation activities;
- Visible project components from SMAs or portions of SMAs;
- Changes to the darkness of the night sky dome as viewed from SMAs due to construction and operation activities; or
- Changes in erosion or sedimentation rates within SMAs;

4.16.3 Typical Special Management Area Impacts from Energy Development

4.16.3.1 Typical Special Management Area Impacts from Geothermal Energy Development

The Geothermal PEIS identified typical impacts on SMAs associated with geothermal energy development; these impacts are summarized in Table 4.16-1.

Table 4.16-1 Typical Impacts to Special Management Areas from Geothermal Energy Development

Project Phase	Activity	Impact	Time Frame
Site Evaluation/ Exploration	– Surveying and well drilling. – Access road and well pad construction. – Staging equipment. – Vehicular traffic.	– Dust. – Noise. – Visual. – Introduction of invasive species to area.	Short-term.
Construction	– Surveying and well drilling. – Access road and well pad construction. – Staging equipment. – Vehicular traffic.	– Dust. – Noise. – Visual. – Introduction of invasive species to area. – Damage to cultural resources.	Short-term.
Operation and Maintenance	– Transformer, power house, and cooling tower. – Steam dissipating into the atmosphere; air pollution in the form of noxious fumes containing hydrogen sulfide, causing a “rotten-egg” smell; and solid waste from energy production.	– Visual. – Air pollution. – Smell. – Solid waste production.	Long-term (life of project).
Decommissioning	– Vehicular traffic. – Facility removal. – Removal of access roads that are not maintained for other uses.	– Dust. – Noise. – Visual. – Introduction of invasive species to area.	Short-term.

4.16.3.2 Typical Special Management Area Impacts from Solar Energy Development

Based on a review of environmental documentation for other solar energy projects, typical impacts for solar energy projects have been developed. The typical impacts to SMAs associated with solar energy development are summarized in Table 4.16-2.

Table 4.16-2 Typical Impacts to Special Management Areas from Solar Energy Development

Project Phase	Activity	Impact	Time Frame
Site Evaluation/ Exploration	– Geotechnical testing. – Equipment installation.	– Minor loss of habitat. – Introduction of invasive species to area.	Long-term.
Construction	– Grading and site preparation. – Solar array installation. – Ancillary structure construction. – Construction traffic.	– Dust. – Noise. – Visual. – Damage to cultural resources. – Habitat loss. – Introduction of invasive species to area. – Major increase in traffic.	Short-term.
Operation and Maintenance	– Presence of solar power plant. – Facility lighting. – Operation traffic.	– Visual. – Light pollution. – Minor increase in traffic.	Long-term (life of project).
Decommissioning	– Vehicular traffic. – Facility removal. – Removal of access roads that are not maintained for other uses.	– Dust. – Noise. – Visual. – Introduction of invasive species to area.	Short-term. Long-term.

4.16.3.3 Typical Special Management Area Impacts from Wind Energy Development

The Wind PEIS identified impacts on SMAs typically associated with wind energy development. Those impacts are summarized in Table 4.16-3.

Table 4.16-3 Typical Impacts to Special Management Areas from Wind Energy Development

Project Phase	Activity	Impact	Time Frame
Site Evaluation/ Exploration	– Monitoring and testing activities. – Limited road construction and excavation. – Clearing or grading could be necessary for installation and monitoring equipment or access to a site.	– Dust. – Noise. – Visual. – Introduction of invasive species to area.	Short-term. Long-term.

Table 4.16-3 Typical Impacts to Special Management Areas from Wind Energy Development

Project Phase	Activity	Impact	Time Frame
Construction	– Vehicular traffic. – Installation of turbines, support facilities, access roads, utility corridors, and transmission lines. – Site clearing and grading, along with construction of access roads, towers, support buildings, utility and transmission corridors, and other ancillary facilities.	– Dust. – Noise. – Visual. – Mortality of biota. – Exposure to contaminants. – Interference with behavioral activities. – Introduction of invasive species to area. – Modification, fragmentation, and reduction of habitat. – Damage to cultural resources.	Short-term. Long-term.
Operation and Maintenance	– Operations and monitoring of wind facility.	– Visual. – Noise.	Long-term (life of project).
Decommissioning	– Vehicular traffic. – Facility removal. – Removal of access roads that are not maintained for other uses.	– Dust. – Noise. – Visual. – Introduction of invasive species to area.	Short-term. Long-term.

4.16.4 Special Management Areas Impacts by Alternative

This section describes the impacts under each alternative using the respective methodology prescribed under NEPA. To compare impacts, this analysis defines the temporal scale (time), spatial extent (area), and intensity of effects for each alternative.

This EIS analyzes impacts to all resources, including habitat and protected species, to the extent necessary for a programmatic document, subject to existing data availability. Site-specific analyses, based on data compiled from detailed studies, will be conducted for site-specific proposals. If the constraints discussed in Section 2.1.2 are discovered during project planning or following further future studies, as determined necessary by an authorized officer, portions of the West Chocolate Mountains REEA may be determined to be closed to and unsuitable for geothermal, solar, or wind energy development.

As discussed in Section 3.16 and displayed in Figure 3.16-1, the only SMA that is adjacent to the West Chocolate Mountains REEA boundary is a small portion of the ISDRA. Within 10 miles, there are three other SMAs: the Dos Palmas Preserve Area of Critical Environmental Concern (ACEC), located approximately 1 mile north; the North Algodones Dunes Wilderness Area, located approximately 7 miles southeast; and the Chuckwalla Desert Wildlife Management ACEC, located just under 10 miles north-northeast.

4.16.4.1 Alternative 1: No Action/No CDCA Plan Amendment

Because geothermal, wind, and solar development could still occur under the No Action/No CDCA Plan Amendment alternative, impacts to special management areas would be

expected to be similar to those detailed in Section 4.16.4.3 for Alternative 3. However, development under the No Action/No CDCA Plan Amendment alternative may occur at a slower rate because an individual plan amendment process would be necessary for each geothermal and solar or wind authorization; thus, impacts may occur at a slower rate, as well.

No renewable energy development cap or other protective stipulations/measures pertaining to the east side of the Coachella Canal would be adopted under this alternative. Thus, there would be no restrictions on development east of the Coachella Canal and impacts to special management areas that would not occur under Alternative 3 east of the Coachella Canal could occur under Alternative 1.

4.16.4.2 Alternative 2: No Development/CDCA Plan Amendment to Identify Areas as Closed to and Unsuitable for Geothermal, Solar, and Wind Energy Development

There would be no new construction or operation of geothermal power plants, or solar or wind energy projects, except those which are currently approved or operating. Special management areas would not be affected by new geothermal, wind, or solar projects; however, the closure of these lands for renewable energy development would represent an opportunity cost. The energy that could have been supplied by development of this area for geothermal, solar, and/or wind energy would have to be filled by other fossil fuel or renewable energy generating facilities constructed elsewhere.

No renewable energy development cap or other protective stipulations/measures pertaining to the east side of the Coachella Canal would be adopted under this alternative. Thus, there would be no restrictions on development east of the Coachella Canal and impacts to special management areas that would not occur under Alternative 3 east of the Coachella Canal could occur under Alternative 2.

4.16.4.3 Alternative 3: Renewable Energy Development Emphasis

Under Alternative 3, geothermal, solar, and wind could be developed to the maximum extent as defined in the geothermal, solar, and wind RFD scenarios. Up to 1,026 acres of land could be disturbed for development of geothermal power plants; up to 29,758 acres of land could be disturbed for development of solar PV projects; up to 6,637 acres could be disturbed for development of CSP projects; and up to 76 acres of land could be disturbed for wind energy projects. Solar development could occur through the development of a 50-MW solar PV power plant and 500-MW CSP power plant. Under this alternative, the REEA would be designated as an SEZ. 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 geothermal and wind energy development.

Direct Special Management Area Impacts from Geothermal Energy Development

Construction of the three 50-MW geothermal power plants could occur anywhere within the West Chocolate Mountains REEA. Traffic and construction activities as a result of geothermal energy development could create short-term increases in noise, dust, and the potential for an increase in the spread of invasive and noxious weeds to the area. Biological resources could experience long-term effects by direct conversion of the land to geothermal

power or loss of habitat. Wildlife within SMAs might experience adverse, short-term effects if construction activities and associated noise disturb normal behaviors, such as feeding and reproduction. A short- or long-term increase in the deposition of dust and the spread of invasive and noxious weeds could also adversely affect species in nearby SMAs. Dust settling on vegetation may cause short-term, adverse effects on the ability of plant species to photosynthesize and/or reproduce.

Operations of geothermal power plants could cause air pollution in the form of noxious fumes containing hydrogen sulfide, causing a "rotten-egg" smell, as well as create solid waste from energy production. The presence of the power plants could also change the primitive visual character of the area. These changes to the area could cause long-term impacts to people who engage in hiking, OHV use, camping, birding, and hunting in the nearby SMAs. In addition, construction of these power plants could cause long-term effects to hydrology and cause a long-term increase in sedimentation.

Under this alternative, the pending geothermal lease application (640 acres) would be approved. Geothermal exploration would begin which could result in the impacts to special management areas discussed earlier in this section. Currently, the size of the power plant is unknown since exploration has not begun; however, other power plants in the region are less than 50 MW so it would be anticipated that exploration would be consistent with that of a geothermal power plant as discussed in the geothermal RFD scenario.

Conclusion

As previously stated, the ISDRA is the only SMA adjacent to the West Chocolate Mountains REEA and three other SMAs fall within 10 miles. If the geothermal energy development were implemented adjacent to the ISDRA or near one of the other SMAs nearby, following the impact criteria outlined in 4.16.2, potential short-term and long-term impacts could occur. However, since the total construction of three geothermal power plants could encompass less than 1,000 acres, the project could be sited away from these SMAs and no direct effects to nearby SMAs would occur. Geothermal energy development would not conflict with Management Goals for SMA, nor would they be a concern to the public.

Indirect Special Management Area Impacts from Geothermal Energy Development

Indirect effects could occur only if the three geothermal power plants were constructed in proximity to the ISDRA or one of the other SMAs within the 10-mile radius of the West Chocolate Mountains REEA. Indirect effects could be primarily limited to air and noise effects, as well as visual effects from construction and operation of the power plants. For the ISDRA, located adjacent to the REEA, there could be effects to erosion and sedimentation rates from construction. Since the total construction of three geothermal power plants could encompass less than 1,000 acres, the project could be sited away from the nearby SMAs and indirect effects could be avoided. Implementation of this alternative would conform to the management goals of the surrounding SMAs.

The designation as an SEZ would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments, including geothermal energy development, to occur within the West Chocolate Mountains SEZ, which could lead to

potential impacts to special management areas from geothermal energy projects similar to those described above, although the development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Direct Special Management Area Impacts from Solar Energy Development

Direct effects to SMAs could occur if up to 6,637 acres of CSP or up to 29,758 acres of solar PV power were developed, although lands acquired by BLM with LWCF funds would be managed as avoidance areas. It is assumed that either CSP or solar PV projects could be developed. Due to the wide range of solar development that could occur in the West Chocolate Mountains REEA, the activities that could occur during solar energy development have been based on the development of a 50-MW solar PV project and a 500-MW CSP project. These sizes were selected based on the availability of data related to development of these types of projects. PV and CSP are the two technologies that have been fielded most widely in the United States and throughout the world.

Traffic and construction activities as a result of solar development could create noise, dust, and the potential for an increase in the spread of invasive and noxious weeds to the area. Wildlife within SMAs might be affected if construction activities and associated noise disturb normal behaviors, such as feeding and reproduction. An increase in the deposition of dust and spread of invasive and noxious weeds could also adversely affect species in nearby SMAs. Dust settling on vegetation may alter or limit the ability for plants to photosynthesize and/or reproduce.

If the solar power plant were located close enough to a SMA to be seen by the human eye, the presence of the construction workforce and equipment, as well as the presence of a solar power plant during operations, could affect the rural to primitive character of the area. This could result in long-term, adverse impacts to people who engage in hiking, OHV use, camping, birding, and hunting in the nearby SMAs. Facility lighting during operations could also create a long-term, adverse impact to wildlife in nearby SMAs.

Conclusion

As stated previously, only a small area of the ISDRA is adjacent to the West Chocolate Mountains REEA. Only this area could be affected by construction and operation of solar power projects. If solar development was implemented adjacent to this area, short-term and long-term effects could occur. Off-site impacts are considered in the EIS and will be considered further in site-specific project analyses. The BLM will consider specific mitigation to minimize or avoid these off-site impacts to the extent possible. Given the magnitude of the potential solar development, the CSP projects likely could be sited away from this SMA; however, if solar PV power was developed to the maximum extent, it is unlikely this SMA could be avoided, and long-term, adverse effects could occur. This would conflict with the management goals of the ISDRA.

Indirect Special Management Area Impacts from Solar Energy Development

Indirect effects to SMAs would be similar to the effects described above; however, they would be primarily limited to air and noise effects, as well as visual effects from construction and operation of the power plants. For the ISDRA, located adjacent to the West Chocolate

Mountains REEA, there could be effects to erosion and sedimentation rates from construction. Indirect effects could occur only if the solar power projects were constructed in close proximity to the one designated Wilderness Area, the ISDRA, or the two ACECs within 10 miles of the REEA. Given the magnitude of the potential solar development (up to 6,637 acres), it is likely the CSP projects could be sited away from these SMAs; however, if solar PV projects were developed to the maximum extent, it is likely the solar PV projects would be sited in proximity to these SMAs and long-term, adverse effects could occur. This could conflict with the management goals of the ISDRA and other surrounding SMAs. However, the development cap would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Direct Special Management Area Impacts from Wind Energy Development

Wind development could cause short- and long-term, adverse impacts to people as well as vegetation and wildlife within nearby SMAs. Traffic and construction activities could create noise, dust, and the potential for an increase in the spread of invasive and noxious weeds to the area. Wildlife within SMAs might be affected if construction activities and associated noise disturb normal behaviors, such as feeding and reproduction. An increase in the deposition of dust and spread of invasive and noxious weeds could adversely affect species in nearby SMAs. Dust settling on vegetation may alter or limit the ability for plants to photosynthesize and/or reproduce.

If the wind power plant were located close enough to a SMA to be seen by the human eye, the presence of the construction workforce and equipment, as well as the presence of a wind power plant during operations, could affect the rural to primitive character of the area. This could create a long-term, adverse impact to people who engage in hiking, OHV use, camping, birding, and hunting in the nearby SMAs. In addition, noise vibrations during construction and operations could create short- and long-term, adverse impacts to wildlife as well as people within nearby SMAs. Wind turbines are known to cause mortality to birds and bats, and the presence of wind turbines could cause long-term, adverse effects to avian and bat species.

Conclusion

As stated above, there is only a small portion of a recreational SMA within the West Chocolate Mountains REEA, and other SMAs exist nearby. If the wind development were implemented close to any of these areas, short-term and long-term impacts could occur. However, considering the magnitude of the wind development in the REEA and following mitigation measures and BMPs discussed in Section 2.2.6, no significant, direct impacts to nearby SMAs are anticipated and the wind development would not conflict with the management goals of the ISDRA.

Indirect Special Management Area Impacts from Wind Energy Development

Indirect effects to SMAs would be similar to the effects described above; however, effects would be primarily limited to air and noise, as well as visual effects from construction and operation of the power plants. Indirect effects could occur if the solar power projects were constructed in close proximity to the one designated Wilderness Area, the ISDRA, or two ACECs within 10 miles of the West Chocolate Mountains REEA. Indirect effects could also occur to avian and bat species in these SMAs, as they could experience mortality from the wind

project in the REEA. Since the total construction of one wind energy project could encompass about 76 acres of BLM and non-BLM land, this plan could be sited away from these SMAs and indirect effects could be avoided. Implementation of this alternative would conform to the management goals of the surrounding SMAs.

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 potential impacts to special management areas from wind energy projects similar to those described above. However, the development cap would limit wind energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

4.16.4.4 Alternative 4: Geothermal Development Only

Under this alternative, geothermal energy could be developed to the achievement of levels of geothermal energy development consistent with the geothermal RFD scenario; there would be no solar or wind energy development. Under this alternative, the following impacts would be the same as Alternative 3:

- Direct and indirect special management area impacts from geothermal energy development;
- Acquired lands; and
- Existing noncompetitive lease application.

Impacts from geothermal energy development would be the same as Alternative 3. Under this alternative, the West Chocolate Mountains REEA would not be designated as an SEZ and solar or wind energy development would not be allowed. Additionally, the development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). This alternative would not conform to the CDCA goal to identify potential sites for wind energy development.

4.16.4.5 Alternative 5: Solar Energy Development Emphasis with Moderate Geothermal Development and No Wind Development

Under this alternative, solar energy could be developed to the achievement of levels of development consistent with the maximum extent as defined in the solar RFD scenario. Geothermal energy could be developed to a moderate level (50 MW) as defined in geothermal RFD scenario.

Under this alternative, the following would be the same as Alternative 3:

- Acquired lands;
- Existing noncompetitive lease application; and
- Direct and indirect special management area impacts from solar development.

Impacts from solar energy development would be the same as Alternative 3. All lands within the West Chocolate Mountains REEA would be designated as an SEZ, which would allow

other compatible renewable energy developments to occur. An SEZ also would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments, including geothermal energy, to occur within the West Chocolate Mountains SEZ.

Direct and Indirect Special Management Area Impacts from Geothermal Energy Development

Under this alternative, there could be partial development of the geothermal RFD scenario. Direct and indirect impacts to SMAs would be similar to the impacts described under Alternative 3; however, the total area of surface disturbance would be reduced since there would only be one 50-MW geothermal plant developed instead of three. Direct effects are anticipated to be short-term and would not have adverse effects to SMAs. No indirect impacts to SMAs would be expected as a result of implementation of this alternative. Implementation of this alternative would conform to the management goals of the ISDRA and the surrounding SMAs.

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 geothermal energy development, which could lead to potential impacts to special management areas from geothermal energy projects similar to those described above. The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

4.16.4.6 Alternative 6: Geothermal Development Emphasis with Moderate Solar Development and No Wind Development

Under this alternative, it is assumed that achievement of levels of development consistent with the maximum development defined in the geothermal RFD scenario would take place (the same as discussed for Alternative 3) and that the level of achievement consistent with partial development of the solar RFD scenario would be realized. Lands within the West Chocolate Mountains REEA that lie east of the Coachella Canal would not be considered for an SEZ, modified or otherwise. Lands west of the canal would be identified as an SEZ, allowing other compatible renewable energy developments to occur.

Under this alternative, the following would be the same as Alternative 3:

- Acquired lands;
- Existing noncompetitive lease application;
- Direct and indirect socioeconomic impacts from geothermal development; and
- Direct and indirect socioeconomic impacts from CSP (dish engine only) and PV solar development.

Direct and Indirect Special Management Area Impacts from Geothermal Energy Development

Impacts from geothermal energy development would be the same as Alternative 3. Under this alternative, the lands west of the Coachella Canal would be identified as an SEZ, a

designation that would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments, including geothermal energy development, to occur within the West Chocolate Mountains SEZ. The lands east of the Coachella Canal would not be considered for an SEZ. In addition, all lands east of the Coachella Canal would have a development cap which would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).Direct and Indirect Special Management Area Impacts from Solar Energy Development

Under this alternative, the only CSP technology implemented could be dish engine technology which requires less acreage for solar development and, thus, results in a smaller area of impacted land (up to 29,758 acres could be disturbed for development of solar PV projects, and up to 6,637 acres could be disturbed for development of CSP projects). In addition, the development cap would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).Direct and indirect effects to SMAs from solar energy development under this alternative would be similar to the impacts described under Alternative 3.

4.17 Social and Economic Conditions

This section discusses the effects to social and economic conditions that may occur with implementation of the alternatives. First, any management goals for this area are provided; second, the impact indicators used to identify and analyze effects are presented; third, typical impacts are discussed for geothermal, solar, and wind energy; and last, impacts are analyzed by alternative.

4.17.1 Management Goals

There are no specific management goals in the CDCA Plan or WECO Plan Amendment for social or economic conditions or for environmental justice for the West Chocolate Mountains REEA. The policies discussed in Chapter 1 provide the direction for the program as it relates to the plan.

4.17.2 Impact Criteria

The potential risk of impacts to social and economic conditions is assessed with respect to the following criteria. Potential impacts on social and economic conditions could occur if any of the following were to take place:

- A permanent or temporary change in the amount of economic activity in the regional economy;
- A permanent or temporary population increase larger than local services, infrastructure, or population could accommodate;
- A tax burden to local residents that is not compensated by the project; or
- A disproportionate share of an adverse impact to any racial, ethnic, or socioeconomic group.

4.17.3 Typical Social and Economic Impacts from Energy Development

Local socioeconomic impacts could arise primarily from the construction and operation of power generating facilities and supporting infrastructure that would be built to develop the geothermal, solar and/or wind resources of the lease tracts. Construction and operation of the facilities and infrastructure could increase local economic activity by creating new jobs and producing additional local expenditures. This increase in economic activity could, in turn, generate secondary economic impacts in the form of more jobs and income, increased public revenue, and a possible increase in local population. Population growth could then impact community infrastructure—housing, schools, domestic water systems, etc.—and social well-being. In the context of the broader regional and national energy economy, the development of the West Chocolate Mountains REEA could yield benefits such as zero emission-based heat and power and avoidance of many of the external social costs associated with power produced from fossil fuels.

Socioeconomic impacts would be primarily felt in Imperial County and in the Coachella Valley of Riverside County. The sizable populations of these areas are within less than an hour commute from the West Chocolate Mountains REEA. The majority of local construction workers would come from these areas or, if commuting from outside the region, could temporarily reside in these areas. Similarly, a large proportion of permanent O&M workers could reside in Imperial County and in the Coachella Valley of Riverside County. As a result, most of the local project expenditures for fuel, housing, transportation, and supplies needed for exploration, development, and operation could occur in these areas.

Because the new energy facilities would be located in Imperial County, most of the public revenue benefits would be received by jurisdictions within Imperial County. The county is the taxing authority and would receive all of the property taxes and a larger part of the sales taxes associated with the project. Additionally, the county could be the recipient of 25 percent of applicable federal royalties. Currently, federal royalties are only assessed on geothermal and oil and gas developments located on BLM lands. These royalties are currently split between federal, state, and local governments at a 25:50:25 ratio. Federal royalties are not assessed on solar or wind power facilities.

In June 2010, the BLM announced interim solar energy rental rates that are assessed based on the acreage used for the facility. These rental rates vary depending on the location, size, and technology used at the solar energy facility. Revenue generated from these solar energy rental rates will go to the federal government. Currently, the BLM is in the process of developing wind energy rental rates (BLM Instruction Memorandum No. 2010-141 2010).

To a lesser extent, some portion of the increased sales tax revenues resulting from the increased economic activity in the area would accrue to Riverside County. Increased employment and employee earnings in the county would generate a greater demand for local goods and services, thus increasing the sales tax receipts. Likewise, the purchase of goods and services used during the exploration, construction, and operation of the facilities could further increase county sales tax receipts.

Potential social impacts associated with a renewable energy facility would most likely to result from local perceptions about threats and opportunities affecting lifestyles and evaluations

of community quality of life (Freudenburg et al. 1994; Leistritz et al. 1981). Such perceptions are often based on the assessment of facility characteristics and their potential for risk or benefit to families and individuals in adjacent communities (Slovic et al. 1991; Edelstein 2004). Renewable energy facilities, in particular geothermal facilities, already exist within the West Chocolate Mountains REEA and residents have some familiarity with geothermal power generation. It is unlikely that one or two additional facilities could result in perceptions of threat to health or quality of life, changes in activity patterns, or substantial changes in the values and beliefs about the quality of place in this social environment. It is more likely that residents in adjacent communities could perceive such a facility as acceptable because it may generate employment, taxes, and it could "fit" with other existing rural industrial facilities. However, large-scale development of renewable energy resources within the West Chocolate Mountains REEA could be viewed differently. Depending on the resource and the technology selected to exploit this resource, perceptions of threat to health and quality of life, changes in activity patterns, or substantial changes in the values and beliefs about the quality of a place in this social environment could be more significant.

The influence on recreation and the aesthetic characteristics of a facility also have the potential to affect the quality of life in adjacent communities. Depending on the location, size, and type of generating facility developed, there is a potential for limited impacts on the aesthetic components of the community's quality of life.

4.17.3.1 Typical Social and Economic Impacts from Geothermal Energy Development

Typical impacts to social and economic conditions associated with geothermal energy development are summarized in Table 4.17-1.

Table 4.17-1 Typical Impacts to Social and Economic Conditions from Geothermal Energy Development

Project Phase	Activity	Impact	Time Frame
Site Evaluation/ Exploration	– Surveying and well drilling. – Access road and well pad construction. – Staging equipment.	– Temporary jobs for the local community near geothermal resources. – Stimulus from local expenditures for fuel, lodging, food, and other needs.	Short-term.
Construction	– Drilling. – Construction of injection wells and sump pits.	– Increases in local employment, earnings, and regional output. – Spending by the construction workers and purchase of goods and services from local suppliers. – Initial injection of funds could be cycled through the economy. – Population increase from construction workers temporarily relocating to the area.	Short-term.

Table 4.17-1 Typical Impacts to Social and Economic Conditions from Geothermal Energy Development

Project Phase	Activity	Impact	Time Frame
		– Additional demand for community services and facilities from temporary workers. – Construction of roads and pipelines that could impact tourism, recreation, hunting, and wildlife viewing associated with these areas. – Negative effects could disproportionately impact minority or low-income groups.	
Operation and Maintenance	– Operation of geothermal plant.	– Increases in local employment, earnings, and regional output. – Spending by permanent workers and purchase of goods and services from local suppliers. – Population increase from workers permanently relocating to the area. – Additional demand for community services and facilities from permanent workers. – Negative effects could disproportionately impact minority or low-income groups.	Long-term.
Decommissioning	– Vehicular traffic. – Staging equipment. – Facility removal.	– Temporary jobs for the local community near geothermal resources. – Loss of full-time jobs for the local community after decommissioning is complete. – Stimulus from local expenditures for fuel, lodging, food, and other needs. – Increase of the aesthetic value and recreational opportunities after decommissioning is complete.	Short-term.

4.17.3.2 Typical Social and Economic Impacts from Solar Energy Development

Based on a review of environmental documentation for other solar energy projects, typical impacts for solar energy projects have been developed. The typical impacts on social and economic conditions associated with solar energy development are summarized in Table 4.17-2.

Table 4.17-2 Typical Impacts to Social and Economic Conditions from Solar Energy Development

Project Phase	Activity	Impact	Time Frame
Site Evaluation/ Exploration	– Staging construction workers and equipment. – Vehicular traffic. – Geotechnical testing.	– Temporary jobs for the local community near solar resources. – Stimulus from local expenditures for fuel, lodging, food, and other needs.	Short-term.
Construction	– Construction of solar facility. – Access road construction. – Construction worker and equipment vehicular traffic.	– Increases in local employment, earnings, and regional output. – Spending by the construction workers and purchase of goods and services from local suppliers. – Initial injection of funds could be cycled through the economy. – Population increase from construction workers temporarily relocating to the area. – Additional demand for community services and facilities from temporary workers. – Construction of roads and pipelines that could impact tourism, recreation, hunting, and wildlife viewing associated with these areas. – Negative effects could disproportionately impact minority or low-income groups.	Short-term.
Operation and Maintenance	– Vehicular traffic.	– Increases in local employment, earning, and regional output. – Spending by permanent workers and purchase of goods and services from local suppliers. – Population increase from workers permanently relocating to the area. – Additional demand for community services and facilities from permanent workers.	Long-term.

Table 4.17-2 Typical Impacts to Social and Economic Conditions from Solar Energy Development

Project Phase	Activity	Impact	Time Frame
		– Negative effects could disproportionately impact minority or low-income groups.	
Decommissioning	– Vehicular traffic. – Staging workers and equipment. – Facility removal. – Removal of access roads that are not maintained for other uses. – Recontouring the surface. – Revegetation.	– Temporary jobs for the local community near geothermal resources. – Loss of full-time jobs after decommissioning is complete. – Stimulus from local expenditures for fuel, lodging, food, and other needs. – Increase of the aesthetic value and recreational opportunities after decommissioning is complete.	Short-term.

4.17.3.3 Typical Social and Economic Impacts from Wind Development

The Wind PEIS identified typical impacts on social and economic conditions associated with wind energy development. The impacts are incorporated by reference and summarized in Table 4.17-3.

Table 4.17-3 Typical Impacts to Social and Economic Conditions from Wind Energy Development

Project Phase	Activity	Impact	Time Frame
Site Evaluation/ Exploration	– Monitoring and testing activities. – Limited road construction and excavation. – Clearing or grading could be necessary for installation and monitoring equipment or access to a site.	– Temporary jobs for the local community near wind resources. – Stimulus from local expenditures for fuel, lodging, food, and other needs.	Short-term.
Construction	– Vehicular traffic. – Installation of turbines, support facilities, access roads, utility corridors, and transmission lines. – Site clearing and grading, along with construction of access roads, towers, support buildings, utility and transmission corridors, and other ancillary facilities.	– Increases in local employment, earnings, and regional output. – Spending by the construction workers and purchase of goods and services from local suppliers. – Initial injection of funds could be cycled through the economy. – Population increase from construction workers temporarily relocating to the area.	Short-term.

Table 4.17-3 Typical Impacts to Social and Economic Conditions from Wind Energy Development

Project Phase	Activity	Impact	Time Frame
		– Additional demand for community services and facilities from temporary workers. – Construction of roads and pipelines that could impact tourism, recreation, hunting, and wildlife viewing associated with these areas. – Negative effects could disproportionately impact minority or low-income groups.	
Operation and Maintenance	– Operations and monitoring of wind facility.	– Increases in local employment, earning, and regional output. – Spending by permanent workers and purchase of goods and services from local suppliers. – Population increase from workers permanently relocating to the area. – Additional demand for community services and facilities from permanent workers. – Negative effects could disproportionately impact minority or low-income groups.	Long-term.
Decommissioning	– Vehicular traffic. – Facility removal. – Removal of access roads that are not maintained for other uses.	– Temporary jobs for the local community near geothermal resources. – Loss of full-time jobs after decommissioning is complete. – Stimulus from local expenditures for fuel, lodging, food, and other needs. – Increase of the aesthetic value and recreational opportunities after decommissioning is complete.	Short-term.

4.17.4 Social and Economic Impacts by Alternative

This section describes the effects under each alternative using the respective methodology prescribed under NEPA. To compare effects, this analysis defines the temporal scale (time), spatial extent (area), and intensity of effects for each alternative.

This EIS analyzes impacts to all resources, including habitat and protected species, to the extent necessary for a programmatic document, subject to existing data availability. Site-specific analyses, based on data compiled from detailed studies, will be conducted for site-specific proposals. If the constraints discussed in Section 2.1.2 are discovered during project planning or following further future studies, as determined necessary by an authorized officer, portions of the West Chocolate Mountains REEA may be determined to be closed to and unsuitable for geothermal, solar, or wind energy development.

Effects on the existing ambient social and economic conditions may arise from project construction, O&M, and decommissioning equipment and vehicles as well as from the introduction of construction or O&M related traffic on local roads near the West Chocolate Mountains REEA. The following discussion analyzes the environmental consequences or impacts expected to occur as a result of anticipated future actions consistent with implementing the alternatives described in Chapter 2.

4.17.4.1 Alternative 1: No Action/No CDCA Plan Amendment

Because geothermal, wind, and solar development could still occur under the No Action/No CDCA Plan Amendment alternative, impacts to social and economic conditions would be expected to be similar to those detailed in Section 4.17.4.3 for Alternative 3. However, development under the No Action/No CDCA Plan Amendment alternative may occur at a slower rate because an individual plan amendment process would be necessary for each geothermal and solar or wind authorization; thus, impacts may occur at a slower rate, as well.

No renewable energy development cap or other protective stipulations/measures pertaining to the east side of the Coachella Canal would be adopted under this alternative. Thus, there would be no restrictions on development east of the Coachella Canal, and impacts to social and economic conditions that would not occur under Alternative 3 east of the Coachella Canal could occur under Alternative 1.

4.17.4.2 Alternative 2: No Development/CDCA Plan Amendment to Identify Areas as Closed to and Unsuitable for Geothermal, Solar, and Wind Energy Development

There would be no new construction or operation of geothermal power plants, or solar or wind energy projects, except those which are currently approved or operating. Topography, geology, and geologic hazards would not be affected by new geothermal, wind, or solar projects; however, the closure of these lands for renewable energy development would represent an opportunity cost. The energy that could have been supplied by development of this area for geothermal, solar, and/or wind energy would have to be filled by other fossil fuel or renewable energy generating facilities constructed elsewhere.

No renewable energy development cap or other protective stipulations/measures pertaining to the east side of the Coachella Canal would be adopted under this alternative. Thus, there would be no restrictions on development east of the Coachella Canal, and impacts to social and economic conditions that would not occur under Alternative 3 east of the Coachella Canal could occur under Alternative 2.

4.17.4.3 Alternative 3: Renewable Energy Development Emphasis

Under Alternative 3, geothermal, solar, and wind could be developed to the maximum extent as defined in the geothermal, solar, and wind RFD scenarios. Up to 1,026 acres of land could be disturbed for development of geothermal power plants; up to 29,758 acres of land could be disturbed for development of solar PV projects; up to 6,637 acres could be disturbed for development of CSP projects; and up to 76 acres of land could be disturbed for wind energy projects. Solar development could occur through the development of a 50-MW solar PV power plant and 500-MW CSP power plant.

Under this alternative, the REEA would be designated as an SEZ. 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 geothermal and wind energy development.

Direct Social and Economic Impacts from Geothermal Energy Development

The implementation of the geothermal RFD scenario could have a direct positive economic impact on Imperial County and on the Coachella Valley in Riverside County, as well as on the larger regional economy and on the State of California as a whole.

For the purposes of this analysis, the impacts associated with design, construction, operation, and decommissioning of three 50-MW geothermal power plants will be used to represent the expected effects of full build-out of the geothermal RFD scenario. Since this EIS is evaluating a conceptual program and specific projects have not yet been identified, no actual costs have been identified for the design, construction, operation, and decommissioning of geothermal plants in the West Chocolate Mountains REEA. In order to develop level of magnitude estimates for the impact analysis, construction and operations costs have been estimated for typical large-scale geothermal plants using accepted industry averages.

Table 4.17-4 estimates the total exploration and construction costs that would be required to complete three 50-MW geothermal power plants in the West Chocolate Mountains REEA. As shown in the table, large-scale geothermal plants in high-quality resource areas typically incur exploration costs of $130-$520/kW and construction costs of $390-$590/kW for steam fields and $980-$1,440/kW for power plants. Therefore, the total exploration and construction costs of three typical 50-MW geothermal power plants could be between $225 million and $382.5 million (as expressed in 2010 dollars).

In addition, a typical geothermal power plant construction project employs approximately 3.1 construction workers per MW (BLM 2008). Therefore, the three 50-MW geothermal power plants could directly generate 465 jobs in Imperial County during the exploration and construction phase.

Typical O&M costs for a large-scale geothermal power plant run between $0.004 and $0.007 per kWh (Renewable Energy Policy Project [REPP] 2010). Therefore, assuming the three 50-MW geothermal power plants operate at 90 percent capacity, the estimated annual operating costs could be between $4.7 and $8.3 million. Additionally, on average, a typical geothermal power plant creates 0.74 permanent full-time jobs per MW of power generated (BLM 2008).

Using this industry average, an estimated 111 full-time jobs could be created during the operation phase of the geothermal plants. Upon decommissioning of these plants, these full-time jobs would be lost.

Table 4-17.4 Typical Exploration and Construction Costs for Three 50-Megawatt Geothermal Power Plants

Activity	Cost per kW[1]	Number of Added kW	Total Costs (in $ millions)
Exploration	$130- $520	150,000	$19.5 - $78 million
Steam Field Construction	$390 - $590	150,000	$58.5 - $88.5million
Power Plant Construction	$980 - $1,440	150,000	$147 - $216million
Total Exploration and Construction Costs	$1,500 - $2,550	150,000	$225 - $382.5 million

Source: Renewable Energy Policy Project (REPP) 2010
Note:
Costs are expressed in 2010 dollars and are for large scale plants that are exploiting "high-quality" geothermal resources. Total exploration and construction costs for large-scale plants exploiting "medium-quality" geothermal resources is approximately $1,770 to $2,880 per kW. Estimated costs for large scale plants with "low-quality" geothermal resources were not available.

Under this alternative, the pending geothermal lease application (640 acres) would be approved. Geothermal exploration would begin which could result in the impacts to social and economic conditions discussed earlier in this section. Currently, the size of the power plant is unknown since exploration has not begun; however, other power plants in the region are less than 50 MW, so it would be anticipated that exploration would be consistent with that of a geothermal power plant as discussed in the geothermal RFD scenario.

Since a large portion of these costs could be spent in the regional economy, exploration and construction costs from additional economic activity generated by the completion of these power plants could increase regional employment, earnings, and economic output. The direct economic impacts associated with the exploration and construction phase could be significant and short-term in nature. Once the positive impacts from the injection of funds and the increase in employment cycle through the economy, the positive benefits would end.

Conversely, expenditures for O&M activities at the plants could have a long-term, positive impact the regional economy. The economic benefits associated with these expenditures could affect the regional economy for the life of the project.

Direct Social and Economic Impacts from Solar Energy Development

Under this alternative, 46 percent of the lands in the West Chocolate Mountains REEA could be leased for solar energy development. It is assumed that either CSP or solar PV projects could be developed. Due to the wide range of solar development that could occur in the West Chocolate Mountains REEA, the activities that could occur during solar energy development have been based on the development of a 50-MW solar PV project and a 500-MW CSP project. These sizes were selected based on the availability of data related to development of these types

of projects. PV and CSP are the two technologies that have been fielded most widely in the United States and throughout the world.

The implementation of the solar RFD scenario could have a direct positive economic impact on Imperial County and on the Coachella Valley in Riverside County, as well as on the larger regional economy and on the State of California as a whole. For purposes of this analysis, the impacts associated with design, construction, operation, and decommissioning of a 50-MW solar PV power plant and a 500-MW CSP project will be used to represent the expected effects of full build-out of the solar RFD scenario.

In order to develop level of magnitude estimates for the impact analysis, construction and operations costs have been estimated for typical PV and solar trough power plants. Using the Jobs and Economic Development Impact Model (JEDI) designed by the National Renewable Energy Laboratory (NREL), total construction and operations costs and total construction and operation employment were estimated for a typical 50-MW PV power plant and a 500-MW CSP project. Table 4.17-5 provides estimated project costs for these typical power plants. Table 4.17-6 provides estimates of direct project employment during the construction and operation phases.

Table 4.17-5 Construction and Operation Costs for a Typical 50-Megawatt PV Power Plant and Typical 500-Megawatt CSP Plant

	50-MW Solar PV Power Plant			500-MW CSP Plant		
Activity	**Cost per kW**	**Number of Added kW**	**Total Costs (in $ million)**	**Cost per kW**	**Number of Added kW**	**Total Costs (in $ million)**
Construction Costs						
Materials & Equipment Costs	$4,530	50,000	$226.5	$2,626.8	500,000	$1,313.4
Labor Costs	$612	50,000	$30.6	$651.6	500,000	$325.8
Other Costs	$1,250	50,000	$62.5	$650.8	500,000	$325.4
Sales Tax	$414	50,000	$20.7	$203.6	500,000	$101.8
Total Construction Costs	$6,806	50,000	$340.4	$4,132.8	500,000	$2,066.4
Annual Operations Costs						
Materials & Services	$.002	87,600,000	$0.2	$.009	1,095,000,000	$10.7
Labor	$.004	87,600,000	$0.4	$.008	1,095,000,000	$8.8
Total Annual Operations & Maintenance Costs	$.007	87,600,000	$0.6	$.017	1,095,000,000	$19.5

Source: NREL 2010
Note:
All figures are expressed in 2010 dollars. Totals may not add due to rounding.
[1]An average capacity factor of 20% was used to convert kW of capacity to kWh measurements for PV projects and a capacity factor of 25% was used to convert kW of capacity to kWh measurements for CSP projects.

The additional economic activity generated by the completion of these power plants could increase regional employment, earnings, and economic output. A large portion of the total

construction and O&M costs could be spent in the regional economy. In addition, a typical 50-MW solar PV plant and a typical 500-MW CSP project could directly employ a total of 3,598 workers during the construction phase and 96 workers during the O&M phase. Total employee earnings in the region could increase by $455.2 million during construction and by $8.5 million during operations (see Table 4.17-5 and 4.17-6). Upon decommissioning of these plants, these full time jobs would be lost.

Table 4.17-6 Total Employment during the Construction and Operation Phases for a Typical 50-Megawatt Solar PV Power Plant and a Typical 500-Megawatt CSP Plant

	50-MW Solar PV Power Plant		500-MW CSP Plant	
Activity	**Jobs (full-time equivalent)**	**Employee Earnings (expressed in $,000)[1]**	**Jobs (full-time equivalent)**	**Employee Earnings (expressed in $,000)[1]**
Construction				
Construction and Installation/Interconnection	389	$30,602	2,168	$340,540
Construction Related Services	260	$13,668	781	$70,420
Total Construction Jobs	649	$44,270	2,949	$410,960
Operations and Maintenance				
On-Site Labor	5	$359.9	91	$8,140
Total Operations and Maintenance Jobs	5	$359.9	91	$8,140

Source: NREL 2010
Notes:
[1] Expressed in 2010 dollars.

Direct Social and Economic Impacts from Wind Energy Development

Under this alternative, the impacts of completing the full wind RFD scenario are considered. Under this alternative, BLM administered public lands within the West Chocolate Mountains REEA could be designated as open to wind ROWs and would be subject to standard stipulations. The implementation of the wind RFD scenario could have a direct positive economic impact on Imperial County and on the Coachella Valley in Riverside County. For purposes of this analysis the impacts associated with design, construction, operation, and decommissioning of a 45-MW wind power plant will be used to represent the expected effects of full build-out of the wind RFD scenario. In order to develop level of magnitude estimates for the impact analysis, construction and operations costs have been estimated for typical wind power plants. Using JEDI designed by the NREL, total construction and operations costs and total construction and operation employment were estimated for a typical 45-MW wind power plant. Table 4.17-7 provides estimated project costs for this typical power plant. Table 4.17-8 provides estimates of direct project employment during the construction and operation phases.

Table 4.17-7 Construction and Operation Costs for a Typical 45-Megawatt Wind Power Plant

	45-MW Wind Plant An average capacity factor of 15% was used to convert kW of capacity to kWh measurements for PV projects and a capacity factor of 22% was used to convert kW of capacity to kWh measurements for CSP projects.		
Activity	**Cost per kW**	**Number of Added kW**	**Total Costs (in $ million)**
Construction Costs			
Materials & Equipment Costs	$1,771.1	45,000	$79.7
Labor Costs	$202.2	45,000	$9.1
Other Costs	$55.5	45,000	$2.5
Total Construction Costs	$2,028.8	45,000	$91.3
Annual Operations Costs	**Cost per kWh[1]**	**Number of Added kWh[1]**	**Total Costs (in $ million)**
Materials & Services	$.005	118,260,000	$0.6
Labor	$.003	118,260,000	$0.3
Total Annual Operations and Maintenance Costs	$.008	118,260,000	$0.9

Source: NREL 2010
Notes:
All figures expressed in 2010 dollars.
[1] A capacity factor of 30% was used to convert figures from kW of capacity to kWh.

Table 4.17-8 Total Employment during the Construction and Operation Phases for a Typical 45-Megawatt Wind Power Plant

	45-MW Wind Power Plant	
Activity	**Jobs (in full-time equivalent)**	**Employee Earnings (expressed in $,000)[2]**
Construction		
Construction and Installation/Interconnection	50	$3,630
Construction Related Services	3	$260
Total Construction Jobs	53	$3,890
Operations and Maintenance		
On-Site Labor	4	$290
Total Operations and Maintenance Jobs	4	$290

Source: NREL 2010
Note:
All figures expressed in 2008 dollars.

The additional economic activity generated by the completion of this power plant could increase regional employment, earnings, and economic output. A large portion of the total construction and O&M costs could be spent in the regional economy. As shown in Tables 4.17-7 and 4.17-8, a typical 45-MW wind power plant could directly employ 53 workers during the construction phase and four workers during the O&M phase. Total employee earnings in the region could increase by $3.9 million during construction and by $290,000 during operations (see Tables 4.17-7 and 4.17-8). Upon decommissioning of the plants, these full time jobs would be lost.

Total Direct Social and Economic Impacts from Alternative 3

Implementation of this action could directly inject a significant amount of income into the regional economy. As shown on Table 4.17-9, total construction expenditures needed to complete this alternative could be expected to reach more than $2.7 billion. The total construction workforce could be an estimated 4,116 persons and the total operation workforce could be an estimated 211 persons. These additional workers could be expected to increase regional labor earnings by $265.1 million during the construction phase and increase regional labor earnings by $33.3 million annually during the operation phase (NREL 2010; MIG, Inc. 2010).

Table4.17-9 Total Direct Impacts Resulting from Implementation of Alternative 3

	Construction Impacts		Operational Impacts	
Activity	**Jobs**	**Total Construction Costs (expressed in $ million)**	**Jobs**	**Annual Operations Costs (expressed in $,000)**
Three 50-MW Geothermal Plants	465	$225 - $382.5	111	$4,700 - $8,300
One 50-MW Solar PV Plant	649	$340.4	5	$600
One 500-MW Solar Trough Power Plant	2,949	$2,066.4	91	$19,500
One 45-MW Wind Power Plant	53	$91.3	4	$915
Total Alternative 3	4,116	$2,723.1 - $2,880.6	211	$$25,715 - $29,315

Sources: NREL 2010; REPP 2010
Note:
Totals may not add due to rounding.

Indirect Social and Economic Impacts from Alternative 3: Combined Impacts from Geothermal, Solar and Wind Energy Development

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 geothermal and wind energy development, which could lead to potential impacts to social and economic conditions from geothermal and wind energy projects similar to those described above, although the development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the

BLM land (700 acres). The development cap would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Implementation of this action could have a positive, indirect impact on the economy of Imperial and Riverside counties. As energy developers complete the renewable energy project described above, they could spend a portion of the $2.7 to $2.9 billion in exploration, design, and construction costs in the local economy. Local suppliers and service providers could see their revenues and income increase as developers purchase construction related supplies.

The increase in construction spending could also impact the regional economy by increasing employment and earnings in the construction industry. As the new construction workers spend a portion of their payroll in the local area and construction companies purchase materials from local suppliers, the overall demand for local goods and services could expand. Revenues at local retail outlets and service providers could increase. As these local merchants respond to this increase in demand, they may, in turn, increase employment at their operations and/or purchase more goods and services from their providers. These new workers may then spend a portion of their income in the area, thus "multiplying" the positive economic impacts of the original injection of funds. These "multiplier" effects could continue on until all of the original funds left the regional economy through either taxes, savings, or through purchases from outside the local area.

A regional input-out model, known as the Impact Analysis for Planning model, or IMPLAN model, was used to quantify these multiplier effects. Table 4.17-10 shows the expected direct, indirect, and induced impacts associated with the construction and operation of three 50-MW geothermal plants one 50-MW PV plant, one 500-MW CSP project, and one 45-MW wind plant. The direct effects shown on this table correspond to actual construction employment and payroll estimates. The indirect effects measure the impacts to the regional economy when the construction firms purchase local supplies and/or hire local service providers. The induced effects measure the impacts to the regional economy that result when the new workers spend a portion of their increased disposable income in the regional economy.

As shown in Table 4.17-10, the 4,116 exploration and construction jobs could support an additional 1,089 jobs in the regional economy. Indirectly, the exploration and construction phase could also generate an additional $578.3 million in employee earnings and increase regional economic output by an additional $148 million. As describe previously, the economic impacts of the exploration and construction phases could be short-term in nature. This injection of funds into the regional economy would be a one-time event anticipated to occur over a four-year time period. Once the funds were to leave the economy through leakages such as taxes, savings, and purchases outside the region, they would not occur again.

Table 4.17-10 Direct, Indirect, and Induced Economic Impacts from Constructing Alternative 3

Type of Impact	Employment	Labor Income	Value Added	Economic Output
Three 50-MW Geothermal Power Plants				
Direct Effects	465	$29,950,000	$36,070,000	$84,960,000
Indirect Effects	53	$2,870,000	$4,260,000	$8,460,000
Induced Effects	70	$2,570,000	$4,980,000	$8,270,000
Total Geothermal	588	$35,390,000	$45,310,000	101,690,000
One 50-MW Solar PV Plant				
Direct Effects	649	$41,780,000	$50,320,000	$118,500,000
Indirect Effects	74	$4,000,000	$5,940,000	$11,800,000
Induced Effects	97	$3,580,000	$6,950,000	$11,540,000
Total PV Solar	820	$49,360,000	$63,210,000	$141,840,000
One 500-MW Solar Trough Power Plant				
Direct Effects	2,949	$189,970,000	$228,700,000	$538,810,000
Indirect Effects	336	$18,190,000	$27,030,000	$53,640,000
Induced Effects	444	$16,290,000	$31,580,000	$52,450,000
Total Solar Trough	3,729	$224,450,000	$287,310,000	$644,900,000
One 45-MW Wind Power Plant				
Direct Effects	53	$3,410,000	$4,110,000	$9,680,000
Indirect Effects	6	$330,000	$490,000	$960,000
Induced Effects	8	$290,000	$560,000	$940,000
Total Wind	67	$4,030,000	$5,160,000	$11,580,000
Total Construction Impacts for Alternative 3				
Direct Effects	4,116	$265,110,000	$319,270,000	$751,950,000
Indirect Effects	469	$25,390,000	$37,720,000	$74,870,000
Induced Effects	620	$22,730,000	$44,080,000	$73,200,000
Total Construction Impacts	5,205	$313,240,000	$401,070,000	$900,020,000

Source: MIG, Inc. 2010
Notes:
Totals may not add due to rounding. Design and exploration costs are included in the construction impacts.
Direct effects correspond to the actual number of employees working at the construction site, their additional payroll and the value of materials purchased in the regional economy to support this construction effort.
Indirect effects measure the economic impacts that could result when local suppliers increase their payroll and expenditures in response to the increase in demand for their goods and services.
Induced effects measure the economic impacts that could result when the construction workers spend a portion of their additional income in the regional economy.

In contrast, the operational impacts are long-term in nature and could recur each year. The estimated 211 full-time, permanent workers could indirectly support an additional 104 jobs in the region. Likewise, operation of power plants under Alternative 3 could indirectly increase labor income in the region by $4.4 million and total economic output by $13.7 million (see Table 4.17-11).

Table 4.17-11 Direct, Indirect, and Induced Economic Impacts from Operations of Alternative 3

Type of Impact	Employment	Labor Income	Value Added	Economic Output
Three 50-MW Geothermal Power Plants				
Direct Effects	111	$17,500,000	$63,610,000	$86,110,000
Indirect Effects	16	$860,000	$1,400,000	$2,560,000
Induced Effects	39	$1,430,000	$2,770,000	$4,610,000
Total Geothermal	166	$19,790,000	$67,780,000	$93,280,000
One 50-MW Solar PV Plant				
Direct Effects	5	$840,000	$3,040,000	$4,100,000
Indirect Effects	1	$40,000	$70,000	$120,000
Induced Effects	2	$60,000	$130,000	$220,000
Total PV Solar	8	$940,000	$3,240,000	$4,440,000
One 500-MW Solar Trough Power Plant				
Direct Effects	91	$14,350,000	$52,150,000	$70,600,000
Indirect Effects	13	$700,000	$1,150,000	$2,100,000
Induced Effects	32	$1,170,000	$2,270,000	$3,780,000
Total Solar Trough	136	$16,220,000	$55,570,000	$76,480,000
One 45-MW Wind Power Plant				
Direct Effects	4	$630,000	$2,290,000	$3,100,000
Indirect Effects	1	$30,000	$50,000	$90,000
Induced Effects	1	$50,000	$100,000	$170,000
Total Wind	6	$710,000	$2,440,000	$3,360,000
Total Operation Impacts for Alternative 3				
Direct Effects	211	$33,310,000	$121,090,000	$163,920,000
Indirect Effects	30	$1,630,000	$2,670,000	$4,880,000
Induced Effects	74	$2,730,000	$5,280,000	$8,770,000
Total Operation Impacts	315	$37,670,000	$129,040,000	$177,570,000

Table 4.17-11 Direct, Indirect, and Induced Economic Impacts from Operations of Alternative 3

Type of Impact	Employment	Labor Income	Value Added	Economic Output

Source: MIG, Inc. 2010
Notes:
Totals may not add due to rounding.
Direct effects correspond to the actual number of employees working at the construction site, their additional payroll and the value of materials purchased in the regional economy to support operation of these facilities.
Indirect effects measure the economic impacts that could result when local suppliers increase their payroll and expenditures in response to the increase in demand for their goods and services.
Induced effects measure the economic impacts that could result when the operations workers spend a portion of their additional income in the regional economy.

Public Revenue

Implementation of Alternative 3 could have a positive impact on public revenue generation in the region. The increased economic activity could increase sales tax receipts. Total assessed value of property in the region could increase and, thus, increase property tax revenues. In addition, holders of renewable energy leases on public lands would be subject to royalty payments of no more than 5 percent of gross proceeds of electrical sales. The Energy Policy Act requires geothermal royalties to be distributed according to the following schedule: 25 percent to the Federal Treasury, 50 percent to the state where the royalties were generated, and 25 percent to the county of origin (Neron-Bancel 2008). Solar and wind energy development projects are exempt from this legislation. The federal government imposes solar energy rental rates on any project developed on BLM property. Similar wind energy rental rates are currently being developed (BLM 2010). Furthermore, federal and state income taxes could increase as employee earnings increased in the area. Table 4.17-12 summarizes the expected changes in local, state, and federal government receipts.

Table 4.17-12 Expected Public Revenue Impacts from Implementing Alternative 3

Revenue Source	Construction (One-Time)	Operations (Annual)
Sales Tax[1]	$4,692,199	$8,659,087
Property Tax	$3,865,444	$6,913,648
Total State and Local Tax[2]	$27,637,765	$23,615,824
Total Federal Tax	$60,118,114	$12,613,558

Source: MIG, Inc. 2010
Notes:
[1] Sales tax only includes changes is local sales tax receipts. It does not include the $20.7 million and the $101.8 million expected to be collected during the construction of the 50MW solar PV and the 500-MW solar trough plants, respectively. These figures have not been included because it is assumed that the specialty equipment needed to build these plants would not be purchased locally.
[2] Sales tax and property tax figures are included in total state and local tax receipts.

Total royalty payments, while a significant local funding source, were not calculated. Without more detailed information on the structure of the market that a West Chocolate Mountains REEA facility could sell to and an assumption on long-term electric prices, gross

proceeds cannot be projected and royalties cannot be calculated. The royalties, however, could be expected to become a major funding source for Imperial County.

Population

According to the Electric Power Research Institute report titled Socioeconomic Impacts of Power Plants, construction workers could commute as much as two hours to construction sites from their homes, rather than relocate. As a result, it is anticipated that the vast majority of the construction workforce (peak workforce of approximately 1,260[2] workers per day over the 36-month duration of construction) could commute to the project site rather than relocate, assuming that hiring could be done from the local region. If the local workforce is not employed in these short-term activities, a relatively large proportion of workers could relocate to the area temporarily. As these workers would not typically bring family with them, impacts to the local and regional population would be expected to be less than could otherwise be the case. Depending on the distribution of the short-term workforce and the phasing of the various projects, the projects would not induce substantial growth in the region, although some localized growth in individual small towns could feasibly occur. The project would be in a remote, uninhabited area, and would not displace existing populations. The impacts to population could range from beneficial (regionally) to possibly adverse (locally) in the short-term.

This alternative is expected to employ approximately 118 workers during operation. Some of the operations employment may involve relocation to the area for workers with specialized technical or managerial skills. The average household size in Imperial County is 3.27 people. Assuming each new project employee has an average household size, total in-migration could be approximately 386 people. This could represent less than a 0.25 percent increase in population for the Imperial Valley communities identified in Table 3.17-2. Given the modest size of the workforce and the likelihood that some of these workers could already reside in the local area, impacts to the Imperial Valley population could be beneficial in the long term. Niland is the closest community to the West Chocolate Mountains REEA. If all new workers and corresponding households relocated to Niland (an extreme case), the community could grow by 27 percent. Under this scenario, the impacts to Niland's population could be adverse in the long term, as population growth could be ten times the average annual population change over the past decade. This scenario, however, is unlikely, and long-term population impacts are not anticipated to be adverse.

Housing

As described above, it is assumed that if the regional workforce is employed in the construction phase, few, if any, construction workers would permanently relocate to the region during this phase of the project. Construction workers typically commute relatively long distances to their work sites, which change over time. Should some construction workers choose

[2] Aggregated peak workforce was calculated by adding together CSP and PV solar, geothermal, and wind workforce estimates. Data gaps existed for peak geothermal and peak wind workforces. As a result, peak wind workforce values are assumed to be the same as the average wind workforce. Geothermal was calculated by reviewing previous geothermal projects and calculating the number of workers per MW of construction. Based upon the Salton Sea Geothermal Unit #6 Power Project Application for Certification, the average number of workers per MW is 2 (Obsidian Energy 2002). Therefore, every 50 MW facility is assumed to require a peak workforce of 100.

to temporarily stay at local area motels or hotels, there would be ample transient housing to support the influx. Temporary housing in the form of hotel/motel rooms is present throughout the two counties of the West Chocolate Mountains REEA, and is typically concentrated in major urban areas or near major transportation nodes. For the purposes of this analysis, only those hotels in the closest population center were tabulated under the assumption that construction and operations workers could congregate to this area for commuting ease. There are approximately 2,700 guest rooms among 50 hotels and motels in the West Chocolate Mountains REEA, with substantial additional temporary housing available in the communities within two hours of the project. Additional temporary housing opportunities are available in the forms of recreational vehicle facilities, mobile home sites, and campgrounds. Also, permanent housing, including rentals and single-family units, are present in the West Chocolate Mountains REEA, and vacancy rates are high in the Riverside County portion of the REEA.

The project would be constructed in a rural area where it would not physically alter any residential or commercial community. Because the location would be away from residences and the project related population increase is expected to be minimal, no substantial change is expected in community interaction patterns, social organization, social structures, or social institutions. If each new worker demanded one unit of housing, operation of the project could result in a demand for 112 residences. The availability of local housing (e.g., 2008 vacancy rates of 5.6 percent in Imperial Valley communities) is more than adequate to meet the demand for housing in the long term on a regional level. As a result, the impacts to Imperial Valley community housing are anticipated to be beneficial in the long term. Niland is the closest community to the West Chocolate Mountains REEA. If all new workers and corresponding households relocated to Niland (an extreme case), the demand for housing could exceed the available demand (based on an 18.6 percent vacancy rate) by approximately 14 percent (Table 3.17-3). Under this scenario, the impacts to housing in Niland could be adverse in the long term if housing demand exceeds the supply. In all likelihood, however, long-term housing impacts are not anticipated to be adverse under Alternative 3.

Growth Inducing Impacts

The local population could grow as a result of project workers migrating into the area with their families, either temporarily or on a permanent basis. In the case of a full build-out of Alternative 3, it is likely many of the construction workers could migrate into the area, at least on a temporary basis. While both the Coachella Valley and the Imperial Valley have most of the skills in the local work force that would be required for plant construction, the large scale of construction that is anticipated to occur within a four-year time period could require more construction labor than is currently available in the region. However, the high unemployment rates currently experienced in Imperial County could serve to temper the need for outside workers.

Social Impacts

Despite region-wide quantitative information that suggests population and housing impacts would not likely create an adverse, short-term impact on communities in the West Chocolate Mountains REEA due to existing high unemployment and a strong likelihood that local hiring could occur, there would be an extremely small possibility that employment and commute trends do not reflect past behaviors, and housing needs could be concentrated in

discrete areas as workers outside the region enter seeking jobs. If this occurs, short-term impacts could affect the local sociocultural aspects of the surrounding communities, specifically widely held attitudes and values. During planning and construction activities, this could include a relatively large influx of people into the smaller communities surrounding the West Chocolate Mountains REEA.

It is assumed that the construction force could be comprised of existing residents distributed throughout the general region (i.e., the two-hour commute shed) that includes parts of the Coachella and Imperial valleys; therefore, it is unlikely that any one community could experience a rapid influx of residents while the rest of the nearby communities would experience few impacts; however, it is possible that some temporary construction personnel coming into the region for employment could find short-term residence in small communities near the West Chocolate Mountains REEA, including Niland, Calipatria, and Westmorland. Depending on the construction schedule of the alternative energy projects under Alternative 3, there is a small possibility that hundreds of additional residents could enter these communities and remain for a handful of years. It is unlikely that the construction personnel (some of whom could be from the general region, while others could be from outside the U.S. southwest) could culturally identify with a group drastically different from the residents of the area. However, the sheer addition of hundreds of new, temporary residents in the area could create some slightly adverse social impacts, as these smaller communities may transform into “boom towns.”

Demographically, the rural communities in the West Chocolate Mountains REEA have higher rates of senior citizen residents who may find an influx of younger, single, and generally male workers threatening. Workers, too, may experience some alienation as they move to these towns, experiencing stress from increased physical isolation in the rural communities of the REEA, as well as social isolation from long-term residents. Other studies on the social impacts associated with short-term, relatively extreme population growth have noted that some social problems have increased, including mental health cases, crime rates, divorces, suicides, and drug abuse.

It is not anticipated that many new construction related families would move to the area during the short-term, but families that choose to temporarily relocate may experience the added stress of coping with temporary, sub-standard housing conditions and overtaxed social services. Larger economic changes may also affect the social fabric of communities near the project, including the possibility that a short-term reduction in available affordable housing may indirectly raise the cost of area rents.

With regard to the widely held attitudes and values present in the communities in the West Chocolate Mountains REEA, these social impacts may be considered to be incompatible, especially if short-term, rapid economic growth results in erosion of the small-town values and rural atmosphere that many communities cite as being key to their identity. Rapid growth in small communities may also lead to volatile production patterns, complicating overall long-term trends, and resulting in a certain amount of risk with regard to planning future development and planning for social programs.

In general, the increase in regional economic output and increased presence of alternative energy production in the region is consistent with the goals of the regional government

associations and Imperial and Riverside counties, which suggests that Alternative 3 could be viewed as beneficial by some parties. Furthermore, if the increased economic activity is not too burdensome on the smaller communities in the region, the short-term influx of workers could provide economic benefits. The growth of alternative energy matches up well with the sustainable and natural resource conscious values expressed in many city documents. However, the aesthetic impacts of alternative energy power plants and facilities may be perceived as an adverse change to the natural scenic vistas cited as valuable, specifically by Niland, the closest community to the West Chocolate Mountains REEA. For those communities that rely on recreation for at least part of their economy, any environmental impacts that reduce recreational opportunities (e.g., changes in land use, aesthetic impacts, etc.) may adversely affect the local economy and threaten at least a part of community identity.

The OHV community could also be affected if recreational opportunities were adversely affected by short-term impacts from either changes in land use or other environmental impacts. There is a common opinion that ecological concerns are limiting the space for OHV recreation, and further limitation as a result of short-term impacts associated with this alternative could compound these views for OHV enthusiasts who use the local area. Similar opinions could be present among seasonal residents to the area, or “snowbirds,” particularly if commonly used camping areas on public lands are transformed into alternative energy locations. As many of these locations are in previously disturbed areas with low slope percentages, there may be some overlap in siting with regard to facilities proposed under this alternative. If Slab City is affected by the project, there may be substantially adverse social impacts to this community, as this area is a key gathering location, and displacement could result in adverse impacts to community cohesion. Other environmental impacts to this community, particularly short-term aesthetic and noise impacts from construction, may also result in changes to the natural landscape that are valued by snowbirds depending on facility proximity.

Environmental groups, and non-governmental organization (NGOs) have expressed theoretical support for the construction of alternative energy production plants; however, there is a concern that construction activities in the area may cause a wide range of environmental impacts, ultimately affecting the surrounding landscape and biological resources irreversibly.

Military institutions in the area could be generally less affected by localized environmental changes, but could be affected in their operations through various possible conflicts between alternative energy technologies and weapon systems in the region, including cited possibilities for wind turbines to affect radar waves, structures to affect night-vision capabilities, and changes in land use to increase pedestrian incursions into secure areas. Socially, these impacts may be interpreted by military leadership as threats to military readiness and national security, regardless if military institutions generally agree with the economic benefits of alternative energy construction activities.

The economic benefits could be welcomed by the economic development agencies in the region and the continued establishment of additional alternative energy power plants in the area could be seen as a positive effect on the region. There may be some concern by economic development agencies if the construction of alternative energy facilities proposed under Alternative 3 results in substantial water use, since agriculture could remain the primary

economic driver of the region and any action that threatens its success would not be widely supported.

Short-term, adverse, social impacts have a slight possibility of occurring depending on the distribution and rate of growth associated with construction activities, but are otherwise not strongly anticipated to occur. Other beneficial effects could occur related to increased economic activity in the region.

Long-term impacts associated with this alternative could include a slight increase in permanent employment in the region, as well as some long-term environmental impacts associated with the operations of the facilities. These may include aesthetic, noise, and other environmental impacts. Contrary to possible short-term social impacts associated with a rapid regional increase in employment, operational employment is expected to be relatively modest, with the alternative energy facilities employing just over 100 full-time employees. Many of these jobs would be high-skilled or technical jobs, and it is anticipated that some people could choose to relocate with their families to the West Chocolate Mountains REEA for employment. This modest growth could be within area forecasts and would not likely result in any widespread social impacts to communities.

The growth of alternative energy power generation in the region is considered a key goal and is socially valued by a number of the communities in the area. Thus, the successful operation of these facilities could be considered a benefit. However, as was the case with short-term impacts, aesthetic impacts associated with facilities under this alternative may adversely affect the scenic vistas valued by communities in the immediate area, specifically Niland. Long-term, adverse impacts related to water availability may also be perceived as an adverse impact to the communities with strong ties to farming since the character and history of many communities in the area are tied inextricably with agriculture. However, the economic effects on the region could be seen as beneficial and could be valued by area communities.

Long-term impacts to OHV enthusiasts, snowbirds, environmental groups, military institutions, and economic development agencies could be similar to those identified under short-term impacts. Changes in land use, a reduction of accessible land, and displacement could adversely affect OHV enthusiasts and snowbirds. Other long-term environmental impacts (e.g., air quality, aesthetics, noise, etc.) may also create adverse impacts to these user groups depending on facility proximity and their own social values with regard to the surrounding landscape. Environmental groups may support the operations of the facilities theoretically, but could be adversely affected if long-term environmental impacts were not mitigated or a well-conceived remediation plan was not in place. The same concerns with regard to the facilities affecting military readiness cited above could continue under operations, but it is anticipated that no substantial conflicts would occur and project designers could adopt measures to reduce these concerns through BMPs, the selection of materials, and/or project siting. The long-term economic benefits associated with this alternative are in agreement with the generalized expressed attitudes of the regional economic development agencies.

Long-term social impacts are anticipated to be beneficial and modest, with the assumption that substantial environmental effects can be mitigated through design choices and project siting.

Recreation

Individuals and groups who participate in recreational activities on public lands in the West Chocolate Mountains REEA could be negatively affected if lease development resulted in closures to OHV use. Reducing the amount of area available for OHVs could increase crowding elsewhere and diminish the recreation experience. In addition, the introduction of industrial features into the landscape at sufficient scale could alter the setting and, thus, the recreation experience for some people. Either result could constitute an adverse socioeconomic impact. Most likely, however, recreation activities could only be disrupted for a short time, and the scale of the industrial features would not be great enough to alter the experience. Any impacts would be transitory and limited.

Other Socioeconomic Impacts

The relatively small long-term population impact generated by implementing this alternative indicates that no impact on public infrastructure in the socioeconomic impact area could occur during the operations of the power facilities. The needs of the limited number of people that could relocate to the area during the operation phase of the project for housing, schools, social services, and utilities could readily be met by the existing infrastructure.

Depending on the timing for construction of the RFD scenario, some moderate, short-term impacts could occur to public infrastructure in the socioeconomic impact area during the construction phase. Approximately 4,100 construction jobs would be required to complete this alternative. Not all of these jobs could be filled by existing residents in the area; therefore, there could be some short-term worker migration into the area. The additional population could increase the demand for housing and various community services and facilities; however, given the transient nature of construction jobs, most of these workers would not relocate their families; therefore, the impact to schools could be marginal.

Environmental Justice

The environmental justice requirement of Executive Order (EO) 12898 is described in Section 3.17.2, Chapter 3, Affected Environment:

Federal agencies identify and address disproportionately high and adverse human health and environmental effects, including the socioeconomic effects of their programs, policies, and activities on minority populations and low-income populations.

Minority populations in this context are Hispanic, African-American, Native American, Asian, or Pacific Islander populations that either: (a) exceed 50 percent in the affected area; or (b) are meaningfully of greater percentage than in the general population. Low-income populations are those that exceed the poverty threshold.

The Hispanic population of the West Chocolate Mountains REEA exceeds 50 percent in Imperial County and its percentage of the population in the Coachella Valley could be construed to be meaningfully greater than the general population of both Riverside County and the state. Additionally, a substantial portion (20.8 percent) of the Imperial County population has income below the poverty level; therefore, there is potential for identified minority or low-income populations to suffer disproportionately from adverse human health and environmental effects as

a result of implementation of this alternative. Specific project site locations have not been selected at this time. Once actual projects are identified and final design is completed, a detailed analysis would be conducted to assess if any potential beneficial or adverse environmental or human health impacts could disproportionately affect minority or low-income populations.

4.17.4.4 Alternative 4: Geothermal Development Only

Under this alternative, geothermal energy could be developed to the achievement of levels of geothermal energy development consistent with the geothermal RFD scenario; there would be no solar or wind energy development. There would be no solar or wind energy development. Under this alternative, the following impacts would be the same as Alternative 3:

- Direct and indirect social and economic impacts from geothermal energy development;
- Acquired lands; and
- Existing noncompetitive lease application.

Impacts from geothermal energy development would be the same as Alternative 3. Under this alternative, the West Chocolate Mountains REEA would not be designated as an SEZ and solar or wind energy development would not be allowed. Additionally, the development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). This alternative would not conform to the CDCA goal to identify potential sites for wind energy development.

Direct Social and Economic Impacts from Geothermal Energy Development

For purposes of this analysis, the impacts associated with design, construction, operation, and decommissioning of three 50-MW geothermal power plants will be used to represent the expected effects of full build-out of the geothermal RFD scenario. The direct impacts from implementing the geothermal RFD scenario under this alternative would be identical to those described in Alternative 3. See Section 4.17.4.2 for a more detailed description of these impacts.

Indirect Social and Economic Impacts from Alternative 4 Impacts from Geothermal Energy Development

Implementation of this action could have a positive indirect impact on the economy of Imperial and Riverside counties. As energy developers complete the project described above, they could spend a portion of the $225 to $382.5 million in exploration, design, and construction costs in the local economy. Local suppliers and service providers could see their revenues and income increase as developers purchase construction related supplies.

The increase in construction spending could also impact the regional economy similar to direct impacts described for geothermal energy development under this alternative. The IMPLAN model was used to quantify economic multiplier effects, as provided in Table 4.17-13, for expected direct, indirect, and induced impacts associated with the construction and operation of three 50-MW geothermal plants.

As shown in Table 4.17-3, the 465 exploration and construction jobs could support an additional 123 jobs in the regional economy. Indirectly, the exploration and construction phase could also generate an additional $5.6 million in employee earnings and increase regional economic output by an additional $16.7 million. As describe previously, the economic impacts of the exploration and construction phase would be short-term in nature. This injection of funds into the regional economy would be a one-time event anticipated to occur over a four-year time period. Once the funds were to leave the economy through leakages such as taxes, savings, and purchases outside the region, they would not occur again.

Table 4.17-13 Direct, Indirect, and Induced Economic Impacts from Constructing Alternative 4

Type of Impact	Employment	Labor Income	Value Added	Economic Output
Three 50-MW Geothermal Power Plants				
Direct Effects	465	$29,950,000	$36,070,000	$84,960,000
Indirect Effects	53	$2,870,000	$4,260,000	$8,460,000
Induced Effects	70	$2,570,000	$4,980,000	$8,270,000
Total Geothermal	588	$35,390,000	$45,310,000	101,690,000
Total Construction Impacts for Alternative 4				
Direct Effects	465	$29,950,000	$36,070,000	$84,960,000
Indirect Effects	53	$2,870,000	$4,260,000	$8,460,000
Induced Effects	70	$2,570,000	$4,980,000	$8,270,000
Total Construction Impacts	588	$35,390,000	$45,310,000	101,690,000

Source: MIG, Inc. 2010
Notes:
Totals may not add due to rounding. Design and exploration costs are included in the construction impacts.
Direct effects correspond to the actual number of employees working at the construction site, their additional payroll and the value of materials purchased in the regional economy to support this construction effort.
Indirect effects measure the economic impacts that could result when local suppliers increase their payroll and expenditures in response to the increase in demand for their goods and services.
Induced effects measure the economic impacts that could result when the construction workers spend a portion of their additional income in the regional economy.

In contrast, the operational impacts would be long-term in nature and could recur each year. The estimated 111 full-time permanent workers could indirectly support an additional 55 jobs in the region. Likewise, operation of power plants under Alternative 4 could indirectly increase labor income in the region by $2.3 million and total economic output by $7.2 million (see Table 4.17-14).

Table 4.17-14 Direct, Indirect, and Induced Economic Impacts from Operations of Alternative 4

Type of Impact	Employment	Labor Income	Value Added	Economic Output
Three 50-MW Geothermal Power Plants				
Direct Effects	111	$17,500,000	$63,610,000	$86,110,000
Indirect Effects	16	$860,000	$1,400,000	$2,560,000
Induced Effects	39	$1,430,000	$2,770,000	$4,610,000
Total Geothermal	166	$19,790,000	$67,780,000	$93,280,000
Total Operation Impacts for Alternative 4				
Direct Effects	111	$17,500,000	$63,610,000	$86,110,000
Indirect Effects	16	$860,000	$1,400,000	$2,560,000
Induced Effects	39	$1,430,000	$2,770,000	$4,610,000
Total Operation Impacts	166	$19,790,000	$67,780,000	$93,280,000

Source: MIG, Inc. 2010
Notes:
Totals may not add due to rounding. Design and exploration costs are included in the construction impacts.
Direct effects correspond to the actual number of employees working at the construction site, their additional payroll and the value of materials purchased in the regional economy to support operation of these facilities.
Indirect effects measure the economic impacts that could result when local suppliers increase their payroll and expenditures in response to the increase in demand for their goods and services.
Induced effects measure the economic impacts that could result when the operations workers spend a portion of their additional income in the regional economy.

Public Revenue

Implementation of Alternative 4 could have a positive impact on public revenue generation in the region. The increased economic activity could increase sales tax receipts. Total assessed value of property in the region could increase and, thus, increase property tax revenues. In addition, holders of renewable energy leases on public lands could be subject to royalty payments of no more than 5 percent of gross proceeds of electrical sales. The Energy Policy Act of 2005 requires geothermal royalties to be distributed according to the following schedule: 25 percent to the Federal Treasury, 50 percent to the state where the royalties were generated, and 25 percent to the county of origin (Neron-Bancel 2008). Federal and state income taxes would increase as employee earnings increased in the area. Table 4.17-15 summarizes the expected changes in local, state, and federal government receipts.

Table 4.17-15 Expected Public Revenue Impacts from Implementing Alternative 4

Revenue Source	Construction (One-time)	Operations (Annual)
Sales Tax[1]	$530,000	$4,549,000
Property Tax	$437,000	$3,632,000
Total State and Local Tax[2]	$3,123,000	$12,406,000
Total Federal Tax	$6,792,000	$6,626,000

Table 4.17-15 Expected Public Revenue Impacts from Implementing Alternative 4

Revenue Source	Construction (One-time)	Operations (Annual)

Source: MIG, Inc. 2010
Notes:
[1] Sales tax only includes changes is local sales tax receipts. It does not include sales paid on equipment purchased outside the region.
[2] Sales tax and property tax figures are included in total state and local tax receipts.

Total royalty payments, while a significant local funding source, were not calculated. Without more detailed information on the structure of the market that a West Chocolate Mountains REEA facility could sell to and an assumption on long-term electric prices, gross proceeds cannot be projected and royalties cannot be calculated. The royalties, however, could become a major funding source for Imperial County.

Population

As previously described under Alternative 3, it is anticipated that the vast majority of the construction workforce (peak workforce of approximately 300 workers per day over the 36-month duration of construction) would commute to the project site rather than relocate with their families. Therefore, the impacts to population are anticipated to range from beneficial (regionally) to possibly adverse (locally) in the short-term.

The project could employ approximately nine workers during operation. This long-term effect could add approximately 29 people to the Imperial Valley population, if using the average household size in Imperial County of 3.27 people. This could represent less than a 0.1 percent increase in population for the Imperial Valley communities. Given the modest size of the workforce and the likelihood that some of these workers already could be residents of the local area, impacts to the Imperial Valley population are anticipated to be beneficial in the long-term. Niland is the closest community to the project site. If all new workers, and corresponding households, relocated to Niland (an extreme case), the community could grow by approximately 0.7 percent. This increase would be less than the average annual population change for the community and, therefore, the population impacts could be beneficial in the long term.

Housing

As described previously, it is assumed that if the regional workforce is employed in the construction phase, few, if any, construction workers would permanently relocate to the communities near the project site during the construction phase. Should some construction workers choose to temporarily stay at a local area motel or hotel, there is ample transient housing. Temporary housing in the form of hotel/motel rooms is present throughout the two counties of the West Chocolate Mountains REEA, with approximately 2,700 guest rooms among 50 hotels and motels concentrated in major urban areas or near major transportation nodes. Additional temporary housing opportunities are available in the forms of recreational vehicle facilities, mobile home sites, and campgrounds. Also, permanent housing, including rentals and single-family units, are present in the area and availability of local housing is more than adequate

to meet the demand for housing in the long term on a regional level. As a result, the impacts to Imperial Valley community housing could be beneficial in the long term.

Growth Inducing Impacts

The local population could grow as a result of project workers migrating into the area with their families, either temporarily or on a permanent basis. In the case of a full build-out of Alternative 4, it is likely that only a small number of these construction workers would migrate into the area, even on a temporary basis. Coachella Valley and the Imperial Valley area have most of the skills in the local work force required for plant construction, as well as a large amount of available labor as a result of the high unemployment rates currently being experienced in the area. Therefore, the vast majority of the construction and operations workers could come from the existing local workforce.

Social Impacts

Short- and long-term impacts associated with Alternative 4 would be similar to those described under Alternative 3, depending on the schedule and timing of project construction. With the absence of wind generation from Alternative 4, however, it is likely that aesthetic concerns could decrease across all communities of place and type.

Recreation

Individuals and groups who participate in recreational activities on public lands in the West Chocolate Mountains REEA could be negatively affected if lease development resulted in closures to OHV use. Similar to Alternative 3, recreation activities would only be disrupted for a short time, and the scale of the industrial features would not be great enough to alter the experience.

Other Socioeconomic Impacts

The relatively small short- and long-term population impacts generated by implementing Alternative 4 indicate that no significant impact on public infrastructure in the socioeconomic impact area would occur during the construction and operations of the project. The needs of the limited number of people that could relocate to the area during the construction and operation phases of the project for housing, schools, social services, and utilities could readily be met by the existing infrastructure.

Environmental Justice

The Hispanic population of the West Chocolate Mountains REEA exceeds 50 percent in Imperial County and its percentage of the population in the Coachella Valley could be construed to be meaningfully greater than the general population of both Riverside County and the state. Additionally, a substantial portion (20.8 percent) of the Imperial County population has income below the poverty level; therefore, there is potential for identified minority or low-income populations to suffer disproportionately from adverse human health and environmental effects as a result of implementation of this alternative. Specific project site locations have not been selected at this time. Once actual projects are identified and final design is completed, a detailed analysis would be conducted to assess if any potential beneficial or adverse environmental or human health impacts may disproportionately affect minority or low-income populations.

4.17.4.5 Alternative 5: Solar Energy Development Emphasis with Moderate Geothermal Development and No Wind Development

Under this alternative, solar energy could be developed to the achievement of levels of development consistent with the maximum extent as defined in the solar RFD scenario. Geothermal energy could be developed to a moderate level (50 MW) as defined in geothermal RFD scenario. There would be no wind energy development.

Under this alternative, the following would be the same as Alternative 3:

- Acquired lands;
- Existing noncompetitive lease application; and
- Direct and indirect social and economic impacts from solar development.

Under this alternative, all lands within the West Chocolate Mountains REEA would be designated as an SEZ, which would allow other compatible renewable energy developments to occur. An SEZ also would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments, including geothermal energy, to occur within the West Chocolate Mountains SEZ.

Taking into account environmental, economic, and financial considerations, the partial build-out of the geothermal RFD scenario could be the construction and operation of one 50-MW geothermal plant in the West Chocolate Mountains REEA. The full build-out for the solar RFD scenario could be the construction and operation of one 50-MW solar PV power plant and one 500-MW CSP project. The following socioeconomic analysis has been developed using these assumptions. Direct and indirect impacts under this alternative that could come from solar energy development would be the same as the solar impacts described under Alternative 3.

Direct Social and Economic Impacts from Geothermal Energy Development

The implementation of the partial geothermal RFD scenario under this alternative could have a direct positive economic impact on Imperial County and on the Coachella Valley in Riverside County as well as on the larger regional economy and on the state as a whole.

For purposes of this analysis, the impacts associated with design, construction, operation, and decommissioning of one 50-MW geothermal power plant are used to represent the expected effects of partial build-out of the geothermal RFD scenario. Since this EIS is evaluating a conceptual program and specific projects have not yet been identified, no actual costs have been identified for the design, construction, operation, and decommissioning of geothermal plants in the West Chocolate Mountains REEA. In order to develop level of magnitude estimates for the impact analysis, construction and operations costs have been estimated for a typical large-scale geothermal plant using accepted industry averages.

Table 4.17-16 estimates the total exploration and construction costs required to complete one 50-MW geothermal power plant in the West Chocolate Mountains REEA. As shown in the table, large-scale geothermal plants in high-quality resource areas typically incur explorations costs of $130-$520/kW and construction costs of $390-$590/kW for steam fields and $980-

$1,440/kW for power plants. Therefore, the total exploration and construction costs of a typical 50-MW geothermal power plant could between $75 million and $127.5 million (as expressed in 2010 dollars).

In addition, a typical geothermal power plant construction project employs approximately 3.1 construction workers per MW (BLM 2008). Therefore, the one 50-MW geothermal power plant could directly generate 155 jobs in Imperial County during the exploration and construction phase.

Table 4.17-16 Typical Exploration and Construction Costs for a 50-Megawatt Geothermal Power Plant

Activity	Cost per kW[1]	Number of Added kW	Total Costs (in $ millions)
Exploration	$130 - $520	50,000	$6.5 - 26 million
Steam Field Construction	$390 - $590	50,000	$19.5 - $29.5 million
Power Plant Construction	$980 - $1,440	50,000	$49 - $72 million
Total Exploration and Construction Costs	$1,500 - $2,550	50,000	$75 - $127.5 million

Source: REPP 2010
Notes:
[1] Costs are expressed in 2010 dollars and are for large scale plants that are exploiting "high-quality" geothermal resources. Total exploration and construction costs for "medium-quality" geothermal resources is approximately $1,770 to $2,880 per kW. Estimated exploration and construction costs for "large scale plants" with "low-quality" geothermal resources were not available.

Since a large portion of these costs could be spent in the regional economy, exploration and construction costs generated by the completion of these power plants could increase regional employment, earnings, and economic output. The direct economic impacts associated with the exploration and construction phase could be significant, but short-term in nature. Once the positive impacts from the injection of funds and the increase in employment cycle through the economy, the positive benefits would end.

Conversely, expenditures for O&M activities from the project could have a long-term, positive impact to the regional economy. The economic benefits associated with these expenditures could affect the regional economy for the life of the project.

Typical O&M costs for a large-scale geothermal power plant run between $0.004 and $0.007 per kWh (REPP 2010). Therefore, assuming the 50-MW geothermal power plant operates at 90 percent capacity, the estimated annual operating costs could be between $1.6 million and $2.8 million. Additionally, on average, a typical geothermal power plant creates 0.74 permanent full-time jobs per MW of power generated (BLM 2008). Using this industry average, an estimated 37 full-time jobs could be created during the operation phase of the geothermal plant. Upon decommissioning of these plant, these full time jobs would be lost.

Total Social and Economic Direct Impacts from Alternative 5

Implementation of this action could directly inject a significant amount of income into the regional economy. As shown in Table 4.17-17, total construction expenditures needed to complete this alternative could reach approximately $2.5 billion. The total construction workforce could be an estimated 3,753 persons and the total operation workforce could be an estimated 133 persons. These additional workers could increase regional labor earnings by $241.7 million during the construction phase and increase regional labor earnings by $21.0 million annually during the operation phase (MIG, Inc. 2010).

Table 4.17-17 Total Direct Impacts Resulting from Implementation of Alternative 5

	Construction Impacts		Operational Impacts	
Activity	**Jobs**	**Total Construction Costs (expressed in $ million)**	**Jobs**	**Annual Operations Costs (expressed in $,000)**
One 50-MW Geothermal Plants	155	$75 - $127.5	37	$1,600 - $2,800
One 50-MW Solar PV Plant	649	$340.4	5	$600
One 500-MW Solar Trough Power Plant	2,949	$2,066.4	91	$19,500
Total Alternative 5	3,753	$2,481.8 - $2,534.3	133	$21,700 - $22,900

Sources: NREL 2010; REPP 2010
Note:
Totals may not add due to rounding.

Indirect Social and Economic Impacts from Alternative 5: Combined Impacts from Geothermal and Solar Energy Development

The designation as an SEZ would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments, including geothermal energy development, to occur within the West Chocolate Mountains SEZ, which could lead to potential impacts to social and economic conditions from geothermal energy projects similar to those described above. The development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Implementation of this action could have a positive, indirect impact on the economy of Imperial and Riverside counties. As energy developers complete the project described above, they could spend a portion of the approximate $2.4 billion in exploration, design, and construction costs in the local economy. Local suppliers and service providers could see their revenues and income increase as developers purchase construction related supplies.

The IMPLAN model was used to quantify economic multiplier effects, as provided in Table 4.17-18, for expected direct, indirect, and induced impacts associated with the construction and operation of one 50-MW geothermal plant, one 50-MW PV plant, and one 500-MW CSP project.

Table 4.17-18 Direct, Indirect, and Induced Economic Impacts from Constructing Alternative 5

Type of Impact	Employment	Labor Income	Value Added	Economic Output
One 50-MW Geothermal Power Plants				
Direct Effects	155	$9,980,000	$12,020,000	$28,320,000
Indirect Effects	18	$960,000	$1,420,000	$2,820,000
Induced Effects	23	$860,000	$1,660,000	$2,760,000
Total Geothermal	196	$11,800,000	$15,100,000	$33,900,000
One 50-MW Solar PV Plant				
Direct Effects	649	$41,780,000	$50,320,000	$118,500,000
Indirect Effects	74	$4,000,000	$5,940,000	$11,800,000
Induced Effects	97	$3,580,000	$6,950,000	$11,540,000
Total PV Solar	820	$49,360,000	$63,210,000	$141,840,000
One 500-MW Solar Trough Power Plant				
Direct Effects	2,949	$189,970,000	$228,700,000	$538,810,000
Indirect Effects	336	$18,190,000	$27,030,000	$53,6450,000
Induced Effects	444	$16,290,000	$31,580,000	$52,450,000
Total Solar Trough	3,729	$224,450,000	$287,310,000	$644,900,000
Total Construction Impacts for Alternative 5				
Direct Effects	3,753	$241,730,000	$291,040,000	$685,630,000
Indirect Effects	428	$23,150,000	$34,390,000	$68,260,000
Induced Effects	564	$20,730,000	$40,190,000	$66,750,000
Total Construction Impacts	4,745	$285,610,000	$365,620,000	$820,640,000

Source: MIG, Inc. 2010
Notes:
Totals may not add due to rounding. Design and exploration costs are included in the construction impacts.
Direct effects correspond to the actual number of employees working at the construction site, their additional payroll and the value of materials purchased in the regional economy to support this construction effort.
Indirect effects measure the economic impacts that could result when local suppliers increase their payroll and expenditures in response to the increase in demand for their goods and services.
Induced effects measure the economic impacts that could result when the construction workers spend a portion of their additional income in the regional economy.

As shown in the table, the 3,753 exploration and construction jobs could support an additional 992 jobs in the regional economy. Indirectly, the exploration and construction phases could also generate an additional $43.9 million in employee earnings and increase regional economic output by an additional $178.9 million. As describe previously, the economic impacts of the exploration and construction phases could be short-term in nature. This injection of funds into the regional economy could be a one-time event anticipated to occur over a four-year time period. Once the funds would leave the economy through leakages such as taxes, savings, and purchases outside the region they would not occur again. In contrast, the operational impacts are

long-term in nature and could recur each year. The estimated 211 full-time, permanent workers could indirectly support an additional 104 jobs in the region. Likewise, operation of power plants under Alternative 5 could indirectly increase labor income in the region by $3.5 million and total economic output by $11.0 million (see Table 4.17-19).

Table 4.17-19 Direct, Indirect, and Induced Economic Impacts from Operations of Alternative 5

Type of Impact	Employment	Labor Income	Value Added	Economic Output
One 50-MW Geothermal Power Plant				
Direct Effects	37	$5,830,000	$21,200,000	$28,700,000
Indirect Effects	5	$290,000	$470,000	$850,000
Induced Effects	13	$480,000	$920,000	$1,540,000
Total Geothermal	55	$6,600,000	$22,590,000	$31,090,000
One 50-MW Solar PV Plant				
Direct Effects	5	$840,000	$3,040,000	$4,100,000
Indirect Effects	1	$40,000	$70,000	$120,000
Induced Effects	2	$60,000	$130,000	$220,000
Total PV Solar	8	$940,000	$3,240,000	$4,440,000
One 500-MW Solar Trough Power Plant				
Direct Effects	91	$14,350,000	$52,150,000	$70,600,000
Indirect Effects	13	$700,000	$1,150,000	$2,100,000
Induced Effects	32	$1,170,000	$2,270,000	$3,780,000
Total Solar Trough	136	$16,220,000	$55,570,000	$76,480,000
Total Operation Impacts for Alternative 5				
Direct Effects	170	$26,850,000	$97,600,000	$132,120,000
Indirect Effects	24	$1,310,000	$2,150,000	$3,930,000
Induced Effects	60	$2,200,000	$4,250,000	$7,070,000
Total Operation Impacts	254	$30,360,000	$104,000,000	$143,120,000

Source: MIG, Inc. 2010
Notes:
Totals may not add due to rounding.
Direct effects correspond to the actual number of employees working at the construction site, their additional payroll and the value of materials purchased in the regional economy to support operation of these facilities.
Indirect effects measure the economic impacts that could result when local suppliers increase their payroll and expenditures in response to the increase in demand for their goods and services.
Induced effects measure the economic impacts that could result when the operations workers spend a portion of their additional income in the regional economy.

Public Revenue

Implementation of Alternative 5 could have a positive impact on public revenue generation in the region. The increased economic activity could increase sales tax receipts. Total assessed value of property in the region could increase and, thus, increase property tax revenues.

In addition, holders of renewable energy leases on public lands would be subject to royalty payments of no more than 5 percent of gross proceeds of electrical sales. Royalties would be distributed according to the following schedule: 25 percent to the Federal Treasury, 50 percent to the state where the royalties were generated, and 25 percent to the county of origin (Neron-Bancel 2008). Additionally, federal and state income taxes would increase as employee earnings increased in the area. Table 4.17-20 summarizes the expected changes in local, state, and federal government receipts.

Table 4.17-20 Expected Public Revenue Impacts from Implementing Alternative 5

Revenue Source	Construction (One-Time)	Operations (Annual)
Sales Tax[1]	$4,280,000	$5,460,000
Property Tax	$3,520,000	$4,360,000
Total State and Local Tax[2]	$25,200,000	$14,900,000
Total Federal Tax	$54,820,000	$7,960,000

Source: MIG, Inc. 2010
Notes:
[1] Sales tax only includes changes is local sales tax receipts. It does not include the $20.7 million and the $101.8 million expected to be collected during the construction of the 50-MW solar PV and the 500-MW solar trough plants, respectively. These figures have not been included because it is assumed that the specialty equipment needed to build these plants would not be purchased locally.
[2] Sales tax and property tax figures are included in total state and local tax receipts.

Total royalty payments, while a significant local funding source, were not calculated. Without more detailed information on the structure of the market that the West Chocolate Mountains REEA could sell to and an assumption on long-term electric prices, gross proceeds cannot be projected and royalties cannot be calculated. The royalties, however, could become a major funding source for Imperial County.

Population

As previously described under Alternative 3, it is anticipated that the vast majority of the construction workforce (peak workforce of approximately 990 workers per day over the 36-month duration of construction) would commute to the project site rather than relocate with their families. Therefore, the impacts to population are anticipated to range from beneficial (regionally) to possibly adverse (locally) in the short-term.

The project alternative is expected to employ approximately 106 workers during operation. This long-term effect could add approximately 347 people to the Imperial Valley population, if using the average household size in Imperial County of 3.27 people. This would represent less than a 0.25 percent increase in population for the Imperial Valley communities. Given the modest size of the workforce and the likelihood that some of these workers could be residents of the local area, impacts to the Imperial Valley population are anticipated to be beneficial in the long-term. Niland is the closest community to the project site. If all new workers, and corresponding households, relocated to Niland (an extreme case), the community could grow by over 24.2 percent. Under this scenario, the impacts to Niland's population are

anticipated to be adverse in the long term, if public and private services could not keep pace with demand. This scenario, however, is unlikely and long-term population impacts are not anticipated to be adverse.

Housing

As described previously, it is assumed that if the regional workforce is employed in the construction phase, few, if any, construction workers would permanently relocate to the communities near the project site during the construction phase. Should some construction workers choose to temporarily stay at a local area motel or hotel, there is ample transient housing. Temporary housing in the form of hotel/motel rooms is present throughout the two counties of the West Chocolate Mountains REEA, with approximately 2,700 guest rooms among 50 hotels and motels concentrated in major urban areas or near major transportation nodes. Additional temporary housing opportunities are available in the forms of recreational vehicle facilities, mobile home sites, and campgrounds. Also, permanent housing, including rentals and single-family units, are present in the area and availability of local housing is more than adequate to meet the demand for housing in the long-term on a regional level. As a result, the impacts to Imperial Valley community housing are anticipated to be beneficial in the long term.

Growth Inducing Impacts

The local population could grow as a result of project workers migrating into the area with their families, either temporarily or on a permanent basis. In the case of a full build-out of this alternative, it is likely many of the construction workers could migrate into the area, at least on a temporary basis. While both the Coachella Valley and the Imperial Valley have most of the skills in the local work force required for plant construction, the large scale of construction that is anticipated to occur within a four-year time period could require more construction labor than is currently available in the region. However, the high unemployment rates currently experienced in Imperial County could serve to temper the need for outside workers.

Social Impacts

Short- and long-term impacts associated with Alternative 5 would be similar to those described under Alternative 3, depending on the schedule and timing of project construction. With the absence of wind generation from Alternative 5, however, it is likely that aesthetic concerns could decrease across all communities of place and type.

Recreation

Individuals and groups who participate in recreational activities on public lands in the West Chocolate Mountains REEA could be negatively affected if lease development were to result in closures to OHV use. Reducing the amount of area available for OHVs could increase crowding elsewhere and diminish the recreation experience. In addition, introduction of industrial features into the landscape at sufficient scale could alter the setting, and thus the recreation experience for some people. Either result could constitute an adverse socioeconomic impact. Most likely, however, recreation activities would be disrupted for only a short time, and the scale of the industrial features would not be great enough to alter the experience.

Other Socioeconomic Impacts

The relatively small long-term population impact generated by implementing Alternative 5 indicates that no impact on public infrastructure in the socioeconomic impact area could occur during the operations of the power facilities. The needs of the limited number of people that could relocate to the area during the operation phase of the project for housing, schools, social services, and utilities could readily be met by the existing infrastructure.

Depending on the timing of the actual construction of the RFD scenario, some moderate short-term impacts could occur to public infrastructure in the socioeconomic impact area during the construction phase. Approximately 3,750 construction jobs would be required to complete the Alternative 5. Not all of these jobs could be filled by existing residents in the area; therefore, there could be some short-term in-migration into the area. The additional population could increase the demand for housing and various community services and facilities. However, given the transient nature of construction jobs, most of these workers would not relocate their families so the impact to schools could be marginal.

Environmental Justice

The Hispanic population of the West Chocolate Mountains REEA exceeds 50 percent in Imperial County and its percentage of the population in the Coachella Valley could be construed to be meaningfully greater than the general population of both Riverside County and the state. Additionally, a substantial portion (20.8 percent) of the Imperial County population has income below the poverty level; therefore, there is potential for identified minority or low-income populations to suffer disproportionately high beneficial and adverse human health and environmental effects as a result of implementation of this alternative. Specific project site locations have not been selected at this time. Once actual projects are identified and final design is completed, a detailed analysis would need to be conducted to assess if any potential adverse environmental or human health impacts may disproportionately affect minority or low-income populations.

4.17.4.6 Alternative 6: Geothermal Development Emphasis with Moderate Solar Development and No Wind Development

Under this alternative, it is assumed that achievement of levels of development consistent with the maximum development defined in the geothermal RFD scenario would take place (the same as discussed for Alternative 3) and that the level of achievement consistent with partial development of the solar RFD scenario would be realized. Lands within the West Chocolate Mountains REEA that lie east of the Coachella Canal would not be considered for an SEZ, modified or otherwise. Lands west of the canal would be identified as an SEZ, allowing other compatible renewable energy developments to occur. There would be no wind energy development.

Under this alternative, the following would be the same as Alternative 3:

- Acquired lands;
- Existing noncompetitive lease application;
- Direct and indirect social and economic impacts from geothermal development; and

- Direct and indirect social and economic impacts from CSP (dish engine only) and PV solar development.

Taking into account environmental, economic, and financial considerations, the full build-out of the geothermal RFD scenario is assumed to be the construction and operation of three 50-MW geothermal plants in the West Chocolate Mountains REEA. The partial build-out for the solar RFD scenario is assumed to be the construction and operation of one 15-MW solar PV power plant and one 150-MW solar trough power plant. The following socioeconomic analysis has been developed using this assumption. Direct and indirect impacts that could come from geothermal energy development under this alternative would be the same as the geothermal impacts described under Alternatives 2 and 3.

Direct and Indirect Social and Economic Impacts from Geothermal Energy Development

For purposes of this analysis, the impacts associated with design, construction, operation, and decommissioning of three 50-MW geothermal power plants will be used to represent the expected effects of full build-out of the geothermal RFD scenario. These direct impacts are identical to those described for Alternative 3. See Section 4.17.4.2 for a detailed description of these impacts.

Direct Social and Economic Impacts from Solar Energy Development

Under this alternative, 46 percent of lands within the West Chocolate Mountains REEA could be leased for solar energy development. It is assumed that either CSP or solar PV projects could be developed. Due to the wide range of solar development that could occur in the West Chocolate Mountains REEA, the activities that could occur during solar energy development have been based on the development of a 50-MW solar PV project and three 150-MW CSP projects, for a total of 500 MW of solar energy projects. This alternative assumes that the CSP projects would utilize solar dish technologies. Solar trough and power tower technologies would not be used under this alternative.

Direct and indirect impacts from this alternative are expected to be identical to those described previously for Alternative 4. However, the lands west of the Coachella Canal would be identified as an SEZ, a designation that would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments, including geothermal energy development, to occur within the West Chocolate Mountains SEZ. The lands east of the Coachella Canal would not be considered for an SEZ.

The change from CSP solar trough to CSP solar dish technology is not anticipated to significantly change the construction or operating costs of these CSP facilities. The CSP plants would be capital intensive and would require large amounts of construction expenditures. Operating costs are anticipated to be similar for each technology. Solar dish technologies have not become widely used at a commercial level; therefore, actual construction and operating costs are not well known. However, it is generally assumed that the cost structure of CSP facilities would not vary significantly between the different technologies.

Since the construction and operating costs associated with the different CSP technologies are not anticipated to vary, construction and operating employment is also not anticipated to be

significantly different. Therefore, the total economic impact to the region is anticipated to be identical regardless of the technology selected.

4.18 Transportation and Traffic

This section discusses the effects on transportation that may occur with implementation of the alternatives. First, the management goals are provided; second, the impact indicators used to identify and analyze effects are presented; third, typical impacts are discussed for geothermal, solar, and wind energy; and last, impacts are analyzed by alternative.

4.18.1 Management Goals

The CDCA Plan does not have any formal management goals for transportation. However, the CDCA Plan's Motorized Vehicle Access Element states:

- Based on implementation priorities, the BLM will, with assistance from the public, determine which routes in [multiple use] Class L and M areas need to be closed or limited in some other way. Route approval will be based on these considerations (from 43 CFR 8342.1 [1981]); and
- Recreation areas and open routes of travel which exist primarily in the northern part of the West Chocolate Mountains REEA shall be located to minimize conflicts between off-road vehicle use and other existing or proposed recreational uses of the same or neighboring public lands, and to ensure the compatibility of such uses with existing conditions in populated areas, taking into account noise and other factors.

4.18.2 Impact Criteria

The potential risk of direct impacts on lands and realty are assessed with respect to the following criteria. Potential impacts on transportation could occur if the any of the following were to take place:

- An increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system;
- An exceedance, either individually or cumulatively, of a level of service (LOS) standard established by the local county congestion management agency;
- Degradation of existing road conditions as a result of construction;
- Inadequate emergency access;
- Loss of access to private land parcels; or
- Loss of access to historically important recreation access points or staging areas.

4.18.3 Typical Transportation and Traffic Impacts from Energy Development

Typical impacts due to energy development include short-term increases in traffic caused by an increase in vehicle access to the area related to project exploration, development (construction), and operations.

4.18.3.1 Typical Transportation and Traffic Impacts from Geothermal Energy Development

The Geothermal PEIS identified typical impacts on transportation associated with geothermal energy development. The impacts are incorporated by reference and summarized in Table 4.18-1.

Table 4.18-1 Typical Impacts to Transportation and Traffic from Geothermal Energy Development

Project Phase	Activity	Impact	Time Frame
Site Evaluation/ Exploration	– Vehicular trips to site for surveying and well drilling.	– Intermittent increase of heavy- and medium-duty pickup trucks and personal vehicles.	Short-term.
Construction	– Shipment of materials to site for construction of injection wells and sump pits. – Construction of access roads if necessary.	– Increased use of local roadways. – Oversized loads causing temporary transportation disruptions and modifications to roads or bridges (such as fortifying bridges to accommodate the size or weight).	Short-term.
Operations and Maintenance	– Routine monitoring and maintenance of power plant.	– Small increase of heavy- and medium-duty pickup trucks and personal vehicles for routine maintenance and monitoring.	Short-term.
Decommissioning	– Removal of facility and access roads that are not maintained for other uses.	– Intermittent increases in the use of local roadways could occur during the decommissioning period. – Overweight and oversized loads causing temporary disruptions to local traffic.	Short-term.

4.18.3.2 Typical Transportation and Traffic Impacts from Solar Energy Development

Based on a review of environmental documentation for other solar energy projects, typical impacts for solar energy projects have been developed. The impacts are summarized in Table 4.18-2.

Table 4.18-2 Typical Impacts to Transportation and Traffic from Solar Energy Development

Project Phase	Activity	Impact	Time Frame
Site Evaluation/ Exploration	– Vehicular trips to site for surveying and well drilling.	– Intermittent increase of heavy- and medium-duty pickup trucks and personal vehicles affecting Level of	Short-term.

Table 4.18-2 Typical Impacts to Transportation and Traffic from Solar Energy Development

Project Phase	Activity	Impact	Time Frame
		Service. (LOS).	
Construction	– Grading and site preparation. – Solar array installation. – Ancillary structure construction. – Construction of access roads, if necessary.	– Increased use of local roadways affecting LOS. – Oversized loads causing temporary transportation disruptions and modifications to roads or bridges (such as fortifying bridges to accommodate the size or weight).	Short-term.
Operations and Maintenance	– Routine monitoring and maintenance of power plant.	– Small increase of personal vehicles for routine maintenance and monitoring.	Short-term.
Decommissioning	– Removal of facility and access roads that are not maintained for other uses.	– Intermittent increases in the use of local roadways could occur during the decommissioning period affecting LOS. – Overweight and oversized loads causing temporary disruptions to local traffic.	Short-term.

4.18.3.3 Typical Transportation and Traffic Impacts from Wind Energy Development

The Wind PEIS identified typical impacts on transportation associated with wind energy development. The impacts are summarized in Table 4.18-3.

Table 4.18-3 Typical Impacts to Transportation and Traffic from Wind Energy Development

Project Phase	Activity	Impact	Time Frame
Site Evaluation/ Exploration	– Site monitoring and testing. – Construction of access roads.	– Intermittent increase of heavy- and medium-duty pickup trucks and personal vehicles.	Short-term.
Construction	– Transporting the dismantled crane to the site. – Delivery vehicle traffic associated with delivery of tower sections and turbine parts. – Transportation and assembly of a large lifting crane and movement of the crane between tower sites, unless self-erecting towers are used.	– Increased use of local roadways. – Oversized loads causing temporary transportation disruptions and modifications to roads or bridges (such as fortifying bridges to accommodate the size or weight).	Short-term.

Table 4.18-3 Typical Impacts to Transportation and Traffic from Wind Energy Development

Project Phase	Activity	Impact	Time Frame
Operations and Maintenance	– Routine maintenance and monitoring.	– Small increase of personal vehicles for routine maintenance and monitoring.	Short-term.
Decommissioning	– Transportation of the dismantled crane, tower sections, and turbine parts removed from site. – Removal of access roads.	– Intermittent increases in the use of local roadways could occur during the decommissioning period. – Overweight and oversized loads causing temporary disruptions to local traffic.	Short-term.

4.18.4 Transportation and Traffic Impacts by Alternative

This section describes the effects under each alternative using the respective methodology prescribed under NEPA. Effects to transportation in the West Chocolate Mountains REEA may arise from construction, O&M, and decommissioning equipment and vehicles as well as from the introduction of construction or O&M related traffic on local roads near the REEA.

This EIS analyzes impacts to all resources, including habitat and protected species, to the extent necessary for a programmatic document, subject to existing data availability. Site-specific analyses, based on data compiled from detailed studies, will be conducted for site-specific proposals. If the constraints discussed in Section 2.1.2 are discovered during project planning or following further future studies, as determined necessary by an authorized officer, portions of the West Chocolate Mountains REEA may be determined to be closed to and unsuitable for geothermal, solar or wind energy development.

As discussed in Section 3.18.4, regional access to the planning area is available via Interstate 8 to the south and Interstate 10 to the north. These freeways connect to SR 111 which directly crosses the planning area. SR 111 begins at the International Border traveling north with two travel lanes in each direction to I-8 with an average daily trip (ADT) range of 29,000 to 37,000. North of I-8, the ADT ranges from 6,000 to 15,000 (County of Imperial 2003).

At this time, the exact location cannot be predicted for exploration and development of the geothermal, solar, and wind power plants in the West Chocolate Mountains REEA; therefore, expected traffic as a result of the proposed alternatives cannot be assigned to a particular road until such a determination has been made.

The following discussion analyzes the environmental consequences or impacts expected to occur as a result of anticipated future actions consistent with implementing the alternatives described in Chapter 2.

4.18.4.1 Alternative 1: No Action/No CDCA Plan Amendment

Because geothermal, wind, and solar development could still occur under the No Action/No CDCA Plan Amendment alternative, impacts to transportation and traffic would be

expected to be similar to those detailed in Section 4.18.4.3 for Alternative 3. However, development under the No Action/No CDCA Plan Amendment alternative may occur at a slower rate because an individual plan amendment process would be necessary for each geothermal and solar or wind authorization; thus, impacts may occur at a slower rate, as well.

No renewable energy development cap or other protective stipulations/measures pertaining to the east side of the Coachella Canal would be adopted under this alternative. Thus, there would be no restrictions on development east of the Coachella Canal, and transportation impacts that would not occur under Alternative 3 east of the Coachella Canal could occur under Alternative 1.

4.18.4.2 Alternative 2: No Development/CDCA Plan Amendment to Identify Areas as Closed to and Unsuitable for Geothermal, Solar, and Wind Energy Development

There would be no new construction or operation of geothermal power plants, or solar or wind energy projects, except those which are currently approved or operating. Transportation and traffic would not be affected by new geothermal, wind, or solar projects; however, the closure of these lands for renewable energy development would represent an opportunity cost. The energy that could have been supplied by development of this area for geothermal, solar, and/or wind energy would have to be filled by other fossil fuel or renewable energy generating facilities constructed elsewhere.

No renewable energy development cap or other protective stipulations/measures pertaining to the east side of the Coachella Canal would be adopted under this alternative. Thus, there would be no restrictions on development east of the Coachella Canal, and transportation impacts that would not occur under Alternative 3 east of the Coachella Canal could occur under Alternative 2.

4.18.4.3 Alternative 3: Renewable Energy Development Emphasis

Under Alternative 3, geothermal, solar, and wind could be developed to the maximum extent as defined in the geothermal, solar, and wind RFD scenarios. Up to 1,026 acres of land could be disturbed for development of geothermal power plants; up to 29,758 acres of land could be disturbed for development of solar PV projects; up to 6,637 acres could be disturbed for development of CSP projects; and up to 76 acres of land could be disturbed for wind energy projects. Solar development could occur through the development of a 50-MW solar PV power plant and 500-MW CSP power plant.

Under this alternative, the REEA would be designated as an SEZ. An SEZ would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments, including geothermal and wind energy development, to occur within the West Chocolate Mountains SEZ.

Direct Transportation and Traffic Impacts from Geothermal Energy Development

Traffic impacts could be caused by increased vehicle access to the area related to project exploration, development (construction), and operations. While it is difficult to exactly define how many more vehicles could use local and trunk roads, it is possible to use the scale of

development expected at West Chocolate Mountains REEA discussed in the geothermal RFD scenario in Section 2.2.

The amount of vehicular traffic would be directly proportional to the number of vehicles that would be related to exploration, construction, and operations. Initial exploration includes drilling two or three deep wells on an equal number of pads. Drilling would last 60 days for a total of 120 to 180 days to drill the wells. This phase would last six months and would require one crew operating the drilling rig. Each well would require about 30 tractor trailer trips to haul in the rig, drilling pipe, water tanks, and other drilling equipment. In addition, drilling activities would require a crew of workers generating 10 passenger vehicle trips per day, as well as an estimated four vehicle trips from medium-sized trucks delivering equipment and water.

Construction of the power plant facilities would last for a period of four months per facility. It is assumed that construction of the three power plant facilities outlined in the RFD scenario could result in 300 passenger vehicle and light truck trips per site daily while construction is ongoing, for a total of 600 vehicle trips per day, assuming all three are constructed simultaneously. Once the project has been completed, it is estimated the operation of the facilities outlined in the RFD scenario could result in up to 22 worker trips daily while the plant is in operation. There would also be an undetermined number of visitor and contractor trips per day. Based on the LOS of the roadways that could provide access to West Chocolate Mountains REEA, the increases of vehicular traffic due to development activities could be short-term in the ADT on local roads; however, this effect would not be adverse. At this time, it cannot be predicted where in the REEA the exploration and development of the power plant could occur; therefore, this traffic cannot be assigned to a particular road until such a determination has been made.

The ISDRA is adjacent to the West Chocolate Mountains REEA. In addition, there are routes of travel within the REEA. Impacts to the ISDRA or the routes of travel as well as loss of access to historically important recreation access points or staging areas could occur if the project was developed in proximity to these features. However, given the small amount of land (1,026 acres on BLM and other land), that could be developed within the REEA, these project could be sited away from open routes of travel and the ISDRA and there would be no effect. Construction vehicles could be parked off-trail in designated vehicle staging areas to minimize any temporary loss of access that could occur during construction. There would be no loss of access to existing recreational areas.

Although short-term increases of vehicular traffic due to development activities could result in adverse impacts to transportation in the planning area, based on the LOS of the roadways that could provide access to the West Chocolate Mountains REEA, as discussed in Section 3.18.1, these impacts would not be significant. Shipments of materials are unlikely to affect primary or secondary road networks significantly; however, this would depend on the location of the project site relative to the material source. Overweight and oversized loads could cause short-term, adverse impacts to local traffic and potential long-term, adverse impacts to the quality of local roads. Mitigation measures and BMPs could be implemented, as listed in Section 2.2.6.

Short-term impacts to traffic and emergency routes could include equipment delivery necessitating lane closures and stringing lines across major and local roadways during construction, operation, and decommissioning. If lane closures were necessary, the applicant would have to obtain an encroachment permit from the appropriate authorities (Caltrans and/or the County of Imperial) for work that would be performed within roadways.

Under this alternative, the pending geothermal lease application (640 acres) would be approved. Geothermal exploration would begin which could result in the impacts to transportation and traffic discussed earlier in this section. Currently, the size of the power plant is unknown since exploration has not begun; however, other power plants in the region are less than 50 MW, so it would be anticipated that exploration would be consistent with that of a geothermal power plant as discussed in the geothermal RFD scenario.

Conclusion

A Traffic Management and Control Plan would specify how the flow of traffic would be controlled and how emergency situations would be addressed. BMPs in Appendices I-A and I-B would reduce impacts to emergency response routes. They would not be a concern to the public. This alternative would be consistent with the management goals for this resource.

Indirect Transportation and Traffic Impacts from Geothermal Energy Development

The designation as an SEZ would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments, including geothermal energy development, to occur within the West Chocolate Mountains SEZ, which could lead to an increase in impacts to transportation and traffic from an increase in the development of geothermal energy projects, although the development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Direct Transportation and Traffic Impacts from Solar Energy Development

Under this alternative, up to 6,637 acres of CSP or up to 29,758 acres of PV projects could be developed, although lands acquired by BLM with LWCF funds would be managed as avoidance areas. It is assumed that either CSP or PV projects could be developed. Due to the wide range of solar development that could occur in the West Chocolate Mountains REEA, the activities that could occur during solar energy development have been based on the development of a 50-MW PV project and a 500-MW CSP project. These sizes were selected based on the availability of data related to development of these types of projects. PV and CSP are the two technologies that have been fielded most widely in the United States and throughout the world.

Short-term increases in the use of local roadways would occur during the construction period. Construction of a 500-MW solar trough project requires, on average, approximately 500 construction and supervisory personnel on site to construct the plant over a three-year period, with 2,100 personnel being required during all phases of construction, although not all would be on site at any one time) (Solar Millennium 2008). Assuming carpooling was used (two people per car), there could be a maximum of 2,100 trips (to and from the site) per day for construction workers. Construction traffic would be dependent upon the amount of cut and fill required, but construction traffic throughout the three-year construction period could amount to over 9,300 individual truck trips for the delivery of equipment and supplies and the removal of fill dirt. Even

with 2,100 trips daily that could be enough to cause a change in the LOS from A to D and result in an adverse effect. Construction of a 50-MW solar PV project requires up to 400 construction personnel during all phases of construction, although up to not all would be on site at any one time. Assuming carpooling was used (two people per car), there could be a maximum of 400 trips (to and from the site) per day for construction workers. Construction traffic would be dependent upon the amount of cut and fill required, but construction traffic throughout the 14-month construction period could amount to over 1,000 truck trips for the delivery of equipment and supplies and the removal of fill dirt.

Construction of a 500-MW CSP projects could degrade the LOS and result in short-term increases in vehicular traffic on local roads, and on routes of travel within the West Chocolate Mountains REEA. However, it would not degrade the LOS down to LOS D and these increases would not be adverse nor would they limit access to existing recreational areas.

Construction of a 50-MW PV projects could degrade the LOS and result in short-term increases in vehicular traffic on local roads, but these increases would not be adverse unless all PV projects were constructed concurrently. This additional traffic could also occur on routes of travel within the West Chocolate Mountains REEA. Due to the relatively small numbers of open routes these increases could be adverse as these vehicles could compete for space with recreational users and could cause delays as users of this area try and reach existing recreational areas.

Shipments of materials are unlikely to affect primary or secondary road networks significantly; however, this would depend on the location of the project site relative to the material source. Overweight and oversized loads could cause short-term, adverse impacts to local traffic and potential long-term, adverse impacts to the quality of local roads. Mitigation measures and BMPs would be implemented, as listed in Section 2.2.6.

Significant direct impacts to transportation are not anticipated during operations. CSP plants require an O&M workforce of approximately 70 to 100 people to conduct periodic maintenance and mirror washing. PV plants typically have a full-time staff of only two to three members during regular operations, including a security officer during non-business hours. Short-term increases in the use of local roadways could occur during the decommissioning period.

Short-term impacts to traffic and emergency routes could include equipment delivery necessitating lane closures and stringing lines across major and local roadways during construction, operation, and decommissioning.

Conclusion

If lane closures were necessary, the applicant would have to obtain an encroachment permit from the appropriate authorities (Caltrans and/or the County of Imperial) for work that would be performed within roadways. A Traffic Management and Control Plan would specify how the flow of traffic would be controlled and how emergency situations would be addressed. BMPs in Appendices I-A and I-B would reduce impacts to emergency response routes. They would not be a concern to the public. This alternative would be consistent with the management goals for this resource.

Indirect Transportation and Traffic Impacts from Solar Energy Development

Because solar energy development could result in up to 29,758 acres of the West Chocolate Mountains REEA being covered in a large impervious surface, surrounding areas could be subject to long-term, adverse, downstream erosion due to increased runoff, however, the development cap would limit solar energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Direct Transportation and Traffic Impacts from Wind Energy Development

As discussed in Section 2.1.3, site evaluation and exploration activities, such construction of METs, would require access roads and result in an increase of vehicular traffic to the West Chocolate Mountains REEA. Transportation activities could be short-term and intermittent, and could involve limited to low volumes of heavy- and medium-duty pickup trucks and personal vehicles. Short-term increases in the use of local roadways could occur during the construction period. Construction generally follows the sequence of planning; surveying and staking, construction of temporary use areas, and road building (30 days); foundation development and trenching for underground electrical lines (60 days); tower and turbine delivery and placement (120 days); electrical line installation (30 days); and cleanup and reclamation (30 days). The number of persons on site during construction is expected to vary between 50. Thus, there could be up to 100 trips per day for construction worker traffic during the construction period. Construction traffic would be dependent upon the amount of cut and fill required, but construction traffic could be over 100 trips per day throughout the construction period associated with equipment and supplies delivery and the removal of fill dirt. This could result in a maximum of 200 trips per day during construction. Given the LOS of local roads, this effect could be short-term and not adverse. This amount of traffic would not cause effects to routes of travel. Shipments of materials would be unlikely to affect primary or secondary road networks significantly; however, this would depend on the location of the project site relative to the material source. Overweight and oversized loads could cause short-term, adverse impacts to local traffic and potential long–term, adverse impacts to the quality of local roads. Mitigation measures and BMPs would be implemented, as listed in Section 2.2.6.

During operations, low volumes of heavy- and medium-duty pickup trucks and personal vehicles are expected for routine maintenance and monitoring. Routine O&M for a project this size are typically conducted by approximately five staff, using three 1.5-ton pick-up trucks. Roads are inspected at least twice annually. Periodic blading or smoothing and application of gravel are performed to maintain road quality. Maintenance of roads is scheduled during times of low wind to minimize airborne dust. Short-term increases in the use of local roadways could occur during the decommissioning period.

Conclusion

A Traffic Management and Control Plan would specify how the flow of traffic would be controlled and how emergency situations would be addressed. BMPs in Appendices I-A and I-B would reduce impacts to emergency response routes. They would not be a concern to the public. This alternative would be consistent with the management goals for this resource.

Indirect Transportation and Traffic Impacts from Wind Energy Development

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 transportation and traffic from an increase in the development of wind energy projects , however, the development cap would limit wind energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

4.18.4.4 Alternative 4: Geothermal Development Only

Under this alternative, geothermal energy could be developed to the achievement of levels of geothermal energy development consistent with the geothermal RFD scenario; there would be no solar or wind energy development. There would be no wind or solar energy development. Under this alternative, the following impacts would be the same as Alternative 3:

- Direct and indirect traffic and transportation impacts from geothermal energy development;
- Acquired lands; and
- Existing noncompetitive lease application.

Impacts from geothermal energy development would be the same as Alternative 3. Under this alternative, the West Chocolate Mountains REEA would not be designated as an SEZ and solar or wind energy development would not be allowed. Additionally the development cap would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres). This alternative would not conform to the CDCA goal to identify potential sites for wind energy development.

4.18.4.5 Alternative 5: Solar Energy Development Emphasis with Moderate Geothermal Development and No Wind Development

Under this alternative, solar energy could be developed to the achievement of levels of development consistent with the maximum extent as defined in the solar RFD scenario. Geothermal energy could be developed to a moderate level (50 MW) as defined in geothermal RFD scenario.

Under this alternative, the following would be the same as Alternative 3:

- Acquired lands;
- Existing noncompetitive lease application; and
- Direct and indirect traffic and transportation impacts from solar development.

Impacts from solar energy development would be the same as Alternative 3. Under this alternative, all lands within the West Chocolate Mountains REEA would be designated as an SEZ, which would allow other compatible renewable energy developments to occur. An SEZ also would allow project-specific consideration, processing, and potential approval of compatible

non-solar renewable energy developments, including geothermal energy, to occur within the West Chocolate Mountains SEZ.

Direct and Indirect Transportation and Traffic Impacts from Geothermal Energy Development

Direct and indirect impacts from geothermal energy development would be similar to the impacts described under Alternative 3; however, the total number of vehicle trips due to geothermal development could be reduced since there could only be one 50-MW geothermal plant developed. Direct impacts are anticipated to be short term and, overall, are not expected to have a significant, adverse impact to transportation. No indirect impacts to transportation are expected as a result of implementation of this alternative.

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 geothermal energy development, which could lead to impacts to transportation and traffic from an increase in geothermal energy projects.

4.18.4.6 Alternative 6: Geothermal Development Emphasis with Moderate Solar Development and No Wind Development

Under this alternative, it is assumed that achievement of levels of development consistent with the maximum development defined in the geothermal RFD scenario would take place (the same as discussed for Alternative 3) and that the level of achievement consistent with partial development of the solar RFD scenario would be realized. Lands within the West Chocolate Mountains REEA that lie east of the Coachella Canal would not be considered for an SEZ, modified or otherwise. Lands west of the canal would be identified as an SEZ, allowing other compatible renewable energy developments to occur. There would be no wind energy development.

Under this alternative, the following would be the same as Alternative 3:

- Acquired lands;
- Existing noncompetitive lease application;
- Direct and indirect traffic and transportation impacts from geothermal development; and
- Direct and indirect traffic and transportation impacts from CSP (dish engine only) and PV solar development.

Direct and Indirect Transportation and Traffic Impacts from Geothermal Energy Development

Under this alternative, the lands west of the Coachella Canal would be identified as an SEZ, a designation that would allow project-specific consideration, processing, and potential approval of compatible non-solar renewable energy developments, including geothermal energy development, to occur within the West Chocolate Mountains SEZ. The lands east of the Coachella Canal would not be considered for an SEZ. In addition, all lands east of the Coachella Canal would

have a development cap which would limit geothermal energy development east of the Coachella Canal to a maximum of 10 percent of the BLM land (700 acres).

Direct and Indirect Transportation and Traffic Impacts by Solar Energy Development

Direct and indirect impacts from solar energy development would be similar to the impacts described under Alternative 3; however, the total number of vehicle trips could be reduced for CSP development since only three 500-MW CSP projects could be developed. Impacts from solar PV development would be the same as Alternative 3. Indirect impacts to transportation would be the same as those under Alternative 3.

4.19 Cumulative Impacts Assessment

4.19.1 Introduction

In accordance with NEPA, this EIS analyzes cumulative impacts of renewable energy development that might occur consistent with each of the development alternatives in conjunction with other developments that affect or could affect the area. Under NEPA, a cumulative impact is the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions (40 CFR § 1508.7). In order to facilitate the cumulative impact assessment, a scenario has been developed that identifies and evaluates past, present, or reasonably foreseeable projects that may, in conjunction with the future development that might take place consistent with the alternatives considered in this EIS, contribute to cumulative environmental effects. This section also describes the methodology used to determine cumulative impacts.

4.19.2 Cumulative Projects

The cumulative scenario includes projects within the same geographic and temporal scope as the actions envisioned under this EIS for the West Chocolate Mountains REEA. The geographic scope varies for each resource area depending on the nature of the resource and the timing and intensity of activities. For example, the geographic scope for cumulative impacts to air quality may extend much further than traffic. Generally, this cumulative impact analysis is confined to a maximum 40-mile buffer surrounding the exterior boundaries of the evaluation area.

This section identifies all projects that could contribute to the overall cumulative impacts for a particular resource. These include renewable and non-renewable energy projects, transportation projects, infrastructure improvement projects, electric transmission, and other projects that meet these criteria, such as:

- Projects that are closely related completed past projects;
- Projects approved and under construction;
- Projects approved, but not yet under construction; or
- Projects that have been proposed and reasonably expected to move forward assuming their approval.

Projects are included in this cumulative analysis if information on the project was available in the BLM's GeoCommunicator mapping system, identified during agency scoping, provided in consultation with the BLM, or in another published cumulative analyses as of December 15, 2010. Table 4.19-1 lists all projects considered in the cumulative impact analysis, separated into three categories: planned projects, foreseeable projects, and foreseeable renewable projects. Table 4.19-1 also lists the locations of the cumulative projects, the project developers/owners, and descriptions of the projects, project permitting status, and a list of impacted or potentially impacted resources that could contribute to cumulative impacts. These projects are depicted in relation to the alternatives on Figure 4.19-1.

4.19.2.1 Existing Projects

While this area of Imperial County and the adjacent Coachella Valley in Riverside County is generally undeveloped, it is intensively farmed, with crop lands, groves, orchards, and feedlots, and supports transmission and transportation corridors, military training facilities, active renewable energy projects, several small communities, and the Salton Sea-Sonny Bono National Wildlife Refuge and ISDRA. The area, however, can be characterized as mostly open land.

Projects included in this cumulative impact assessment are listed in Table 4.19-1, and are included in the description of the existing setting for the resources described in Chapter 3, as appropriate. Past projects are included in this analysis only where their impacts could contribute to cumulative impacts when combined with the potential direct and indirect impacts presented for the alternatives in this EIS.

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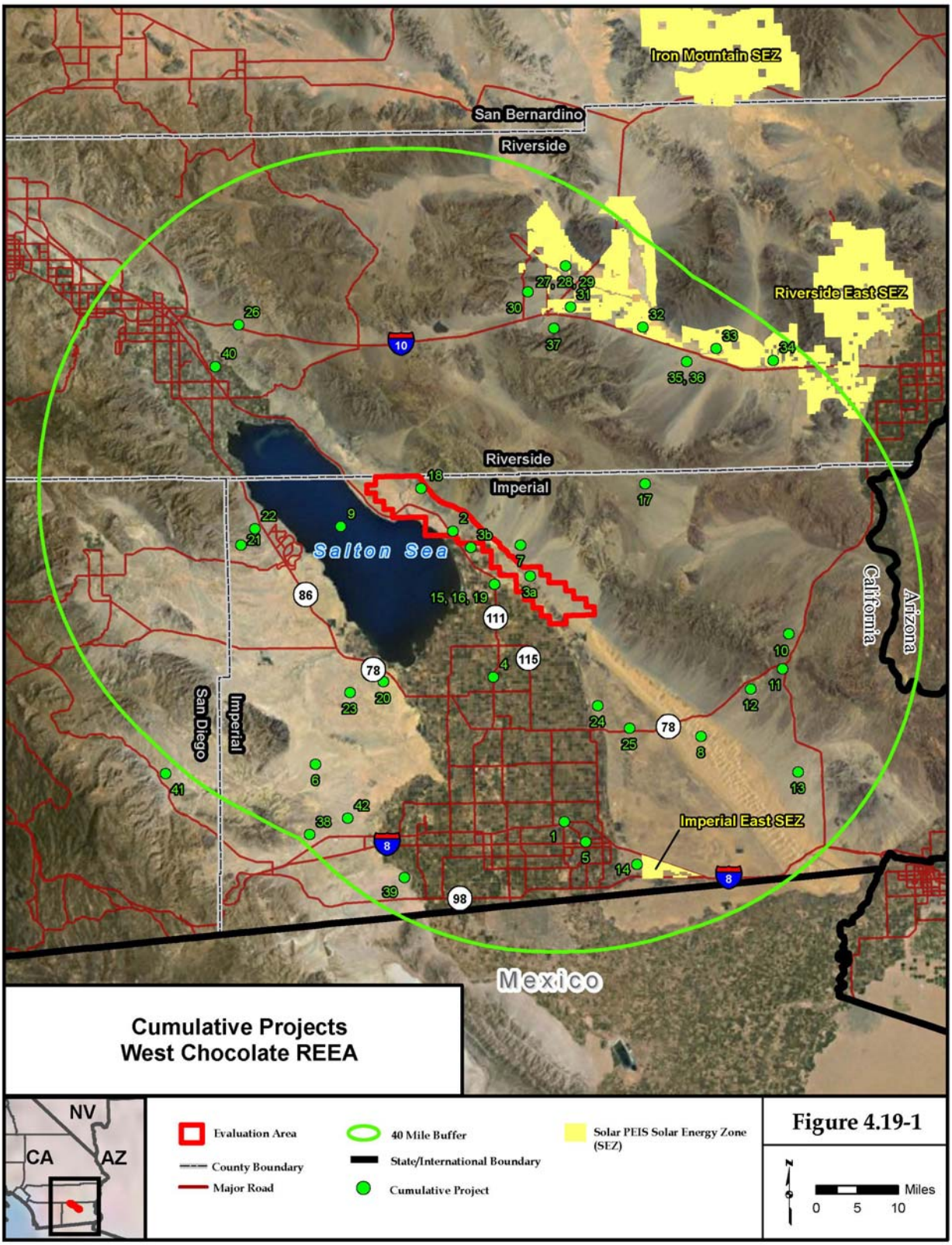
Iron Mountain SEZ
San Bernardino
Riverside
Riverside East SEZ
Riverside
Imperial
Salton Sea
California
Arizona
San Diego
Imperial
Imperial East SEZ
Mexico
Cumulative Projects
West Chocolate REEA
NV
CA
AZ
Evaluation Area
County Boundary
Major Road
40 Mile Buffer
State/International Boundary
Cumulative Project
Solar PEIS Solar Energy Zone (SEZ)
Figure 4.19-1
Miles
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Table 4.19-1 Cumulative Projects

	Project Name/ Application #	Location/Project Name	Owner/Applicant	Project Description	Project Type	Status	Affected Resources	Distance (approx.)	Overlapping WCM EIS Direct/Indirect Impacts
Existing Projects									
1	CA-670-2006-12	Holtville	Ormat	Ormat Continuing Operations EA	Energy	Existing	Aesthetics, Air, Noise, Traffic, Socioeconomics	22.5 miles	Air
2	CA-670-2009-114	West Chocolate Mountains Renewable Energy Evaluation Area	IID	230-kV Transmission Line Upgrade (Highline to Mirage) which goes north into Riverside County and interconnects to the SCE system at the Mirage Substation, in the California Independent System Operator (ISO) Balancing Authority.	Transmission	Existing	Aesthetics, Energy and Minerals	0	Aesthetics, Lands and Realty
3a	F Line	West Chocolate Mountains Renewable Energy Evaluation Area	IID	161-kV transmission line (Midway to Blythe) which starts at the Midway Substation and goes east over the CMAGR to Blythe Substation where it interconnects to the Western Area Power Administration (WAPA) Balancing Authority.	Transmission	Existing	Aesthetics, Energy and Minerals	0	Aesthetics, Lands and Realty
3b	N-Line	West Chocolate Mountains Renewable Energy Evaluation Area	IID	92-kV Transmission Line (Midway to Coachella Valley) which starts at the Midway Substation and connects through IID's Coachella Valley Substation to the SCE Mirage Substation.	Transmission	Existing	Aesthetics, Energy and Minerals	0	Aesthetics, Lands and Realty
4	SR 111	Imperial County	Imperial County	North/South running County Highway	Transportation	Existing	Traffic	0	Traffic
5	CACA 000966 CACA 001903 CACA 006218 CACA 006217 CACA 017568 CACA 006219 CACA 006964 CACA 006692X	SR 115 and I-8	ORRESOURCES Geothermal	Geothermal energy development	Energy	Active	Construction Impact: Aesthetics; Air Quality; Biology; Cultural; Hazards; Hydrology; Noise; Recreation; Socioeconomic; Traffic	25 miles	Air
6	Sunrise Powerlink/ CACA47658	Public lands in Imperial and San Diego counties	SDG&E	90-mile, 500-kV transmission line from the Imperial Valley Substation (in Imperial County, near the City of El Centro) to a new Suncrest Substation (near Alpine, Calif.) and a new 27-mile 230-kV transmission line that includes both overhead and underground segments from the new Suncrest Substation to the existing Sycamore Canyon Substation (near Marine Corps Air Station Miramar).	Energy	Active	Biological Resources (wildlife), Cultural Resources, Environmental Justice, Lands and Realty, Public Health and Safety (wildland fire), Recreation, Socioeconomics	26 miles	None
Foreseeable Projects									
7		Chocolate Mountain Aerial Gunnery Range Withdrawal Renewal	Department of the Navy	Renewal of BLM Land withdrawn for use as an aerial gunnery range.	Military Operations	Active	Land use, recreation, socioeconomics, archaeological resources, biological resources, airspace	< 2 miles	Lands and Realty, Hazards (Airspace)
8		Imperial Sand Dunes	BLM	Imperial Sand Dunes Recreation Area Management Plan	Recreation	Active	Land use, recreation, socioeconomics, archaeological resources, biological resources	Adjacent	Lands and Realty, Recreation, aesthetics, socioeconomics (?), biological resources, traffic

Table 4.19-1 Cumulative Projects

	Project Name/ Application #	Location/Project Name	Owner/Applicant	Project Description	Project Type	Status	Affected Resources	Distance (approx.)	Overlapping WCM EIS Direct/Indirect Impacts
9	Salton Sea Species Conservation Habitat Project	Riverside and Imperial Counties	California Natural Resources Agency	This project would construct habitat configured in a series of interconnected shallow ponds within the current footprint of the Salton Sea. The Project size at total build out would be approximately 2,400 acres, to be constructed over a period of several years depending on land availability and cost.	Restoration	Active	Water Resources, Biological Resources, Land Use	Adjacent	Water Resources, Biological Resources
Foreseeable Renewable Energy Projects									
10	CACA 052078 CACA 048272	Black Mountain south of CMAGR	Imperial Wind LLC	Wind energy development	Energy	Active	Construction Impact: Aesthetics; Air Quality; Biology; Cultural; Hazards (Airspace); Hydrology; Noise; Recreation; Socioeconomic; Traffic	> 20 miles	Aesthetics, Hazards (Airspace), Biological Resources
							Operational Impact: Aesthetics; Biology; Land Use; Hazards (Air Space); Recreation		Aesthetics, Hazards (Airspace), Biological Resources
11	CACA-052186	Black Valley	Renewergy	Wind energy development	Energy	Active - Pending relinquishment of application. Company is selling. New application from new owner will come in at same time of relinquishment of this application.	Construction Impact: Aesthetics; Air Quality; Biology; Cultural; Hazards (Airspace); Hydrology; Noise; Recreation; Socioeconomic; Traffic	20 miles	Aesthetics, Hazards (Airspace), Biological Resources
							Operational Impact: Aesthetics; Biology; Land Use; Hazards (Air Space); Recreation		Aesthetics, Hazards (Airspace), Biological Resource,
12	CACA-51947	Gold Basin		Wind Energy testing	Energy	Active	Construction Impact: Aesthetics; Air Quality; Biology; Cultural; Hazards (Airspace); Hydrology; Noise; Recreation; Socioeconomic; Traffic	20 miles	Aesthetics, Hazards (Airspace), Biological Resources, Water Resources
							Operational Impact: Aesthetics; Biology; Land Use; Hazards (Air Space); Recreation		Aesthetics, Hazards (Airspace), Biological Resources,
13	CACA 049615	West of Ogilby Road, east of railroad	Iberdrola (Pacific Solar Investments)	Solar energy development	Energy	Active	Construction Impact: Aesthetics; Air Quality; Biology; Cultural and Paleontological; Hazards; Hydrology; Noise; Recreation; Socioeconomic; Traffic	30 miles	Air Quality, Biological Resources, Socioeconomics,
							Operational Impact: Aesthetics; Land Use; Hydrology; Recreation		Air Quality, Biological Resources, Socioeconomics, Water Resources

Table 4.19-1 Cumulative Projects

	Project Name/ Application #	Location/Project Name	Owner/Applicant	Project Description	Project Type	Status	Affected Resources	Distance (approx.)	Overlapping WCM EIS Direct/Indirect Impacts
14	CACA 049884	BLM lands lying east of Lake Cahuilla – C ACEC south of I-8 and north of the All American Canal	Solar Reserve	Solar energy development	Energy	Active	Construction Impact: Aesthetics; Air Quality; Biology; Cultural; Hazards; Hydrology; Noise; Recreation; Socioeconomic; Traffic; Airspace Conflicts	30 miles	Air Quality, Biological Resources, Socioeconomics,
							Operational Impact: Aesthetics; Biology; Land Use; Hydrology; Recreation; Airspace Conflicts		Air Quality, Biological Resources, Socioeconomics, Water Resources
15	Hudson Ranch 1		Energy Source	Geothermal energy development	Energy	Under construction	Construction Impact: Aesthetics; Air Quality; Biology; Cultural; Hazards; Hydrology; Noise; Recreation; Socioeconomic; Traffic	< 1 mile	Aesthetics, Air Quality, Biological Resources, Cultural and Paleontological, Hydrology, Recreation, Socioeconomics, Traffic
							Operational Impact: Aesthetics; Biology; Land Use; Hydrology; Recreation		Aesthetics, Air Quality, Biological Resources, Cultural, Hydrology, Recreation, Water Resources, Socioeconomics, Traffic
16	Hudson Ranch 2		Energy Source	Geothermal energy development	Energy	Active	Construction Impact: Aesthetics; Air Quality; Biology; Cultural; Hazards; Hydrology; Noise; Recreation; Socioeconomic; Traffic	< 1 mile	Aesthetics, Air Quality, Biological Resources, Cultural and Paleontological, Hydrology, Recreation, Socioeconomics, Traffic
							Operational Impact: Aesthetics; Biology; Land Use; Hydrology; Recreation		Aesthetics, Air Quality, Biological Resources, Cultural, Hydrology, Recreation, Water Resources, Socioeconomics, Traffic
17	CACA 051062	Northeastern Imperial County	John Deere Renewables	Wind Energy Testing	Energy	Active	Construction Impact: Aesthetics; Air Quality; Biology; Cultural; Hazards (Airspace); Hydrology; Noise; Recreation; Socioeconomic; Traffic	15 miles	Aesthetics
							Operational Impact: Aesthetics; Biology; Land Use; Hazards (Air Space); Recreation		Aesthetics
18	Wister	West Chocolate Mountains REEA	Ormat	Geothermal energy development	Energy	Active	Construction Impact: Aesthetics; Air Quality; Biology; Cultural; Hazards; Hydrology; Noise; Recreation; Socioeconomic; Traffic	0 miles	Aesthetics, Air Quality, Biological Resources, Cultural and Paleontological, Hydrology, Recreation, Socioeconomics, Traffic

Table 4.19-1 Cumulative Projects

	Project Name/ Application #	Location/Project Name	Owner/Applicant	Project Description	Project Type	Status	Affected Resources	Distance (approx.)	Overlapping WCM EIS Direct/Indirect Impacts
							Operational Impact: Aesthetics; Biology; Land Use; Hydrology; Recreation		Aesthetics, Air Quality, Biological Resources, Cultural, Hydrology, Recreation, Water Resources, Socioeconomics, Traffic
19	CA-670-2006-114	Niland	BioRenewable Projects Solar Application	Solar energy development	Energy	Active	Construction Impact: Aesthetics; Air Quality; Biology; Cultural; Hazards; Hydrology; Noise; Recreation; Socioeconomic; Traffic; Airspace Conflicts	< 1 mile	Aesthetics; Air; Biology; Cultural; Hydrology; Noise; Recreation; Socioeconomic; Traffic
							Operational Impact: Aesthetics; Biology; Land Use; Hydrology; Recreation; Airspace Conflicts		Aesthetics; Air; Biology; Cultural; Hydrology; Noise; Recreation; Socioeconomic; Traffic
20	CACA 049150 CACA 051580	SE of San Sebastian Marsh, West of Highway 86, NE of Navy Ranges. Northeast Superstition Mountains	Sunpeak	Solar energy development	Energy	Active	Construction Impact: Aesthetics; Air Quality; Biology; Cultural; Hazards; Hydrology; Noise; Recreation; Socioeconomic; Traffic; Airspace Conflicts	18 miles	Air; Biology; Socioeconomic
							Operational Impact: Aesthetics; Biology; Land Use; Hydrology; Recreation; Airspace Conflicts		Air; Biology; Socioeconomic
21	CACA 051002 CACA 043003	Truckhaven Geothermal Leasing Area		Geothermal energy development	Energy	Active	Construction Impact: Aesthetics; Air Quality; Biology; Cultural; Hazards; Hydrology; Noise; Recreation; Socioeconomic; Traffic	18 miles	Biological resources, Air
							Operational Impact: Aesthetics; Biology; Land Use; Hydrology; Recreation		
22	CACA 029853X	Truckhaven Geothermal Leasing Area	Magma	Geothermal energy development	Energy	Active	Construction Impact: Aesthetics; Air Quality; Biology; Cultural; Hazards; Hydrology; Noise; Recreation; Socioeconomic; Traffic	12 miles	Biological resources, air
							Operational Impact: Aesthetics; Biology; Land Use; Hydrology; Recreation		Biological resources, air
23	CACA 042339	Southwest of Salton Sea and SR 78.	Layman	Geothermal energy development	Energy	Active	Construction Impact: Aesthetics; Air Quality; Biology; Cultural; Hazards; Hydrology; Noise; Recreation; Socioeconomic; Traffic	20 miles	Air; Biology; Socioeconomic
							Operational Impact: Air, Aesthetics; Biology; Land Use; Hydrology; Recreation		Air Quality; Biology; Cultural; Socioeconomic

Table 4.19-1 Cumulative Projects

	Project Name/ Application #	Location/Project Name	Owner/Applicant	Project Description	Project Type	Status	Affected Resources	Distance (approx.)	Overlapping WCM EIS Direct/Indirect Impacts
24	CACA 050618 CACA 049906 CACA 050616 CACA 050627 CACA 050617	N of SR 78 and East of SR 115	Unknown	Geothermal energy development	Energy	Active	Construction Impact: Aesthetics; Air Quality; Biology; Cultural; Hazards; Hydrology; Noise; Recreation; Socioeconomic; Traffic	10 miles	Aesthetics; Air Quality; Biology; Recreation, Socioeconomic, Traffic
							Operational Impact: Air, Aesthetics; Biology; Land Use; Hydrology; Recreation		Aesthetics; Air Quality; Biology; Recreation, Socioeconomic, Traffic
25	CACA 050615 CACA 050621	North and South of SR 78 and East of SR 115	Unknown	Geothermal energy development	Energy	Active	Construction Impact: Aesthetics; Air Quality; Biology; Cultural; Hazards; Hydrology; Noise; Recreation; Socioeconomic; Traffic	13 miles	Aesthetics; Air Quality; Biology; Recreation, Socioeconomic, Traffic
							Operational Impact: Air, Aesthetics; Biology; Land Use; Hydrology; Recreation		Aesthetics; Air Quality; Biology; Recreation, Socioeconomic, Traffic
26	BLM	Shavers Valley/I-10 Corridor in Riverside County	Sierra Renewables	Solar energy development	Energy	Active	Construction Impact: Aesthetics; Air Quality; Biology; Cultural; Hazards; Hydrology; Noise; Recreation; Socioeconomic; Traffic; Airspace Conflicts	25 miles	Hydrology
27	BLM	Desert Sunlight/West of SR 177 in Riverside County	First Solar	250 MW solar photovoltaic project located on 5,000-6,000 acres. Project would tie into the SCE Red Bluff Substation. Approximately 27 AF would be used during construction and 3.8 AF/year during operation.	Energy	Active	Construction Impact: Aesthetics; Air Quality; Biology; Cultural; Hazards; Hydrology; Noise; Recreation; Socioeconomic; Traffic; Airspace Conflicts	30 miles	Hydrology
28	Riverside County	Eagle Mountain Pumped Storage/West of SR 177 in Riverside County	Eagle Crest Energy	1,300 MW pumped storage project designed to store off-peak energy to utilize during on-peak hours. The captured off-peak energy will be used to pump water to an upper reservoir where the energy will be stored. The water will then be released to a lower reservoir through an underground electrical generating facility where the stored energy will be released back into the Southwestern grid during “high demand peak” times, primarily weekdays. Estimated water use is 8,100 AF/year for the first four-year start-up period and replacement water is 1,763 AF/year thereafter. 1	Hydro Power	Active	Construction Impact: Aesthetics; Air Quality; Biology; Cultural; Hydrology; Noise; Recreation; Socioeconomic; Traffic;	30 miles	Hydrology and Air
29	BLM	Eagle Mountain Soleil/West of SR 177 in Riverside County	enXco	100 MW photovoltaic plant on 1,216 acres of BLM land. Would require a 5-8 mile transmission line to planned SCE Red Bluff Substation.	Energy	Active	Construction Impact: Aesthetics; Air Quality; Biology; Cultural; Hazards; Hydrology; Noise; Recreation; Socioeconomic; Traffic; Airspace Conflicts	30 miles	Hydrology and Air
30	BLM	Green Energy Express/West of SR 177 and North of I 10 in Riverside County	Green Energy Express	70-mile double-circuit 500 kV transmission line and new 500/230 kV substation from near the Eagle Mountain Substation (eastern Riverside County) to Southern California.	Transmission	Active	Aesthetics, Cultural, Biological, Energy and Minerals	26 miles	None

Table 4.19-1 Cumulative Projects

	Project Name/ Application #	Location/Project Name	Owner/Applicant	Project Description	Project Type	Status	Affected Resources	Distance (approx.)	Overlapping WCM EIS Direct/Indirect Impacts
31	BLM	Chuckwalla Solar 1/Northeast of SR 177 and I 10 Intersection in Riverside County	Chuckwalla Solar LLC	200 MW solar photovoltaic project on 4,083 acres of land. Project would be developed in several phases and would tap into an existing SCE 161-kV transmission line crossing the site.	Energy	Active	Construction Impact: Aesthetics; Air Quality; Biology; Cultural; Hazards; Hydrology; Noise; Recreation; Socioeconomic; Traffic; Airspace Conflicts	26 miles	Hydrology
32	BLM	Palen Solar/North of I 10 and SW of Palen McCoy Wilderness	Solar Millennium/Chevron LLC	500 MW solar trough project on 5,200 acres. Facility would consist of two 250 MW plants. Approximately 3,870 acres would be disturbed. Project would include interconnection to the SCE Red Bluff Substation. Project would use 300 AF/year.	Energy	Active	Construction Impact: Aesthetics; Air Quality; Biology; Cultural; Hazards; Hydrology; Noise; Recreation; Socioeconomic; Traffic; Airspace Conflicts	31 miles	Hydrology
33	BLM	Genesis Solar/North of I 10 and South of Palen/ McCoy Wilderness	Nextera	250 MW solar trough project located on 4,640 acres north of the Ford Dry Lake. Project includes six mile natural gas pipeline and a 5.5 mile gen-tie line to the Blythe Energy Center to Julian Hinds Transmission Line, then travel east on shared transmission poles to the Colorado River Substation.	Energy	Active	Construction Impact: Aesthetics; Air Quality; Biology; Cultural; Hazards; Hydrology; Noise; Recreation; Socioeconomic; Traffic; Airspace Conflicts	32 miles	Hydrology
34	BLM	Mule Mountain Solar/ North of I 0 and Southeast of Palen/ McCoy Wilderness	enXco	300 MW solar photovoltaic project	Energy	Active	Construction Impact: Aesthetics; Air Quality; Biology; Cultural; Hazards; Hydrology; Noise; Recreation; Socioeconomic; Traffic; Airspace Conflicts	36 miles	Hydrology
35	BLM	DPV 2/Along I 10 Blythe to Palm Springs	SCE	New 500 kV transmission line parallel to the existing Devers-Palo Verde Transmission Line from Midpoint Substation, approximately 10 miles southwest of Blythe, to the SCE Devers Substation, near Palm Springs. The ROW for the 500 kV transmission line would be adjacent to the existing DPV ROW and would require an additional 130 feet of ROW on federal and State land and at least 130 feet of ROW on private land and Indian Reservation land.	Transmission	Active	Aesthetics, Cultural, Biological, Energy and Minerals	31 miles	None
36	BLM	Desert Southwest Transmission/Along I 10 Blythe to Palm Springs	IID	New, approximately 118-mile 500 kV transmission line from a new substation/switching station near the Blythe Energy Project to the existing Devers Substation located approximately 10 miles north of Palm Springs, California.	Transmission	Active	Aesthetics, Cultural, Biological, Energy and Minerals	31 miles	None
37	BLM	Red Bluff Substation/South of I 10	SCE	Proposed 230/500 kV Substation near Desert Center. Planned to interconnect renewable projects near Desert Center with the DPV transmission line.	Energy	Active	Aesthetics, Cultural, Biological	22 miles	None
38	Ocotillo Express Wind Energy Project/ CUP 10-0007	Ocotillo area, Imperial County.	Ocotillo Express, LLC	Up to 465 MW wind energy project within 12,436 acres. Total project footprint is approximately 1,167 acres.	Energy	Active	Aesthetics, Biological Resources, Cultural Resources, Socioeconomics	39 miles	Biological Resources
39	Ocotillo Sol/ CACA 51625	Imperial Valley west of the town of El Centro, adjacent to the Imperial Valley Substation	SDG&E	Proposed photovoltaic solar field that would produce 12 to 14 megawatts of renewable energy. The project would connect with the Imperial Valley Substation.	Energy	Active	Cultural Resources, Biological Resources, Energy and Minerals	35 miles	None

Table 4.19-1 Cumulative Projects

	Project Name/ Application #	Location/Project Name	Owner/Applicant	Project Description	Project Type	Status	Affected Resources	Distance (approx.)	Overlapping WCM EIS Direct/Indirect Impacts
40	Path 42 Transmission Project (also known as the Coachella Valley-Ramon/Devers 230-kV transmission line upgrade project)	Stretching 20 miles north of Interstate 10 from Coachella to Thousand Palms	IID	Known as Path 42, the upgraded transmission lines will have the needed capacity to transport 700 additional megawatts of power created by renewable generators in IID's service territory when the project is completed in December 2013. Path 42 will interconnect with its neighboring utility, SCE.	Energy	Active	Biological Resources (wildlife), Cultural Resources, Environmental Justice, Lands and Realty, Public Health and Safety (wildland fire), Recreation, Socioeconomics	24 miles	None
41	Tule Wind Energy Project/ CACA-49698	McCain Valley in eastern San Diego County, approximately 60 miles east of San Diego, near Boulevard, CA	Iberdrola Renewables, Inc.	The project would deliver power through the project substation by a 138-kilovolt transmission line to run south to an interconnection with the proposed SDG&E Boulevard Substation. The project would produce up to 186 megawatts of power.	Energy	Active	Aesthetics, Biological Resources (wildlife), Public Health and Safety, Socioeconomics	>40 miles	None
42	Imperial Valley Solar Project (IVSP)/CACA-47740	North of I-8 in southwestern Imperial County, approximately 4 miles east of Ocotillo.	Imperial Valley Solar LLC./ AES Solar Power, LLC. (AES Solar)	The IVSP was initially approved as a solar thermal project with a ROW grant issued by BLM in October 2010. Since that time IVSP has been reconfigured, and the proposed action evaluated within the current Plan of Development is the construction and operation of a 350 to 400 megawatt alternating current (MWAC) photovoltaic (PV) solar generation facility located on both private lands and public lands managed by the BLM in Imperial County, California.	Energy	Active	Biological Resources, Cultural, Mineral Resources	34 miles	None

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4.19.2.2 Reasonably Foreseeable Renewable Energy Projects

Table 4.19-1 lists 11 solar, three wind, and eight geothermal energy projects planned within a 40-mile buffer surrounding the West Chocolate Mountains REEA. These currently undeveloped projects are at various stages of analysis by government agencies. An additional four transmission line projects are proposed within the REEA. In addition, the Imperial East Solar Energy Zone is within the CESA. It is not expected that all of these projects will be approved or constructed; however, given the number of projects proposed and political focus on permitting, approving, and constructing renewable energy, it is reasonable to assume that some of the renewable projects will be built. Typical impacts from wind, solar and geothermal energy projects are described below, as a supplement to the information included in Table 4.19-1.

Typical Impacts from Geothermal Energy Projects

Utility scale geothermal energy projects extract heated water or steam from the Earth's crust to drive a turbine to generate electricity. Development occurs in three distinct phases: exploration, construction, and O&M.

Geothermal field depletion and the length of federal leases usually limit the lifespan of these developments to 20 to 50 years. At the end of the project's lifecycle, infrastructure is removed and the land is restored in accordance with a decommissioning plan. Generally, geothermal energy projects potentially can:

- Alter the visual landscape;
- Disturb wetlands or water bodies;
- Remove or alter vegetation and potential wildlife habitat;
- Temporarily displace wildlife;
- Temporarily increase air pollutants and dust emissions;
- Temporarily increase noise; and
- Disturb paleontological and cultural resources.

Seismic and drilling exploration is used to characterize the size and quality of the geothermal resources. Drilling equipment for TG drilling is selected based on the depths and design of the wells to be drilled and the physical and logistical conditions of the drilling sites. Most gradient wells are drilled with a small rotary rig (often truck-mounted) similar to those used for drilling water wells, or a diamond-coring rig similar to those 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. After the wells are completed, temperature profiles are measured periodically in each well using a small downhole temperature probe, which is typically transported in a small truck.

For energy production to support each 50-MW increment of net geothermal generation, it is estimated that up to 40 FD wells (16 production wells, 16 injection wells, and 8 dry holes)

would need to be drilled. This includes both the initial wells and make-up or replacement wells that would need to be drilled periodically during the life of the project. 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.

Once wells are drilled, they are connected by overland pipes that deliver the heated water or steam to be used in nearby turbines at the power plants. Access roads are constructed to access the field and perform maintenance activities.

While each facility may be slightly different in its design, in general, each 50-MW plant would cause about 70 acres of initial surface disturbance, with about 41 acres of long-term disturbance after reclamation after construction. The overall geographic extent of the well field (including production and reinjection wells), roads, transmission lines, and the power plant can be sizable, even though the actual footprint is relatively small.

Power plants would emit small amounts of vapor which could be seen from a distance on the rare cold days in the valley. The stacks are relatively short by comparison to fossil fuel power plants.

Typical Impacts from Solar Energy Projects

PV and CSP are the two dominant solar energy technologies on the market. PV technology creates electricity directly from sunlight through solar cells. Solar cells have traditionally been made of monocrystalline silicon, but other material technologies exist. PV solar cells produce alternating current electricity, which is converted to direct current electricity with an inverter and then integrated directly into the power grid (rooftop applications) or transferred along distribution lines (utility-scale applications).

CSP technology, or “solar thermal” technology, concentrates sunlight to heat a liquid that produces steam that turns a simple turbine to create electricity. Parabolic troughs, solar power towers, and solar dishes are all forms of CSP technology that focus mirrors on a single point to generate steam. Generally, CSP technologies have been developed for utility-scale applications.

Both primary solar technologies (PV and CSP) projects are proposed in the West Chocolate Mountains REEA. Some of these projects do not have detailed project descriptions available or have not undergone formal impact assessment. Both CSP and solar PV technologies have similar impacts, although CSP usually has a significant requirement for water for cleaning and cooling. Typically, both types of construction projects cause the following:

- Temporary increases in air pollutants and dust emissions;
- Temporary increases in noise;
- Temporary or permanent disruptions of wildlife patterns from construction activities;
- Possible loss of cultural or historic resources; and
- Temporary disruptions of local traffic patterns and road use.

Most of the construction impacts can be mitigated through site-specific BMPs. Because solar projects may result in a single use for the land, several permanent impacts could occur as a result of operations, including:

- Permanent loss of wildlife habitat;
- Impacts to existing recreational activities;
- Increased impermeable surfaces that could lead to an increased magnitude or frequency of flooding events; and
- Permanent alteration of visual or aesthetic characteristics.

Typical Impacts from Wind Energy Projects

Wind energy projects included in the cumulative scenario are the Black Mountain south of CMAGR (applicant: Imperial Wind LLC); Black Valley; Gold Basin; and wind testing in Northeastern Imperial County (applicant: John Deere Renewables).

Wind generation facilities typically comprise multiple wind turbines that are connected to a substation through a network of underground and overhead lines. In addition to erecting the wind turbines, installing a wind generation system typically requires constructing access roads, substations, and a switchyard, as well as connecting the substation to a transmission line. The equipment for all the structures is stored at a staging area prior to construction.

Many of the impacts associated with wind generation facilities result from their extensive areal coverage; that is, the turbines and other infrastructure typically cover tracts of land, but the facilities, themselves, do not cover the entire area. Generally, wind farms may:

- Disturb wetlands or water bodies;
- Remove or alter vegetation and potential wildlife habitat;
- Temporarily displace wildlife; and
- Disturb paleontological and cultural resources.

Other construction related impacts are those typical of construction projects, in general, such as generation of noise and dust from construction activities and a temporary increase in traffic from the movement of construction and equipment vehicles on local streets.

Operating wind generation facilities typically:

- Alters the visual landscape;
- Causes airspace conflicts;
- Causes the death or injury of birds and bats;
- Permanently displaces wildlife; and
- Influences migration patterns.

Construction of a wind generation facility temporarily increases local employment. Non-local workers require housing. However, wind power generation facilities typically employ approximately 30 permanent workers and, therefore, do not have a significant impact on local economies.

As a first step to determine the viability of a location for a wind power generation project, METs are installed to collect relevant meteorological data. The four wind projects considered in the cumulative scenario are currently in the MET stage of development. METs are typically 60 meters in height and the ground is disturbed for a 60-meter radius surrounding the tower. A ROW grant for METs is usually valid for three years; therefore, three years is the typical duration of operation. Construction impacts of METs may include:

- Vegetation trimming or removal;
- Dust from vehicles;
- Impacts to listed species; and
- Impacts to paleontological and cultural resources.

Impacts that typically occur during three-year operation period include:

- Alteration of the visual landscape;
- Airspace conflicts;
- Injury or mortality of migratory birds and bats; and
- Displacement of wildlife, and interruption of migration patterns.

4.19.2.3 Other Foreseeable Projects

Other projects planned in the area include the ISDRA Management Plan currently under revision, four transmission lines and the Solar PEIS (discussed below). These projects are in various stages of development, as noted in Table 4.19-1.

Solar Energy Programmatic Environmental Impact Statement

In addition to the active projects listed in Table 4.19-1, this analysis includes the potential solar energy projects considered within two SEZs of the Solar PEIS (DOE 2012). The PEIS anticipates up to 24,000 MW [BLM land only; total of SEZs in all states] of development and 508 MW and 13,148 MW of solar energy development in the Imperial East SEZ and Riverside East SEZ, respectively. The impacts from these potential energy projects have been included in the West Chocolate Mountains REEA EIS because the PEIS determined that certain resources could be cumulatively affected by solar energy development in the two SEZs. According to the PEIS, the following resources could be cumulatively impacted by development outside their respective SEZs:

Imperial East (DOE 2012)

- Air Quality and Climate: A 31-mi (50-km) radius from the center of the Imperial East SEZ

- Native American Concerns: Imperial Valley and adjacent areas within a 25-mi (40-km) radius of the Imperial East SEZ
- Minerals: Eastern Imperial County
- Water resources
  - Surface Water: Colorado River, All-American Canal
  - Groundwater: Imperial Valley Groundwater Basin
- Vegetation, Wildlife and Aquatic Biota, Special Status Species: A 50-mi (80-km) radius from the center of the Imperial East SEZ, including portions of Imperial County
- Rangeland Resources: Eastern Imperial County
- Recreation: Eastern Imperial County
- Lands and Realty: Eastern Imperial County
- Specially Designated Areas and Lands with Wilderness Characteristics: Lands within a 25-mi (40-km) radius of the Imperial East SEZ
- Socioeconomics: A 50-mi (80-km) radius from the center of the Imperial East SEZ
- Environmental Justice: Imperial County

Riverside East (DOE 2012)

- Air Quality and Climate: A 31-mi (50-km) radius from the center of the Riverside East SEZ within the Mojave Desert Air Basin
- Vegetation, Wildlife and Aquatic Biota, Special Status Species: A 50-mi (80-km) radius from the center of the Riverside East SEZ, including portions of Imperial County
- Socioeconomics: A 50-mi (80-km) radius from the center of the Riverside East SEZ
- Environmental Justice: A 50-mi (80-km) radius from the center of the Riverside East SEZ

Resources not included from the Solar PEIS were deemed to be outside of the cumulative effects study area, such as noise and vibration, energy and minerals, visual resources and aesthetics, soils, paleontological resources, and transportation and traffic.

The Solar PEIS determined that impacts would occur from development in the two closest Solar Energy Zones and that these impacts would affect resources beyond the boundaries of the SEZs (see Table 4.19-1). While the Solar PEIS described these impacts, due to the programmatic nature of that analysis, it did not quantify specific impacts. Given the general analysis, it is not possible to consider the cumulative impacts of the SEZs in the more specific analysis of this EIS. It is possible to state that some resources would be affected cumulatively, especially if development within the SEZs and the West Chocolate Mountains REEA were to happen simultaneously.

4.19.3 Cumulative Impacts Analysis

The following methodology was used to characterize potential cumulative impacts:

1. Review direct and indirect impacts under the alternatives considered in the West Chocolate Mountains REEA EIS:
   a. By resource;
   b. By spatial and temporal extent; and
   c. By intensity (if possible);
2. Identify past, present, and reasonably future projects with potential overlapping direct and indirect impacts:
   d. By resource;
   e. By spatial and temporal extent; and
   f. By intensity (if possible); and
3. Identify and analyze impacts that would be cumulative in nature.

This cumulative effects analysis considers the interaction of other past and ongoing activities with this project, in conjunction with the potential effects under the alternatives of this EIS.

For resource sections where the analysis in Chapter 4 determined that there would be no impact or that there would be no impact after mitigation, the cumulative effects under the alternatives are not analyzed because the action would not contribute to cumulative impacts to that resource. For each resource, the No Action/No CDCA Plan Amendment Alternative would result in continuation of current management and any development would be speculative; therefore, there would be no impacts foreseen under this alternative. For this reason, the No Action Alternative is not discussed further in this section. The No Development/CDCA Plan Amendment Alternative would designate the West Chocolate Mountains REEA as a renewable energy ROW exclusion area under the CDCA Plan and there would be no impacts as a result of renewable energy development except that it would not be developed and fossil fuels would not be replaced or development would occur in another location. For this reason, the No Development/CDCA Plan Amendment Alternative is not discussed further in this section.

4.19.3.1 Air Quality and Climate

Geographic Extent

The cumulative effects study area for air includes the Imperial Valley in Imperial County and the Coachella Valley in southern Riverside County. These two regions are regulated by their respective air pollution control boards, as discussed in Chapter 3, Existing Environment.

Existing Cumulative Conditions

Construction of any of the projects would take place in desert, rural areas where population is sparse, with the exception of the small communities of Niland and Slab City. Since

development under the alternatives would be located in an area designated as non-attainment for ozone, any significant increase in emissions of non-attainment pollutants (or precursors) would have the potential to impact air quality adversely.

Reasonably Foreseeable Future Projects and Changes

Most of the emissions expected under the alternatives would be localized during construction, with substantial lower emission rates occurring throughout the O&M phases. The only exception would be slightly higher operational emissions from geothermal energy projects. The direct and indirect air quality impacts and rates for all three energy resources are discussed in detail in Section 4.1.4.

Cumulative Impact Analysis for All Development Alternatives

Given the analysis in Section 4.1.4, it is expected that development would lead to a short-term, localized increase in particulates and emissions. Along with current and reasonably expected levels of air emissions in the cumulative effects study area, there could be a corresponding short-term increase in cumulative air emissions generated by implementation of any of the development alternatives.

The largest increase in air emissions, primarily occurring during construction, would take place under Alternative 3. Whether these emissions would trigger federal conformity or otherwise degrade air quality to cause a change in attainment status is speculative at this time. It is reasonable to assume, however, that if full build-out were to occur within a four-year period, there would be substantial dust and other emissions that could significantly degrade air quality in the two regulated basins. Construction would generate emissions of CO, NO_X, VOCs, SO_2, PM_{10}, and $PM_{2.5}$.

Daily construction emission rates under the alternatives are based on the assumption that all construction activities would occur concurrently and that all equipment for each activity would be operating on the same day. This assumption is expected to produce a conservative estimate of the maximum daily emissions during construction. The emissions would be localized to those locations under construction.

Construction of the reasonably foreseeable projects within the same cumulative effects study area as the West Chocolate Mountains REEA would generate similar types of emissions and could contribute cumulatively to impacts to air quality. Individually, the foreseeable projects could exceed the daily construction emission thresholds for the same or different criteria pollutants as the project.

4.19.3.2 Noise

Cumulative Impact Analysis for All Development Alternatives

Noise impacts are limited to locations where there are receptors to hear noise. There are no regulated noise receptors within the West Chocolate Mountains REEA and, therefore, no direct, indirect, or cumulative impacts would occur.

4.19.3.3 Topography, Geology, and Geologic Hazards

Geographic Extent

The geographic scope for analysis of cumulative impacts to geology and soil resources is limited to the REEA and the faults that are located within the REEA. Any potential impacts associated with geology, topography, and geologic hazards related to construction, operation and maintenance, and decommissioning of any of the projects would be site-specific and would occur only within the boundaries of the REEA.

Existing Cumulative Conditions

The project area consists of undeveloped land, agricultural land, open space land, and desert. Very few structures currently exist in the area. Most structures in the area are agricultural or industrial in nature and are uninhabited.

Reasonably Foreseeable Future Projects and Changes

Most of the impacts expected under the alternatives would be localized during construction. The only exception would be impacts related to seismic activity from other geothermal projects in the area. The direct and indirect geologic impacts and rates for all three energy resources are discussed in detail in Section 4.3.4.

Cumulative Impact Analysis for All Development Alternatives

Cumulative impacts on geologic resources or seismic characteristics from geothermal exploration, drilling, and development are expected to be minor. Any impacts from development that might occur would be minimal and largely limited to the REEA. The construction of new access roads, improvements to existing roads and bridges, and installation of wells and facilities would involve cut and fill operations. If large amounts of fill material would be necessary, increased demands on off-site supplies of sand, gravel, and crushed rock could occur. If multiple construction projects were developed within a single area, local supplies of required fill material, particularly gravel or crushed rock, could be reduced to the point of impacting the needs of roadways and other construction projects. Local changes in topography could be caused by construction of roads, well pads, pipelines, and the power plants. Seismic events related to geothermal reservoir injection could cumulatively contribute to seismic events triggered by other geothermal development.

4.19.3.4 Soils

Geographic Extent

Impacts to soils under the alternatives would generally be confined to the West Chocolate Mountains REEA. It is possible that soils along alluvial fans and other sloping terrain could erode during large storm events and be exacerbated by energy facilities and grading. In these rare situations, soils could be transported away from the analysis area to lower elevations causing gullying and increased sedimentation to channels and, potentially, the Salton Sea.

Existing Cumulative Conditions

The local lands surrounding the West Chocolate Mountains REEA generally share the same desert soil characteristics. The adjacent lands are primarily rural, open spaces.

Past, Present, and Reasonably Foreseeable Projects and Changes

Given that the cumulative effects study area is confined to the West Chocolate Mountains REEA, there are no other regional projects considered in the cumulative impacts analysis.

Cumulative Impact Analysis for All Development Alternatives

Construction of the energy projects under the alternatives would involve grading certain areas to level the sites and to construct flood control structures if necessary to mitigate impacts from large storm events. Erosion could occur in these areas due to the removal of vegetation and soil exposure. Developers would implement an erosion control plan to minimize the amount of any soil erosion during construction.

Due to the potential for water-driven erosion at some project locations, such as alluvial fans, developers would be required to construct an erosion control and stormwater flow system. Erosion would occur during flash flood events, but the potential adverse effects of erosion would be addressed and minimized by the erosion control design to slow flow or impound high water for later release. Some control structures would allow sheet flow to on- and off-site drainages, thereby minimizing downcutting of soils. Drainage plans may improve existing natural washes, by reinforcing their banks and allowing the remaining stormwater flow to pass through the site naturally. Construction of the erosion control and stormwater detention system would reduce water erosion susceptibility within project sites and to downgradient lands.

To further ensure that effects related to soil erosion are minimized, applicants may use BMPs in their plans of development to reduce localized soil impacts resulting from wind and water erosion; however, they would not eliminate all soil loss within project sites. Wind erosion would be exacerbated due to the removal and maintenance of vegetation within the project site, likely resulting in a localized loss of topsoil. Also, placement of impervious surfaces (primarily solar arrays, but also other energy infrastructure) may alter the drainage characteristics of the site, limiting the effectiveness of stormwater detention systems during monsoonal precipitation events.

As with construction, there would be the potential for erosion and topsoil loss during decommissioning, but the legally required erosion control measures would be implemented. Therefore, decommissioning of projects would not contribute to substantial soil erosion or loss of topsoil in the area.

All other foreseeable construction projects in the cumulative effects area for soils would also be required by law to implement similar control measures to prevent erosion. However, the acreage affected by the other foreseeable projects would contribute to an overall cumulative impact to soil resources over the life of a project.

To reduce effects on soil production, applicants may be required to salvage native soil where flood control berms are built. After construction of the berms, salvaged soil would be

replaced to provide a homogenous appearance as well as preserve sensitive soils and seed banks. Implementation of this type of measure could be expected for the other projects in the cumulative effects area for soils. On a local scale, the cumulative effects could be large, given the amount of vegetation clearing and grading.

4.19.3.5 Water Resources

Geographic Extent

Impacts to water resources are confined to two primary areas: surface and groundwater use and quality and changes in hydrologic function from surface alteration. These impacts are generally confined to watersheds and groundwater basins and recharge zones. Water quality regulations are generally implemented at the watershed level. Therefore, this cumulative effects analysis for hydrology and water quality considers the watersheds and subwatersheds of the region.

Existing Cumulative Conditions

During years of normal Colorado River flows, the All-American Canal delivers 3.1 million AF/year to the IID. Some of this allotment is distributed to other parties. A large proportion of the transfer is planned to be supplied from water generated by increased efficiency and conservation. The remaining water, approximately 2.8 million AF/year, is used for consumptive uses by the IID. Groundwater is limited in the region, with an estimated 14 million AF of poor quality groundwater within the Imperial Valley.

Past, Present, and Reasonably Foreseeable Projects and Changes

Ongoing and foreseeable development throughout the cumulative effects area for hydrology and water quality includes agriculture (irrigation), commercial and residential development, and other proposed renewable energy projects as well as other water users such as golf courses, pools, and similar types of water intensive recreational amenities. Additional renewable energy development is expected in the area and these other projects could have overlapping construction schedules; therefore, they could contribute to a cumulative demand for dust suppression water that exceeds availability.

Cumulative Impact Analysis for All Development Alternatives

The potential for hydrology and water quality impacts of the alternatives to combine with the effects of other projects within the geographic extent of the cumulative analysis is described below. These projects would use water for dust suppression during construction, and to a lesser degree, operations. Geothermal power plants use groundwater for cooling and to make up a loss of geothermal reservoir water over time. Solar projects also use water to clean panels, with CSP generally requiring more cleaning than solar PV facilities. Wind farm operations do not require any water for the life of the project. The water for these purposes could be obtained from the IID from its apportionment of the Colorado River. Some water rights could also be purchased from landowners.

Water Use

Under Alternative 3, full build-out would require considerable amounts of water, especially during construction. The total water needs for all projects during a four-year construction cycle would be significant and could exceed hundreds of AF/year for dust control. Other foreseeable projects would require similar amounts of water, which would need to be supplied from the same sources.

Given that the IID has indicated that it may have up 25,000 AF/year available for renewable energy projects, this would represent a significant shortfall and would presumably limit the numbers of projects or the timing of their construction.

Operational water needs would vary depending on the project size and technology chosen. If three of the solar projects in the West Chocolate Mountains REEA were wet cooled trough technology, they would consume up to 17,136 AF/year of water for the life of the projects. In many areas of the West, the scarcity of water has driven some developers towards less water intensive technologies, such as solar PV and dish-engine. If all of these projects used less water intensive technologies, they could consume up to 3,219 AF/year for panel cleaning. If the other 11 foreseeable solar energy projects within the cumulative effects study area (i.e., within 40 miles) used less intensive water technology, they would need similar quantities of water. Under the RFD scenario for this alternative, water demand for operational purposes could be 4,499 gallons/MWH. According to the DOE, the geothermal steam condensing consumptive rate is 1,400 gallons/MWH (DOE 2006). This represents the amount of water that is not returned to the geothermal reservoir per MWH. In existing California binary geothermal power plants, fluid loss (usage) for operations ranges from 623 to 2,556 acre-feet/year. Operating at 100 percent capacity, the three 50-MW binary cycle geothermal power plants would require 1,869 to 7,668 acre-feet/year.

These projects would individually and collectively place a burden on surface and groundwater supplies in the area. As of 2011, there would not be enough potential water to supply all the projects for dust suppression during construction and all the projects for operational water needs, including geothermal plants and solar projects.

Large solar projects would also create impermeable surfaces, which could interfere with groundwater recharge.

Within the cumulative effects study area for hydrology, there are about 12 projects in Imperial and Riverside counties that may contribute to a cumulative hydrologic impact. The primary concern for renewable energy projects would be water needs for dust suppression during construction. The precise needs of these projects, which are in various stages of review, is currently unknown. Other solar and geothermal energy projects would also need water during construction, which would require up to 200 AF/year each for dust suppression, depending on site and soil conditions. Given that there are about eight of these kinds of projects currently being proposed, up to 1,600 AF/year would be needed for dust suppression. Operation water needs (panel cleaning and domestic use) would require about 1 AF/year/MW to clean solar PV and CSP panels (as well as cool trough and power tower projects). A recently proposed solar PV project near Las Vegas requires about 29 AF/year to clean up to 400 MW of solar PV panels.

Water Quality

Water quality could also be adversely and cumulatively affected by large-scale renewable energy development in the West Chocolate Mountains and surrounding areas. This would primarily occur from hazardous material spills at construction sites. Developers, however, would implement programs to reduce spill prevention and countermeasures. These include emergency release response procedures to address any potential release of hazardous materials. Any project that would have aboveground oil storage capacity greater than 1,320 U.S. gallons, or completely buried oil storage capacity greater than 42,000 U.S. gallons, would be required by law to implement a SPCC plan, although it is unlikely that any would reach this threshold.

With successful implementation of the spill prevention measures, any release from either this project or any foreseeable project would have short-term and localized effects. Given the depth to groundwater in the area and the requirements for spill prevention and cleanup, considerable cumulative impacts to water quality would not be likely. Therefore, it is unlikely that there would be a cumulative impact to water quality that would result in degradation of groundwater quality.

The combined effects of the alternatives could also have a potential cumulative impact on surface water quality by increasing erosion and sedimentation, or introducing contaminated waters and the similar impacts of past, present, and reasonably foreseeable projects.

During construction of renewable projects within the West Chocolate Mountains REEA, implementation of a SWPPP and BMPs would be required by a General Permit. This would help ensure all the appropriate erosion control measures were used during construction to prevent on-site or off-site siltation or erosion. All other foreseeable construction projects would also be required by law to implement a SWPPP to prevent erosion. Therefore, there would not be a considerable cumulative impact to erosion in the cumulative effects area.

Drainage within any project could cause sheet flow to migrating channels, which is typical of desert landscapes, especially on alluvial fans. During heavy precipitation, alluvial fan deposits can be subject to rapid flow changes, resulting in debris flows, landslides, and flash floods. Extreme rain events can suspend sand, gravel, or even boulders, and transport them downstream or downslope, resulting in damage to structures impacted by flood waters. Flood events on alluvial fans in arid climates are triggered by significant storms. In the Lower Sonoran Desert, these would include the random summer cloudbursts that occur infrequently but can supply a large amount of water to a small area, as well as larger storms such as extra-tropical storms. Any of these storms could result in flooding that could cause significant damage across the analysis area and could cause significant localized destruction.

Project proponents would be required to conduct hydrologic modeling to help design project facilities to mitigate flood risk. The other foreseeable projects would be constructed on alluvial fans and alluvium on the valley floors.

Some projects under the alternatives could directly or indirectly affect jurisdictional waters as regulated by the U.S. Corps of Engineers. It is possible that one or more project in combination with other past, present, or reasonably foreseeable projects could create a cumulative impact to regulated jurisdictional waters. Increased sedimentation and degraded

water quality would be the primary cumulative impacts of these projects. To mitigate the potential impacts of a proposed project, BLM would require BMPs, such as designing drainage crossings to accommodate estimated peak flows and ensure that natural volume capacity can be maintained throughout construction and upon post-construction restoration. Typical cross-sections will be required in the 404 Permit application. It is assumed that the other projects identified in the cumulative projects scenario will be required to adhere to similar requirements if the projects affect waters of the United States.

4.19.3.6 Vegetation

Geographic Extent

The cumulative environmental analysis for vegetation includes a 40 mile buffer surrounding the exterior boundaries of the West Chocolate Mountains REEA. This was determined by considering the expected direct and indirect impacts to vegetation found within the REEA. Direct impacts include loss of vegetation. Indirect impacts could include the introduction of invasive species that out-compete native species of vegetation.

Analysis of cumulative impacts will assess regional impacts on vegetation resulting from cumulative loss.

Existing Cumulative Conditions

Projects within the West Chocolate Mountains REEA would be constructed in a location that supports a broad variety of habitat types including desert scrub, desert wash, and scattered desert woodlands. The cumulative impacts area also includes the Salton Sea, the West Chocolate Mountains, the Imperial Sand Dunes, various lake beds, numerous drainages, and areas relatively devoid of native vegetation including developed areas, paved roads, highways, access roads, and other disturbed areas. Invasive and noxious weed species have been identified throughout the cumulative impacts area.

Past, Present, and Reasonably Foreseeable Projects and Changes

Much of the land in the cumulative analysis area has been historically altered by human activities, resulting in conversion of undeveloped land and vegetation loss, and degradation. Reasonably foreseeable future projects that could impact vegetation in the cumulative impacts area characterize overall development trends in the Imperial and Coachella Valleys.

In addition to one-time construction impacts, the projects would have ongoing operational impacts on vegetation. Therefore, all projects that might contribute impacts over time in the cumulative area are considered for this analysis. This would include transportation, transmission, wind power, and solar power projects.

Cumulative Impact Analysis for All Development Alternatives

The potential for vegetation impacts to combine with the effects of other projects within the geographic extent of the cumulative analysis is described below. Projects envisioned within the West Chocolate Mountains REEA would have adverse impacts on vegetation both during construction and operation.

Cumulative impacts to vegetation can be additive, that is, directly proportional in severity to the quantity of the resource affected (such as vegetation loss or wetland fill), or exponential. For exponential impacts, increasing levels become disproportionately more substantial if they affect biological features that are critical to the survival of a species.

Additionally, cumulative impacts on vegetation could be exacerbated as a result of project schedules. Construction of multiple projects within the same time period can result in greater impacts from construction equipment and vehicle traffic, and overall habitat degradation and loss. If projects were to be constructed consecutively, project impacts would be reduced in intensity but prolonged in duration, and given the number of projects planned in the Imperial Valley and Coachella Valley region, it is likely that concurrent construction would occur.

Projects within the West Chocolate Mountains REEA would remove cover and forage vegetation. Of particular concern would be loss to habitat and food sources used by sensitive species, such as the desert tortoise, burrowing owl, flat-tailed horned lizard, Nelson's bighorn sheep, and several bird species. The alternatives, in conjunction with other projects, would result in cumulative impacts on native vegetation communities, including spiny shrubs, cacti, ephemeral annuals and hard grasses. Vegetation would be cleared for construction activities and, while vegetation would be allowed to repopulate areas where there would not be permanent project features, the area would be maintained via regular mowing. Additionally, washing of the solar panels would introduce new sources of water and the solar panels would introduce new areas of shading, which would adversely affect native vegetation. Drainage and berms would also alter the topography of the REEA, which could impact native vegetation. It is anticipated that other planned renewable projects in the Imperial and Riverside counties would have similar impacts to vegetation and existing habitat to the REEA.

BMPs incorporated as part of all of the development alternatives would lessen the impact of developments in the West Chocolate Mountains REEA on vegetation communities (including rare and endemic species). These measures, which would also be required for other federal projects within the REEA, could include pre-construction surveys and BMPs to minimize impacts to native vegetation. While these measures would minimize impacts to sensitive vegetation species, development would cumulatively result in a long-term, adverse impact to vegetation communities due to vegetation loss. Even with the implementation of BMPs, the alternatives would contribute to unavoidable adverse impacts to vegetation

4.19.3.7 Fish and Wildlife

Geographic Extent

The cumulative environmental analysis for fish and wildlife resources includes a 40-mile buffer surrounding the exterior boundaries of the West Chocolate Mountains REEA. This was determined by considering the expected direct and indirect impacts to species and their habitats found within the REEA. Direct impacts include loss or fragmentation of habitat or displacement of individuals. Indirect impacts could include the introduction of species that outcompete or prey on native species.

The cumulative impacts area reflects natural watershed boundaries (similar to the boundary used for the cumulative impact to water resources) and encompasses the local ranges

of species that may be affected by the Action Alternatives and other projects. Analysis of cumulative impacts will assess regional impacts on wildlife corridors and species impacts resulting from cumulative habitat fragmentation and loss.

Existing Cumulative Conditions

Projects within the West Chocolate Mountains REEA would be constructed in an area that supports a broad variety of biological resources. They would be located within the Lower Sonoran Desert biome, which is comprised of a diverse range of habitat types typical of those found in the desert. These habitat types include desert scrub, desert wash, and scattered desert woodlands. The cumulative impacts area also includes the Salton Sea, the West Chocolate Mountains, the Imperial Sand Dunes, various lake beds, numerous drainages, and areas relatively devoid of native vegetation including developed areas, paved roads, highways, access roads, and other disturbed areas. The area supports habitat for, and populations of, numerous species of fish and wildlife.

Past, Present, and Reasonably Foreseeable Projects and Changes

Much of the land in the cumulative analysis area has been historically altered by human activities, resulting in conversion of undeveloped land and habitat loss, fragmentation, and degradation. Reasonably foreseeable future projects that could impact fish and wildlife in the cumulative impacts area characterize overall development trends in the Imperial and Coachella valleys.

In addition to one-time construction impacts, the alternatives would have ongoing operational impacts on fish and wildlife. Therefore, all projects that might contribute impacts over time in the cumulative area are considered for this analysis. This would include transportation, transmission, wind power, and solar power projects.

Cumulative Impact Analysis for All Development Alternatives

The potential for impacts on fish and wildlife species to combine with the effects of other projects within the geographic extent of the cumulative analysis is described below. Projects envisioned within the West Chocolate Mountains REEA would have adverse impacts on fish and wildlife both during construction and operation.

Cumulative impacts to fish and wildlife can be additive or exponential. For exponential impacts, increasing levels become disproportionately more substantial if they affect vegetation or habitat that is critical to the survival of a species. An example of an exponential impact is habitat fragmentation, where the result of the construction of multiple projects in a particular area results in fragmentation of areas that formerly provided contiguous habitat into separate areas too small to support dependent species such as mule deer.

Additionally, cumulative impacts on fish and wildlife could be exacerbated as a result of project schedules. Construction of multiple projects within the same time period can result in greater impacts from emissions, noise, construction equipment, and vehicle traffic, and overall habitat degradation and loss. If projects were to be constructed consecutively, project impacts would be reduced in intensity but prolonged in duration, resulting in adverse impacts on the life cycles of species and/or resulting in prolonged or permanent displacement of fish and wildlife

from critical habitats. Given the number of projects planned in the Imperial Valley and Coachella Valley region, it is likely that concurrent construction would occur.

Projects within the West Chocolate Mountains REEA would fragment and degrade habitat, and remove cover and forage vegetation. Of particular concern would be loss to habitats used by fish and wildlife, such as mule deer and several bird species. Habitat loss of up to about 50,000 acres within the REEA and additional lands within a 40-mile radius of the REEA would result in a substantial permanent conversion of desert habitat to industrial/commercial uses. This could have a considerable impact on a variety of fish and wildlife through direct habitat loss and/or habitat fragmentation.

BMPs would minimize impacts to fish and wildlife species and their habitat. While these measures would minimize impacts, development would cumulatively result in long-term, adverse impacts, such as habitat loss, fragmentation, and degradation. Even with the implementation of BMPs, the alternatives would contribute to unavoidable adverse impacts to these resources.

BMPs incorporated as part of all of the development alternatives would lessen the impact of developments in the West Chocolate Mountains REEA on fish and wildlife. While these measures would minimize impacts, development would cumulatively result in a long-term, adverse impact to fish and wildlife due to habitat loss, fragmentation, and degradation.

4.19.3.8 Special Status Species

Geographic Extent

The cumulative environmental analysis for special status species includes a 40-mile buffer surrounding the exterior boundaries of the West Chocolate Mountains REEA. This was determined by considering the expected direct and indirect impacts to species and their habitats found within the REEA. Direct impacts include loss or fragmentation of habitat or displacement of individuals of special status species. Indirect impacts could include moving protected species to other locations or the introduction of species that outcompete or prey on special status species.

The cumulative impacts area reflects natural watershed boundaries (similar to the boundary used for the cumulative impact to water resources) and encompasses the local ranges of species that may be affected by the alternatives and other projects. Analysis of cumulative impacts will assess regional impacts on wildlife corridors and species impacts resulting from cumulative habitat fragmentation and loss.

Existing Cumulative Conditions

Projects within the West Chocolate Mountains REEA would be constructed in an area that supports a broad variety of biological resources. They would be located within the Lower Sonoran Desert biome, which is comprised of a diverse range of habitat types typical of those found in the desert. These habitat types include desert scrub, desert wash, and scattered desert woodlands. The cumulative impacts area also includes the Salton Sea, the West Chocolate Mountains, the Imperial Sand Dunes, various lake beds, numerous drainages, and areas relatively devoid of native vegetation including developed areas, paved roads, highways, access roads, and

other disturbed areas. The area supports habitat for, and populations of, numerous special status flora and fauna.

Past, Present, and Reasonably Foreseeable Projects and Changes

Much of the land in the cumulative analysis area has been historically altered by human activities, resulting in conversion of undeveloped land and habitat loss, fragmentation, and degradation. Reasonably foreseeable future projects that could impact special status species in the cumulative impacts area characterize overall development trends in the Imperial and Coachella valleys.

In addition to one-time construction impacts, the alternatives would have ongoing operational impacts on special status species. Therefore, all projects that might contribute impacts over time in the cumulative area are considered for this analysis. This would include transportation, transmission, wind power, and solar power projects.

Cumulative Impact Analysis for All Development Alternatives

The potential for impacts on special status species to combine with the effects of other projects within the geographic extent of the cumulative analysis is described below. Projects envisioned within the West Chocolate Mountains REEA would have adverse impacts on special status species both during construction and operation.

Cumulative impacts to special status species can be additive or exponential. For exponential impacts, increasing levels become disproportionately more substantial if they affect vegetation or habitat that is critical to the survival of a species. An example of an exponential impact is habitat fragmentation, where the result of the construction of multiple projects in a particular area results in fragmentation of areas that formerly provided contiguous habitat into separate areas too small to support dependent species.

Additionally, cumulative impacts on special status species could be exacerbated as a result of project schedules. Construction of multiple projects within the same time period can result in greater impacts from emissions, noise, construction equipment, and vehicle traffic, and overall habitat degradation and loss. If projects were to be constructed consecutively, project impacts would be reduced in intensity but prolonged in duration, resulting in adverse impacts on the life cycles of species and/or resulting in prolonged or permanent displacement of these species from critical habitats. Given the number of projects planned in the Imperial Valley and Coachella Valley region, it is likely that concurrent construction would occur.

Projects within the West Chocolate Mountains REEA would fragment and degrade habitat, and remove cover and forage vegetation. Of particular concern would be loss to habitats used by sensitive species, such as the desert tortoise, burrowing owl, flat-tailed horned lizard, Nelson’s bighorn sheep, and several bird species. These species are known to inhabit the REEA, but no critical habitat has been designated at this time. Other projects outside of the REEA could also contribute to a cumulative impact to these species, especially for any individuals that must be relocated or translocated prior to construction. Habitat loss of up to about 50,000 acres within the REEA and additional lands within a 40-mile radius of the REEA would result in a substantial permanent conversion of desert habitat to industrial/commercial uses. This could have a

considerable impact on a variety of special status species through direct habitat loss and/or habitat fragmentation

The West Chocolate Mountains REEA also contains eight special status plant species. These species are known to inhabit other nearby within a 40 mile radius of the REEA and would, thus, be similarly affected by other projects in the cumulative effects study area.

BMPs would minimize impacts to fish and wildlife species and their habitat. While these measures would minimize impacts, development would cumulatively result in long-term, adverse impacts, such as habitat loss, fragmentation, and degradation. Even with the implementation of BMPs, the alternatives would contribute to unavoidable adverse impacts to these resources

BMPs incorporated as part of all of the development alternatives would lessen the impact of developments in the West Chocolate Mountains REEA on special status species. These measures, which would also be required for other federal projects within the REEA, could include pre-construction surveys to identify special status plant and wildlife species on site, BMPs to minimize impacts to these species, biological monitors to ensure that impacts on special status species would be avoided to the fullest extent possible, and other measures to avoid or minimize impacts. While these measures would minimize impacts, development would cumulatively result in a long-term, adverse impact to special status species due to habitat loss, fragmentation, and degradation.

4.19.3.9 Cultural Resources

Cumulative impacts on cultural resources take into account the impacts of the Proposed Action or an alternative, as well as those likely to occur as a result of other existing, proposed and reasonably foreseeable projects. When analyzing cumulative impacts on cultural resources, an assessment is made of the impacts on individual resources as well as the inventory of cultural resources within the cumulative impact analysis area.

Geographic Extent

A cumulative impact of the Proposed Action on cultural resources is defined as the incremental physical impact of the Proposed Action or an alternative when added to other closely related past, present, and reasonably foreseeable probably future projects.

The regulations implementing Section 106 of the NHPA contemplate close coordination between the NEPA and NHPA processes (36 CFR §800.0) and expressly integrate consideration of cumulative concerns within the analysis of a proposed action's potential direct and indirect effects by defining "adverse effect" to include "reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative" (36 CFR §800.5(a)(1)).

The CEQ provides that when establishing the proper geographic scope, the boundaries should not be too broad as to make the analysis unwieldy, nor so narrow as to miss significant issues. Additionally, the EPA provides that for non-ecological resources, other geographic areas should be considered, such as historic districts (for cultural resources).

Landscape analysis pertaining to cultural resources in the Imperial Valley has focused largely on the oscillations of the Ancient Lake Cahuilla shoreline. While this analysis has yielded a wealth of data pertaining to settlement along the lake, and prehistoric use of the lake, it does not account for how the entirety of the Valley and surrounding hillsides were used as a complete subsistence system. In consideration of these factors, the cumulative effects study area for cultural resources has been defined as the Imperial Valley, bordered by the Chocolate, Superstition, Jacumba, Coyote, Santa Rosa, and Orocopia Mountains.

Existing Cumulative Conditions

As noted in Section 3.9.3.4, portions of the West Chocolate Mountains REEA have been the subject of 30 cultural resources studies and reports on file at the South Coastal Information Center of the California Historical Resources Information Center. However, these studies represent approximately five percent of the total REEA and are not representative of the total number of studies conducted through the REEA.

Human occupation created a substantial corpus of archaeological resources, 156 of which have been previously recorded within the West Chocolate Mountains REEA, including 106 prehistoric sites, 19 prehistoric isolates, 21 historic period sites, two historic-period isolates, one site containing both prehistoric and historic components, and seven GLO mapping features. Six recorded archaeological sites contain evidence of human burials that bear special significance and sensitivity for modern Native Americans. Presumably other habitation sites also contain human remains. While ceramic scatters are the most common resource type documented within the REEA, lithic scatters are also very common, as are thermal features (e.g., hearths) and sites with habitation debris.

In addition, there is a strong concentration of prehistoric sites along the maximum shoreline of Lake Cahuilla, which is a National Register District and congruent with BLM ACECs. Sites are also strongly correlated in lower elevations presumably as the inhabitants established their work and living areas adjacent to the receding shoreline.

Historic era cultural resources in Imperial Valley largely fall within the categories of travel and transportation, agricultural development, and World War II military uses. The Southern Pacific Railroad; historic road alignments, such as the Plank Road in the Imperial Sand Dunes; irrigation features, such as the Coachella and East Highline and other canals and laterals; and the remains of General Paton’s Desert Training Center, are all examples of some of the types of historic resources found within the valley.

Only a portion of the West Chocolate Mountains REEA has been the subject of intense cultural resources survey; therefore, the total number of prehistoric or historic archaeological sites present in the reasonable foreseeable cumulative projects analysis area is unknown and estimates are used to infer cumulative impacts for this analysis. The BLM requires intensive cultural resources studies on an undertaking-by-undertaking basis.

Past, Present, and Reasonably Foreseeable Projects and Changes

Cumulative conditions to cultural resources involve the disturbance of culturally significant resources, and the alteration of the historic and cultural landscape of the area over time. Cultural resources have been damaged or destroyed by development construction activities, and other human activities, such as increased pedestrian access to sites made by project roads and facilities. In recent years, impacts to cultural resources have been reduced as a result of various protections for cultural resources, including those required under the NHPA and the implementation of mitigation measures requiring construction monitoring, evaluation of resources discovered during monitoring, and avoidance or data recovery for significant resources.

Projects listed in Table 4.19-1 have the potential to impact cultural resources through ground disturbance, noise impacts, visual impacts, effects to tribally sensitive plants and wildlife. Impacts to these resources areas could contribute to the cumulative impact to cultural resources. These projects include proposed or approved projects within cultural resources study area. These projects have either undergone independent environmental review pursuant to state and local requirements or will do so prior to approval. Even if environmental review has not been completed for the projects described in Table 4.19-1, their potential effects were considered in the cumulative impacts analysis in this EIS for the geographic area described above. These projects are in the various stages of permitting or construction.

Cumulative Impact Analysis for All Alternatives

Alternatives 1, 3, 4, 5 and 6 would contribute to cumulative cultural resource impacts. To mitigate these impacts, and maintain consistency with the CDCA Plan impacts would be minimized through the implementation of required BMPs described in Appendix I-A3. BMPs assume that the required surveys, evaluations, and consultations will occur. Consultation with the California State Historic Preservation Office (SHPO), Native American governments, and other identified consulting parties would be conducted for any renewable energy development projects in the West Chocolate Mountains REEA. If adverse direct or indirect effects (see Section 4.9) to historic properties could not be avoided through BMPs, project redesign, or other means, consultation for the resolution of such effects would be initiated to determine what appropriate measures would be required to resolve adverse effects

Any projects proposed for development within the REEA have the potential to impact cultural resources through ground disturbance, alteration of the landscape, noise, or visual impacts. These impacts can be further defined by project phase, as discussed below.

Construction. Cultural resources could be at risk from construction activities and site preparation methods that involve ground-disturbing activities including, but not limited to, brushing, grading, trenching, drilling, and auguring. This includes the noise and visual impacts of construction vehicles within a cultural site or a traditional cultural landscape and the alternation of a landscape through construction activities. Proposed projects would be required to avoid or mitigate impacts to known cultural resources within the project footprint; however, there is usually a risk for unanticipated damage or inadvertent discoveries of unknown resources during project construction. If any unanticipated resources are encountered during construction, measures to reduce impacts to these resources would be implemented. Construction of other

projects located in the geographic area for the cumulative analysis could also result in damage to previously unknown cultural resources encountered during construction.

As all projects proposed currently or in the future under Alternatives 1, 3, 4, 5, and 6, and any of the cumulative projects listed in Table 4.19-1 would be required to provide avoidance and mitigation for any potential impacts to known or unanticipated cultural resources to reduce impacts. Because the cultural resources within the geographic scope are important for their potential contribution to knowledge of history, BMPs to collect scientific value from archaeological cultural resources, including systematic data recovery, would be imposed. With the implementation of BMPs, there would be a reduction in the net loss of the cumulative value or context of the cultural resources within the geographic scope. No cumulative loss or displacement of known cultural resources resulting from proposed projects and the projects within the same geographic context is expected due to avoidance of known resources and implementation of BMPs during construction. Individually, and cumulatively, the cultural resources surveys and data collection performed for projects proposed as a consequence of the Proposed Action and other projects in the analysis area contribute to scientific knowledge about the prehistoric and historic uses of the area, including information about prior inhabitants and their cultures.

Operations and Maintenance. As described above, approved projects will be designed to avoid known cultural resources and thus would have no direct lasting effects on these resources. In addition, any known or unknown historic and archaeological resources that could be encountered during operation and maintenance activities would be mitigated by BMPs such as having an archaeological monitor on site and having an Unanticipated Discovery Plan would ensure identification, evaluation, avoidance, and protection of those resources. Given these factors, the operation of approved projects would not contribute to cumulative impacts on cultural resource within the geographic extent. (Direct and Indirect effects are discussed in more detail in Section 4.9.)

Direct impacts to cultural resources can be avoided or minimized through the implementation of BMPs that would result in the avoidance of direct impacts to archaeological sites and the permanent preservation of culturally significant resources by reducing and/or controlling public access to culturally sensitive areas. These measures reduce the direct cumulative impacts of construction projects on cultural resources and have resulted in beneficial cumulative effects by identifying and preserving cultural resources and contributing to knowledge about the prehistoric and historic resources in the area.

Decommissioning. The decommissioning of projects constructed as a result of the Proposed Action, consistent with a BLM-approved decommissioning plan, would reduce any project-related contributions to cumulative effects. In addition, it is unlikely that any unanticipated resources would be discovered during decommissioning activities, as such all cultural resources at the project site would probably have been previously identified during either construction or operation. Therefore, decommissioning would not contribute to any adverse cumulative impact on cultural resources. In addition, with decommissioning and restoration, the project site would be restored to a condition similar to pre-construction conditions, and any effect that the project may have on culturally important landscapes through the introduction of noise, alteration of the view, alternation of the landscape, or impact to traditional uses of the area

such as through damage to traditional plants and animals would be eliminated or substantially reduced.

Under Alternative 2, the No Development/CDCA Plan Amendment Alternative, the CDCA Plan would be amended to identify the West Chocolate Mountains REEA as closed to and unsuitable for geothermal leasing and development and closed to and unsuitable for wind and solar energy development. There would be no new construction or operation of geothermal power plants, or solar or wind energy projects, except those which are currently approved or operating. No cumulative impacts to cultural resources would occur.

4.19.3.10 Paleontological Resources

Cumulative impacts on paleontological resources take into account the impacts of the Proposed Action or an alternative as well as those likely to occur as a result of other existing, proposed and reasonably foreseeable projects. When analyzing cumulative impacts on paleontological resources, an assessment is made of the impacts on individual resources as well as the inventory of paleontological resources within the cumulative impact analysis area.

Geographic Extent

The cumulative effects study area for paleontological resources includes all areas of Imperial Valley that contain the ten (10) geologic formations that BLM classifies as having a "moderate" to "high" potential to contain significant fossils. Formations classified as having a "moderate" potential to contain significant fossils (PYFC Class 3 – Moderate) are the Arroyo Diablo Formation of the Palm Spring Group; the Brawley Formation (Ql); the Borrego Formation of the Palm Spring Group; Shavers Well Formation (QP); the Palm Spring Formation; and the Borrego Formation of the Palm Spring Group. Formations classified as having a "high" potential to contain significant fossils (PYFC Class 4 – High) include the Quaternary alluvium (Qal); Quaternary cave deposits; Quaternary lake/playa deposits (Ql)-Lake Cahuilla beds; Quaternary nonmarine deposits (Qc); and, Quaternary paleospring deposits.

Existing Cumulative Conditions

Cumulative conditions to paleontological resources involve the loss of non-renewable scientifically important fossils and associated data, and the incremental loss to science and society of these resources over time. Development projects have resulted in the loss of paleontological resources in the Imperial Valley. The goals of the CDCA Plan are to ensure that paleontological resources are given full consideration in management and land use planning decisions, to ensure proper data recovery of significant resources where an impact to that resource cannot be avoided or otherwise mitigated, and to preserve and protect a representative sample of resources within the CDCA. Additionally, the Plan states that the BLM will encourage and support well-directed paleontological research, and the recreation element calls for a program of public interpretation and education that includes paleontological resources.

Paleontological records and literature searches conducted at the Stout Research Center at Anza Borrego State Park, the San Diego Natural History Museum, and the Museum of Paleontology at the University of California - Berkeley, revealed the presence of 24 known paleontological resources localities within the REEA, and another 25 located within a 1-mile

radius of the REEA. Additionally, a database search of Late Pleistocene vertebrate localities for California, which includes institutional records and published references, produced information about several paleontological resource localities recorded within 1 mile of the REEA (Jefferson 1991a,b).

Past, Present, and Reasonably Foreseeable Projects and Changes

Those projects listed in Table 4.19-1 within geologic formations with a "moderate" to "high" potential for significant fossils have the potential to impact paleontological resources through ground disturbance, noise impacts and visual impacts, and thus, contribute to cumulative impacts on paleontological resources.

Cumulative Impact Analysis for All Alternatives

Under Alternatives 1, 3, 4, 5 and 6, long-term, impacts to paleontological resources (direct and indirect as discussed in Section 4.10) could occur during exploration and during construction and operation of the renewable energy projects, although lands acquired by BLM with LWCF funds would be managed as avoidance areas. Solar development represents the largest amount of disturbance to paleontological resources. The nature of the technology requires large areas of land to be cleared and leveled for the development. Long-term, direct impacts to paleontological resources could occur during construction and operation of the CSP projects. Long-term, direct impacts to paleontological resources could occur during construction and operation of the solar PV projects. Long-term, direct impacts to paleontological resources could occur during construction and operation of the wind projects.

While these impacts could be initiated during the construction phase of the project, the impacts could remain until project decommissioning, with all improvements and facilities removed from the site and the property returned to its original character. These impacts could be adverse.

Construction. Paleontological resources could be at risk from construction activities and site preparation methods that involve ground-disturbing activities including, but not limited to, brushing, grading, trenching, drilling, and auguring. This includes the noise and visual impact of construction vehicles and the alternation of a landscape through construction activities. Proposed projects would be required to avoid or mitigate impacts to known paleontological resources within the project footprint; however, there is usually a risk for unanticipated damage or inadvertent discoveries of unknown resources during project construction. If any unanticipated resources are encountered during construction, measures to reduce impacts to these resources would be implemented. Construction of other projects located in the geographic area for the cumulative analysis could also result in damage to previously unknown paleontological resources encountered during construction.

As all projects proposed currently or in the future under Alternatives 1, 3, 4, 5, and 6, and any of the cumulative projects listed in Table 4.19-1 would be required to provide avoidance and mitigation for any potential impacts to known or unanticipated paleontological resources to reduce impacts. Because the paleontological resources within the geographic scope are important for their potential contribution to knowledge of paleoclimatic evolution of the Imperial Valley, BMPs to collect scientific value from paleontological resources, including fossil recovery, would

be imposed. With the implementation of BMPs there would be a reduction in the net loss of the cumulative value or context of the paleontological resources within the geographic scope. No cumulative loss or displacement of known paleontological resources resulting from proposed projects, and the projects within the same geographic context is expected, due to avoidance of known resources and implementation of mitigation measures during construction, including monitoring. Individually, and cumulatively, the paleontological resources surveys and data collection performed for projects proposed as a consequence of the Proposed Action and other projects in the analysis area contribute to scientific knowledge about the prehistoric natural environment of the area.

Operations and Maintenance. As described above, approved projects will be designed to avoid known paleontological resources and thus would have no direct lasting effects on these resources. In addition an unknown paleontological resource that could be encountered during operation and maintenance activities would be mitigated by BMPs, such as having an archaeological monitor on site and having an Unanticipated Discovery Plan, to ensure identification, evaluation, avoidance, and protection of those resources. Given these factors, the operation of projects proposed as a result of the Proposed Action would not directly contribute to cumulative impacts on paleontological resources within the geographic extent.

Direct impacts to paleontological resources can be avoided or minimized through the implementation of BMPs that result in the avoidance of direct impacts to archaeological sites and the permanent preservation of significant resources by reducing and/or controlling public access to paleontologically sensitive areas. These measures reduce the direct cumulative impacts of construction projects on paleontological resources, and have resulted in beneficial cumulative effects by identifying and preserving paleontological resources and contributing to knowledge about the prehistoric natural environment in the Imperial Valley.

Decommissioning. The decommissioning of projects constructed as a result of the Proposed Action, consistent with a BLM-approved decommissioning plan, would reduce any project-related contributions to cumulative effects. In addition, it is unlikely that any unanticipated resources would be discovered during decommissioning activities, as such all paleontological resources at the project site would probably have been previously identified during either construction or operation. Therefore, decommissioning would not contribute to any adverse cumulative impact on paleontological resources. In addition, with decommissioning and restoration, the project site would be restored to a condition similar to pre-construction conditions, and any effect that the project may have on paleontological resources through the introduction of noise, alteration of the view, or alternation of the landscape would be eliminated or substantially reduced.

Physical impacts to paleontological resources would be adverse, permanent, and irreversible; however, cumulative impacts could be mitigated with the implementation of preconstruction field surveys to determine the locations of paleontological resources and a Paleontological Resource Monitoring and Recovery Plan. A pre-work survey would be necessary at elevations less than 40 feet msl along the ancient Lake Cahuilla shorelines. Other pre-work surveys may be necessary to determine if paleontological resources could be encountered and if the sediments could be affected by the chosen alternative. A paleontological monitoring program would be implemented where surficial disturbance activities occur. In the event significant

subsurface paleontological resources are identified during construction, they would be addressed according to the stipulations of the BLM. Paleontological surveys would be required before any ground-disturbing activities would be permitted.

Indirect impacts to paleontological resources during development of renewable energy projects could occur through increased surface exposures and through potential development-induced erosion which could result in damage to paleontological features. Implementation of BMPs and erosion control measures could mitigate erosion impacts.

Under Alternative 2, the No Development/CDCA Plan Amendment Alternative, the CDCA Plan would be amended to identify the West Chocolate Mountains REEA as closed to and unsuitable for geothermal leasing and development and closed to and unsuitable for wind and solar energy development. There would be no new construction or operation of geothermal power plants, or solar or wind energy projects, except those which are currently approved or operating. No cumulative impacts to paleontological resources would occur.

4.19.3.11 Visual Resources

Geographic Extent

For the purposes of this analysis, the geographic extent for visual resources is the West Chocolate Mountains REEA and a one-mile buffer, which includes the Salton Sea.

Existing Cumulative Conditions

The West Chocolate Mountains REEA has not received a final VRM class. It has had a visual inventory and has designated the REEA as iVRM Class IV. The objective of iVRM Class IV The objective of this class is to provide for management activities which require major modifications of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements. Based on this inventory, the area has been designated a Class C landscape, which is the lowest ranking for visual quality. Due to this interim classification, only a one-mile buffer has been used in this cumulative effects analysis.

Past, Present, and Reasonably Foreseeable Future Projects and Changes

In addition to SR 111, the cumulative effects study area includes three transmission lines (Map Nos. 1, 2 and 3), a small northern portion of the ISDRA, the Hudson Ranch 1 and 2 and Wister geothermal projects, and a solar project near Niland.

Planned development throughout the cumulative effects area for visual resources is dominated by energy and transmission projects, including both solar and geothermal facilities, and the associated infrastructure. The trend in renewable energy development is representative of reasonably foreseeable future projects in the cumulative effects area based on existing forecasts. There are no other reasonably foreseeable non-energy projects anticipated in the area.

Cumulative Impact Analysis for All Development Alternatives

The potential for the aesthetic and visual impacts of the alternatives to combine with the effects of other projects within the geographic extent of the cumulative analysis is described below. The development alternatives in this EIS would result in changes in the scenic landscape. The area is designated, however, to allow the greatest change in the natural landscape. Plumes from dust emissions caused by construction activities could extend beyond the one-mile cumulative effects study area buffer. These would be limited to the construction phase and only on days with favorable meteorological conditions and construction activity. Long-term intermittent, visual impacts could occur from vapor plumes from geothermal power plants. Again, these would be limited to the rare cold days in the Lower Colorado Desert.

Any one of these projects could result in an alteration to the visual character and an introduction of contrast that would be consistent with the applicable iVRM Class IV.

4.19.3.12 Lands and Realty

Cumulative Impact Analysis for All Development Alternatives

Impacts to lands and realty would involve curtailing land use authorizations currently allowed by the CDCA Plan, including ROWs, easements, and other lands actions, or limiting future lands actions. The designation of all or part of the REEA for renewable energy ROWs and geothermal leases could limit future non-renewable energy ROWs or other lands actions. There are no currently pending ROW applications that would be affected by the alternatives and, therefore, there would be no direct, indirect, or cumulative impacts to the lands and realty program. Other, existing land use authorizations would not be affected because future applications would be subject to valid, existing rights.

4.19.3.13 Human Health and Safety/Hazardous Materials

Geographic Extent

Impacts to hazards and hazardous materials caused by the alternatives would be limited to the West Chocolate Mountains REEA and land directly adjacent to the site because impacts would result only from incidents associated with hazardous materials during construction or maintenance activities. Cumulative impacts could occur during construction and operation and would be limited to the areas of concurrent construction or maintenance.

Existing Cumulative Conditions

There are no identified hazardous waste sites known within the West Chocolate Mountains REEA.

Past, Present, and Reasonably Foreseeable Projects and Changes

Construction of renewable energy projects at the West Chocolate Mountains REEA could cause cumulative impacts to human health and safety and hazardous wastes and materials. Individual projects would be bound by the regulations identified in Section 3.13 and measures discussed below to manage hazardous wastes at these developments, which would mitigate and minimize the potential for cumulative impacts from these materials.

Cumulative Impact Analysis for All Development Alternatives

Regarding cumulative environmental contamination impacts, a proposed project's contribution to a cumulative impact would only be considered significant if it combined with other projects to result in substantial volumes of contaminated soil that required off-site treatment and that, as a combined volume, exceeded the capacity of available treatment facilities or resulted in substantial exposure of hazardous materials to the public. For the reasons discussed below, projects considered in the West Chocolate Mountains REEA EIS would not contribute to cumulative impacts.

Hazardous Materials, Spills, and Potential Exposures

Construction and operational activities associated with the West Chocolate Mountains REEA EIS study area could result in releases of hazardous materials in localized areas in the REEA. Applicants would implement a number programs and measures to reduce the potential for a spill and to address spills that occur. In addition to the SWPPP and the SPCC Plan that would be required, the applicant would prepare a Waste Management Plan, a Health and Safety Plan, an Emergency Response Plan, and a Weed Management Plan. Additionally, developers would implement a Hazardous Materials Management Program, which would outline procedures for storage and transport of hazardous materials and would restrict the refueling of construction equipment on site. Given the small quantities of materials to be used during construction and operations, any spill would be small and would be readily cleaned up using the applicant's plans. The measures described above would reduce the potential for spills of hazardous materials and ensure cleanup measures would be implemented if a spill were to occur. Since any spills could be small, localized, and cleaned up, there would not be the potential for impacts of the projects to combine with impacts of other projects, and there would not be a considerable cumulative impact.

There is currently no evidence to suggest that on-site soils or groundwater are contaminated, but they have not been sampled and characterized and mining activity has been reported within the site boundaries. The West Chocolate Mountains REEA is currently undeveloped and vacant, and there is no evidence of previous commercial or agricultural activity. Several construction activities would involve disturbance of soils and exposure of groundwater as a result of excavation, drilling, or surface disturbance including site preparation (clearing and grading), water wells and water storage pond construction, O&M building construction, substation below grade equipment installation, and foundations for the transmission line structures and the solar tracking system foundations.

Fire Hazards

Wildfire risks from construction and operations are associated with combustion of native materials due to smoking, refueling, sparks from welding, and operating vehicles and other equipment off roadways. Brushing activities for vegetation control and removal during construction could result in fire. These risks would be associated with construction and large foreseeable projects. Applicants would develop and implement a Fire Management Plan that would establish standards and practices to minimize the risk of fire danger and, in case of fire, provide for immediate suppression and notification. Concurrent construction of the foreseeable projects could increase the fire risks; however, each project could implement its own fire

management program to reduce the potential risk of fires. Therefore, there would not be a significant cumulative impact.

4.19.3.14 Energy and Minerals

Cumulative Impact Analysis for All Development Alternatives

There were no direct or indirect impacts identified to energy and minerals, and no cumulative impacts have been identified.

4.19.3.15 Recreation

Geographic Extent

Projects envisioned under the alternatives would be authorized by BLM, although it is likely that other non-BLM authorizations would be required. Existing and reasonably foreseeable recreational activities within the exterior boundaries of West Chocolate Mountains REEA (i.e., BLM and non-BLM land) would be affected by renewable energy development. Development could have a direct and indirect impact to recreation within the REEA, such as OHV use, camping, and birding. These activities could be displaced to other lands outside of the REEA. Other projects in the region could have a similar direct effect on recreation and could, therefore, cause a cumulative loss of land used for recreation.

Existing Cumulative Conditions

Recreational use in the West Chocolate Mountains REEA is low; therefore, the removal of this area used by a limited number of people would contribute a small cumulative impact to the overall loss of recreational land in the region.

Past, Present, and Reasonably Foreseeable Projects and Changes

Ongoing and foreseeable development throughout the cumulative effects area for recreation is dominated by proposed renewable energy projects. Additional renewable energy development is expected in the area.

Cumulative Impact Analysis for All Development Alternatives

Up to about 50,000 acres of land could ultimately be developed for renewable energy at the West Chocolate Mountains REEA. In addition, tens of thousands of other acres of other BLM and non-BLM land could be developed in the foreseeable future. If all of these projects are developed, they would cause a cumulative impact to recreational use in the region. None of these areas, however, are specifically managed for recreation (that is, they are not Special Recreation Management Areas), but rather managed for extensive recreation.

4.19.3.16 Special Management Areas

Cumulative Impact Analysis for All Alternatives

There are no SMAs within the West Chocolate Mountains REEA; therefore, no cumulative impacts would occur.

4.19.3.17 Social and Economic Conditions

Geographic Extent

The socioeconomic potential impacts of the alternatives would be limited to the local and regional economy within Imperial and Riverside counties and the local communities within that region; therefore, the geographic area analyzed for cumulative socioeconomic impacts is the local and regional economy and the local population within the Imperial and Coachella valleys.

The proposed plan would have no impact to public services and utilities and, therefore, cumulative impacts to public services and utilities are not analyzed further.

Existing Cumulative Conditions

Imperial and Riverside Counties have been severely affected by the recent recession with unemployment increasing and housing development and population growth decreasing. Existing conditions have been influenced by the construction and operation of past and present projects, which have affected demand for and supply of jobs as well as housing demand, business revenues, and property values. Local demand for housing and workforce has historically reflected the prevailing level of development and growth in the area.

Past, Present, and Reasonably Foreseeable Projects and Changes

All projects identified in Table 4.19-1 are included since they would all contribute to changes in the rural character of the area. Construction and operation of the large number of proposed renewable energy development projects that are planned could increase business and tax revenues, primarily in Imperial County, and to a lesser degree, Riverside County. All of these projects would also increase the use of local businesses and hotels.

Cumulative Impact Analysis for All Development Alternatives

The potential impact of the proposed plan, when added to other past, present, and reasonably foreseeable future actions, would constitute the cumulative effects from renewable energy development. During construction of the potential projects, local spending would increase in Imperial and Riverside counties. This would benefit the local and regional economy through expenditures on goods and services.

While all of the possible projects considered in the cumulative impacts analysis would be expected to have some influence on socioeconomic resources, a number of major renewable energy construction projects are planned which would be expected to have a particular influence on socioeconomic conditions. Collectively, these foreseeable projects would require large numbers of laborers during construction, but would have a smaller labor force for operations.

The addition of the foreseeable projects could draw on the unemployed work force, but also could draw workers from other regions, especially for scarce technical skills. Local construction workers for projects or any of the foreseeable projects would receive additional income for the duration of their employment. These local workers as well as non-local workers would also likely spend locally. Construction crews would use local accommodations for lodging, which would have a beneficial impact on the service industry in the area. Projects would

also draw on locally procured materials, goods, and services, and some regional suppliers would be stimulated by these purchases. As more clean energy projects are permitted over time to meet renewable portfolio standard mandates, key regional suppliers to providers would benefit in the future from retooling and inventory replenishment related to the clean energy infrastructure transformation in the area. The concurrent construction of the foreseeable projects would result in a beneficial cumulative impact on the local and regional economy and tourism, and could decrease unemployment for the periods of construction.

The cumulative socioeconomic impacts would take place within a setting characterized by trade-offs between desert habitat/ecological resources and alternative land uses in addition to energy development. The main theme would be managing how renewable energy generation comes on line within a fragile desert community ecosystem in a sustainable manner. Cumulative socioeconomic impacts can arise from the increased competition for remaining land (following build out to reach renewable portfolio standards targets) and desert scarcity that may arise from the cumulative effects of permitting multiple projects and their related mitigation and purchased land offset requirements to preserve habitats elsewhere. Competing against these mitigation and conservation uses will be other commercial, industrial, and residential developments proposed by municipalities. The competing pressures from collective energy developments may potentially contribute to social conflicts and dissension related to differing views concerning the highest and best use of remaining lands within municipal borders.

It is possible that some forms of tourism involving the natural appreciation of the desert and OHV use of this open space area would be impacted by the development alternatives, but mitigation can address this potential small effect. Collectively, however, cumulative effects from multiple renewable projects to recreation may adversely affect economic conditions and the sense of social well-being of historical recreational users of the area.

Further, given that many people live in the area due to its rural character, projects approved under the West Chocolate Mountains REEA EIS combined with other changes in the landscape may permanently alter the rural feel of the community.

Environmental Justice

Cumulative impacts to environmental justice are not analyzed for the West Chocolate Mountains REEA EIS because it would not result in disproportionately high or adverse effects on minority or low-income populations and, therefore, would not contribute to cumulative impacts to environmental justice.

4.19.3.18 Transportation and Traffic

Geographic Extent

Traffic impacts caused by implementation of the alternatives would be limited to the regional freeways (I-10 or I-8) and what would probably be the primary haul road (SR 111) that comprise the local transportation network; therefore, the geographic area analyzed for cumulative traffic and transportation impacts is the road network within a 20-mile buffer surrounding the West Chocolate Mountains REEA.

If the projects envisioned in this EIS are built concurrently within a four-year timeframe, there would be a considerable increase in road use for construction equipment and workers' vehicles. The project would potentially impact traffic and transportation systems by increasing the volume of traffic during the construction phase. Because impacts to traffic and transportation would result primarily from construction related activities, this analysis is limited to cumulative projects that would have concurrent construction schedules.

Existing Cumulative Conditions

The project would be located along an approximately 25-mile stretch of land adjacent primarily to SR 111, near Brawley, Calipatria, and Niland, California in a rural, sparsely populated area with a significant amount of publicly owned land. The current average daily traffic is considerably lower than the LOS for SR 111; therefore, the road can absorb significant higher levels of traffic.

Past, Present, and Reasonably Foreseeable Projects and Changes

Construction of renewable energy projects located within 20 miles of the West Chocolate Mountains REEA and with constructions schedules concurrent to those that might occur under the development alternatives (Alternatives 3, 4, 5, and 6) could result in cumulative traffic impacts to the regional freeways and SR 111.

Cumulative Impact Analysis for All Development Alternatives

Up to 1,000 personally operated vehicles, supply vehicles, and large trucks with construction equipment and materials could use the local road network to access renewable energy projects in the West Chocolate Mountains REEA. About four other foreseeable projects could also be built during the same timeframe, with an additional traffic load. Together, these activities would not cause a permanent cumulative impact to the transportation network, but could cause intermittent traffic disruptions during peak construction periods if all projects are built concurrently. Traffic increases during operations would be significantly lower and would, therefore, not exceed LOS for SR 111.

4.20 Summary of Impacts

For almost all of the resource areas, there were no impacts under the No Action/No CDCA Plan Amendment and the No Development/CDCA Plan Amendment Alternatives. The only exceptions were the Lands and Realty and the Energy and Minerals resource areas.

Lands and Realty

No Action/No CDCA Plan Amendment Alternative

Under the No Action/No CDCA Plan Amendment Alternative, the CDCA Plan would not be amended. The West Chocolate Mountains REEA would remain under current management of the CDCA Plan, which categorized the area as "unclassified," which makes the land provisionally available for geothermal leasing and for authorization of solar and wind projects. Any future applications for wind or solar projects would be processed on an individual basis,

with any necessary plan amendments initiated at that time, consistent with the goals and objectives of the CDCA Plan. Lands and realty would not be affected by the geothermal, wind, or solar processes, but the energy needs would be filled by other fossil fuel or renewable energy generating facilities elsewhere. No action would be taken on the existing noncompetitive geothermal lease application.

No Development/CDCA Plan Amendment Alternative

Under the No Development/CDCA Plan Amendment Alternative, no lands would be leased for geothermal energy development or designated as suitable for solar or wind ROWs in the West Chocolate Mountains REEA. There would be no new construction or operation of geothermal power plants, solar or wind energy projects, except those which are currently approved or operating. Since the West Chocolate Mountains REEA would not be designated as suitable for geothermal leasing or solar or wind ROW, these types of lands and realty actions would not be allowed to occur. Other uses would still be allowed under the current land use classification; however, the closure of these lands for renewable energy development would represent an opportunity cost. The energy that could have been supplied by development of this area for geothermal, solar and/or wind energy would have to be filled by other renewable energy generating facilities constructed elsewhere. Under this alternative, the BLM would deny the existing noncompetitive geothermal lease application. The LWCF lands would be managed as avoidance areas.

Energy and Minerals

No Action/No CDCA Plan Amendment Alternative

Under the No Action/No CDCA Plan Amendment Alternative, the CDCA Plan would not be amended. The West Chocolate Mountains REEA would remain under current management of the CDCA Plan, which categorized the area as “unclassified,” which makes the land provisionally available for geothermal leasing and for authorization of solar and wind projects. Any future applications for wind or solar projects would be processed on an individual basis, with any necessary plan amendments initiated at that time, consistent with the goals and objectives of the CDCA Plan. Energy and minerals would not be affected by the geothermal, wind, or solar processes, but the energy needs would be filled by other fossil fuel or renewable energy generating facilities elsewhere. No action would be taken on the existing noncompetitive geothermal lease application.

No Development/CDCA Plan Amendment Alternative

Under the No Development/CDCA Plan Amendment Alternative, no lands would be leased for geothermal energy development or designated as suitable for solar or wind ROWs in the West Chocolate Mountains REEA. There would be no new construction or operation of geothermal power plants, solar or wind energy projects, except those which are currently approved or operating. Since the West Chocolate Mountains REEA would not be designated as suitable for geothermal leasing or solar or wind ROW, these types of lands and realty actions would not be allowed to occur. Other uses would still be allowed under the current land use classification; however, the closure of these lands for renewable energy development would represent an opportunity cost. The energy that could have been supplied by development of this area for geothermal, solar and/or wind energy would have to be filled by other fossil fuel or

renewable energy generating facilities constructed elsewhere. Under this alternative, the BLM would deny the existing noncompetitive geothermal lease application.

4.20.1 Best Management Practices

Proposed BMPs are presented in Appendix I. These that would be applicable to these resources would be implemented as required. No individual mitigation measures were proposed.

4.20.2 Residual Impacts

No residual impacts for any impacts were identified.

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5 Consultation and Coordination

5.1 Public Participation Summary

5.1.1 Public Scoping Period

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 Bureau of Land Management (BLM) extended the scoping period to March 19, 2010 to provide an opportunity for all interested parties to participate in the process. The scoping period commenced with publication of the Notice of Intent (NOI) in the Federal Register (FR) on February 10, 2010, 75(27):6698-6699. The NOI announced a period for public scoping of alternatives, issues, impacts, and planning criteria. The NOI also requested the views of other agencies as to the scope and content of the environmental information that was relevant to the statutory responsibilities or areas of expertise for those agencies. Federal, state, and local agencies, as well as individuals or organizations that were interested or may be affected by the BLM's decision on this Proposed Action, were invited to participate in the scoping process and, if eligible, could request or be requested by the BLM to participate as a cooperating agency.

5.1.2 Scoping Meeting

The BLM held one public scoping meeting near the project location, at the Calipatria Inn and Suites (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 for 30 minutes prior to the meeting to allow participants to review displays, maps, and literature, as well as to meet members of the Environmental Impact Statement (EIS) team and BLM staff. To encourage public comment, repositories were provided for the public to deposit written comments. The environmental consulting firm preparing the EIS on behalf of the BLM, Ecology and Environment, Inc. (E & E), explained its role as the third-party consultant, described opportunities for public involvement, and provided an overview of the environmental issues to be addressed in the Draft EIS.

The meeting concluded with a facilitated public comment session where the BLM invited the public to provide verbal comments on the Proposed Action. A court reporter recorded the scoping meeting and prepared a transcript of the presentations and public comments. In addition to having the opportunity to provide verbal comments at the scoping meeting, participants were also given the opportunity to provide written comments or to take a comment form to fill out and mail in at a later date. All meeting materials also contained a project-specific email address to facilitate collection of electronic comments.

In addition to verbal comments and written comments received during the scoping meeting, the BLM received nine written comments (seven letters, one comment card, and one e-mail), and three verbal comments from private citizens, government agencies, non-governmental organizations (NGOs), and business associations by the March 19, 2010 close of scoping.

For public involvement, the BLM also used the National Environmental Policy Act (NEPA) commenting process to contribute to its compliance with Section 106 of the National Historic Preservation Act (NHPA) (16 United States Code [U.S.C.] 470f) as provided for in 36 Code of Federal Regulations (CFR) 800.2(d)(3).

5.1.3 Scoping Response

A verbatim transcript of the public scoping meeting was recorded, 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 NGOs; and one comment letter and one verbal comment were received from individuals at the public scoping meeting.

5.1.4 Issues Identified During Scoping

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 those comments are provided in Appendix J. Additionally, Table 5-1 lists the commenter, the topic of their comment, and the location of the BLM's response to those comments in the text of the Draft EIS/Draft Proposed CDCA Plan Amendment. The method used to categorize issues is indicated in Sections 3.2 and 3.3 of Chapter 3, Affected Environment.

Some comments indicate misunderstanding of the current action, which is consideration of allowing energy development leases (geothermal) and rights-of-way (solar and wind) in the West Chocolate Mountains Renewable Energy Area (West Chocolate Area). Since the Proposed Action does not involve actual development of energy facilities, specific impacts of specific projects cannot be determined or analyzed but have been addressed in the EIS for this action at a general landscape level. Comments summarized below may reflect inaccurate use of terms such as "project" or "project area" for this particular proposed land use planning (and to a lesser extent, lease issuance) action.

Table 5-1. Comments on the Draft EIS/Draft CDCA Plan Amendment

Issue/Topic	Commenter	BLM Response
Project Alternatives	U.S. Environmental Protection Agency	Section 2.2.3.1.2 Section 2.2.5.1.2 Section 2.2.6.1.2
	Center for Biological Diversity	Section 1 Section 2.1.3 to 2.1.5 Section 2.2.6.2 Section 2.4.1 to 2.4.2
	Brightsource Energy	Section 2.1.3 to Section 2.1.5
	Briggs Law	Section 2.4.1 to 2.4.2
	Defenders of Wildlife	Section 2.4.1 to 2.4.2
Project Description	Bureau of Reclamation	Section 1.2
	U.S. Environmental Protection Agency	Section 1 Section 1.1.1 to 1.1.3 Section 1.2 Section 2.1 Section 2.1.3 to 2.1.5 Section 2.2.3.1.2 Section 2.2.3.2.1 Section 2.2.5.1.2 Section 2.2.6.1.2 Appendix I
	Brightsource Energy	Section 1.8.8 Section 2.1.2
	Center for Biological Diversity	Appendix I Section 2.2.3.1.2 Section 2.2.3.2.1 Section 2.2.3.2.5 Section 2.2.5.1.2 Section 2.2.6.1.2
Purpose and Need	U.S. Environmental Protection Agency	Section 1.8.8
	Defenders of Wildlife	Section 1.8.8
	Center for Biological Diversity	Section 1.7.2.13
Air Quality	U.S. Environmental Protection Agency	Executive Summary Section 4.4.4.3 Appendix D
	Center for Biological Diversity	Section 4.1.4.1 to 4.1.4.6 Appendix I
Biological Resources	U.S. Fish and Wildlife Service	Section 2.2.3.2.1 to 2.2.3.2.5 Section 2.2.6 Section 2.2.6.2.1 to 2.2.6.2.2 Section 3.7 and 3.8
	Defenders of Wildlife	Section 2.2.3.2.1 to 2.2.3.2.5 Section 2.2.6 Section 2.2.6.2.1 to 2.2.6.2.2 Section 3.7 and 3.8

Table 5-1. Comments on the Draft EIS/Draft CDCA Plan Amendment

Issue/Topic	Commenter	BLM Response
Biological Resources (CONTINUED)	Briggs Law	Section 4.8.4
	Center for Biological Diversity	Section 2.2.3.2.1 to 2.2.3.2.5 Section 2.2.6 Section 2.2.6.2.1 to 2.2.6.2.2 Section 3.7 and 3.8
	Brightsource Energy	Section 2.2.3.2.1 to 2.2.3.2.5 Section 2.2.6 Section 2.2.6.2.1 to 2.2.6.2.2 Section 3.7 and 3.8
	U.S. Environmental Protection Agency	Section 2.1.2 Section 2.1.4 Section 2.1.5 Section 2.1.6 Section 2.2.3.1 Section 2.2.3.2.2 Section 2.2.3.2.3 Section 2.2.3.2.4 Section 2.2.6.2.1 Section 2.2.6.2.2 Section 2.2.6.2.3 Section 4.20
Climate Change	Defenders of Wildlife	Section 4.1.4.1 to 4.1.4.6
	Center for Biological Diversity	Section 4.1.4.1 to 4.1.4.6
Cultural Resources	Ft. Yuma Quechan Tribe	Section 5.2
	U.S. Environmental Protection Agency	Section 1.6.12 Section 2.2.3.2 Section 5.2
	Briggs Law	Section 5.2
	Defenders of Wildlife	Section 5.2
	Native American Heritage Commission	Section 5.2
Paleontology	CA Department of Parks and Rec	Section 3.1.3.2
Cumulative Impacts	U.S. Environmental Protection Agency	Section 4.19
	Center for Biological Diversity	Section 4.19
	Wilderness Society	Section 4.19
Environmental Justice	U.S. Environmental Protection Agency	Section 4.17.4.1 to 4.17.4.6
Hazards and Public Health and Safety	U.S. Marine Corps	Section 4.13.4.3
	Department of Toxic Substances Control	Section 4.13.4.1 to 4.13.4.6
	U.S. Environmental Protection Agency	Section 4.13.4.1 to 4.13.4.6
	Coachella Valley Water District	Section 4.13.4.1 to 4.13.4.6
	Public	Section 4.3.3.1

Table 5-1. Comments on the Draft EIS/Draft CDCA Plan Amendment

Issue/Topic	Commenter	BLM Response
Hydrology, Water Quality and Water Resources	U.S. Environmental Protection Agency	Executive Summary Section 2.1.2 Appendix I Section 3.5.3 Section 4.5.4 Section 4.5.4.3 Section 4.5.4.6 Section 4.5.19
	Imperial Irrigation District	Executive Summary Section 2.1.2
	Center for Biological Diversity	Appendix I Section 4.5.4.6 Section 4.8.4 Section 4.8.4.3 Section 4.8.4.6
	Brightsource Energy	Appendix I Section 4.5.4.6 Section 4.8.4 Section 4.8.4.3 Section 4.8.4.6
	Public	Appendix I
	Department of Conservation	Appendix I
	U.S. Army Corps of Engineers	Appendix I
Lands and Realty	U.S. Marine Corps	Section 3.12.3 to 3.12.5
	Coachella Valley Water District	Section 3.12.3 to 3.12.5
	California State Lands Commission	Section 3.12.3 to 3.12.5
	CA Department of Parks and Rec	Section 3.12.3 to 3.12.5
Recreation	U.S. Marine Corps	Section 3.15.3.1
	Public	Section 4.15.4.3 to 4.15.4.6
Socioeconomics and Economics	U.S. Environmental Protection Agency	Section 3.17.3.2
Soils and Geology	U.S. Environmental Protection Agency	Section 2.1.4 Section 2.1.5 Section 2.1.6
	Center for Biological Diversity	Section 3.4.3.1 to 3.4.3.2
	Public	Section 4.3.4.3 to 4.3.4.6
Transportation and Circulation	Caltrans	Appendix I
	CA Department of Parks and Rec	Appendix I
	U.S. Marine Corps	Section 4.18.4.1 to 4.18.4.6
Waste	Department of Toxic Substances Control	Section 4.13.4.1 to 4.13.4.6

Project Alternatives

Four comments were received regarding project alternatives. These included recommendations that the EIS: (1) describe how each alternative was developed, how each alternative addresses each project objective, and how each alternative will be implemented; (2) describe the rationale used to determine whether impacts of an alternative are significant; (3) provide a discussion of alternative sites, capacities, and generating technologies relevant to the development of geothermal, solar, and wind resources; (4) describe the benefits and disadvantages associated with each of the proposed technologies; and (5) establish a wide range of alternatives, including consideration of an environmentally preferred alternative.

Project Description

Four comments were received regarding the project description. These included recommendations that the EIS: (1) identify the premium geothermal, solar, and wind resource areas in the West Chocolate Mountains Renewable Energy Area (West Chocolate Area); (2) describe and summarize the key studies and information used to identify these areas; (3) describe the actions that BLM would take if the reasonably foreseeable development (RFD) scenario underestimates the geothermal capacity within a specific area; and (4) describe the reasonably foreseeable future land use and associated impacts that would result from the additional power supply, including an estimate of the amount of growth, the likely location, and the biological and environmental resources at risk.

Purpose and Need

Three comments were received regarding the purpose of and need for the project. These comments included suggestions that the Draft EIS discuss the proposed project in the context of the larger energy market the project would serve, identify potential purchasers of the power produced, and discuss how the project would help the state meet its renewable portfolio standards and goals.

Aesthetics/Visual Resources

One comment was received regarding the loss of unspoiled scenic vistas in the desert due to development of large-scale renewable energy projects.

Air Quality

Several comments were received pertaining to air quality and emissions, reduction of criteria air pollutants and hazardous air pollutants (air toxics), existing air quality conditions and regulations, quantification of emissions, specification of emission sources, an equipment emissions mitigation plan, a fugitive dust control plan, general conformity to an approved implementation plan, cumulative impacts to air quality, the new source review (NSR) construction permit program, and the NSR program permit process. The Desert Protective Council (DPC) provided comments related to dust generation and air quality impacts from a variety of natural and human activities.

Biological Resources

Several comments regarding biological resources were received. The Wildlife Research Institute provided comments related to golden eagles and new permit regulations for golden eagles.

The U.S. Environmental Protection Agency (EPA) provided comments related to biological resources and habitat; construction, operation, and maintenance impacts on habitat; protection of high-value habitat and creation or preservation of linkages; species/habitat impacts due to shade from solar collectors, habitat loss and fragmentation, fences around the project site(s), and shade impacts to avian species; regulations; and invasive species management.

The Center for Biological Diversity provided comments related to invasive/exotic species, sensitive/rare species habitat, the need for biological surveys, habitat impacts and mitigation, desert tortoises, flat-tailed horned lizards, burrowing owls, and wildlife movement.

The DPC provided comments related to comprehensive review of habitat/corridors and flat-tailed horned lizards.

Defenders of Wildlife provided comments related to Salton Sea riparian habitat restoration, the Wister Unit of the Imperial Wildlife Area, appropriate use of lands acquired for conservation, and compatibility of wind energy with bat and avian species.

Comments regarding special status species included requests to configure the boundary of the West Chocolate Area around habitat for desert tortoise, flat-tailed horned lizard, and burrowing owl.

Climate Change

Comments were received regarding climate change effects on desert ecosystems. Commenters recommended that the EIS discuss: (1) whether the trenching, grading, and filling associated with the construction of renewable energy projects would affect the desert's ability to store carbon, and, if so, to what degree; (2) how climate change could influence the proposed project, specifically within sensitive areas; and (3) how the projected impacts could be exacerbated by climate change. Comments also included concerns about energy development's effect on greenhouse gas (GHG) emissions and geothermal energy projects' impacts to air quality.

Cultural Resources

Cultural resources comments were received during the scoping period. There were four comments from the Agua Caliente Indian Tribe regarding cultural sites and evaluation of resources, and four comments from the EPA regarding tribal consultation and regulatory requirements for evaluation of cultural and historic resources. One comment was from a member of the public who inquired about the resources that may be found in the West Chocolate Area.

Cumulative Impacts

Several comments regarding cumulative impacts were received. They suggested that the EIS include: (1) disclosure of any power sales agreements in the vicinity of an identified renewable energy development area; (2) assessment of the effect that all proposed projects in the area would have on "at-risk resources" and desert habitat in general; (3) consideration of the cumulative impacts associated with multiple large-scale solar projects proposed in the desert and the potential impacts on various resources, endangered species, and habitat; (4) identification of whether the proposed project is located within one of the solar energy study areas, as defined by the BLM and the U.S. Department of Energy (DOE); (5) description of the reasonably foreseeable future land use and associated impacts that would result from the additional power supply; (6) discussion of the anticipated climate change benefits from renewable energy; and (7) quantification of GHG emissions from different types of generating facilities including solar, geothermal, natural gas, coal-burning, and nuclear, as well as a comparison of these values.

Energy and Minerals

One comment was received regarding the impacts to minerals within the project area.

Environmental Justice

Two comments were received regarding environmental justice. Those comments: (1) recommended that the EIS include an evaluation of environmental justice populations within the geographic scope of the project; and (2) suggested that assessment of the project's impact on minority and low-income populations should reflect coordination with those affected populations; and (3) asked that those populations be allowed a meaningful opportunity to participate in the decision-making process.

Growth Inducement

One comment was received regarding the generation of additional electricity from renewable energy could indirectly result in population growth in the area.

Hazards and Public Health and Safety

Several comments were received during the scoping period regarding hazards and public health and safety.

Navy Special Warfare provided comments about compatibility of renewable energy projects with operations on and around the Chocolate Mountain Aerial Gunnery Range (CMAGR) including: (1) potential displacement of protected natural resources onto military lands due to development of nearby public lands; (2) growth caused by public lands development leading to an increase in noise and traffic load onto nearby communities; (3) range transients crossing military property and related security and safety concerns; (4) encroachment onto military lands by recreationalists due to adjacent public development; (5) fire safety issues; (6) ground and airborne radar interference from moving wind turbine blades causing flight safety concerns; (7) lighting impacts to pilots using night vision goggles; and (8) heights of renewable energy structures and the transmission lines that connect these sources to the grid posing potential aviation obstacles to Marine Corps low-level aircraft entering and exiting the range airspace and those transiting the area via military training routes and special use airspace.

Several comments recommended that the EIS identify/evaluate health and safety issues such as: (1) measures to ensure that off-highway vehicle (OHV) users and other users are not injured due to hazards associated with exposed collectors, piping, and transmission lines; (2) potential hazards and impacts to humans and wildlife, especially birds; (3) potential direct, indirect, and cumulative impacts of hazardous waste from construction and operation of the proposed project; (4) projected hazardous waste types and volumes, and expected storage, disposal, and management plans; (5) hazards from inactive Formerly Used Defense Sites (FUDS) located on the federal lands earmarked for geothermal, solar, or wind development; (6) fire and prevention of Homeland Security issues; (7) adequate law enforcement personnel; and (8) access to emergency services and hospitals. A comment also requested that agencies responsible for spill prevention, planning, and cleanup be identified.

Hydrology, Water Quality, and Water Resources

Comments regarding water resources included a request that the EIS: (1) provide information on Clean Water Act (CAA) Section 303(d) impaired waters in the West Chocolate Area, if any, and efforts to develop and revise Total Maximum Daily Loads (TMDLs); (2) quantify the expected surface water and groundwater required to construct, operate, and maintain the project; (3) analyze potential impacts to the aquatic resources, associated terrestrial resources, and wildlife species and plants (e.g., avoidance of microphyll woodland areas in Mammoth Wash); and (4) identify measures that would be taken during construction and operations and maintenance to avoid, minimize, and mitigate impacts to listed and at-risk species that are dependent on surface water and groundwater resources.

Commenters also expressed concerns about the project's impact on available water supplies in the area, the quantity of water that would be required for various project uses, and the quantity of water used by the project compared with water needed for different solar technologies (i.e., whether water usage could be minimized by using alternative technologies).

Lands and Realty

Several comments were received regarding compatibility of renewable energy and surrounding land uses. The comments included recommendations that the EIS: (1) discuss how renewable energy fits in with public use of land; (2) contain references and descriptions of land use plans and resource management plans associated with areas that have been identified as premium geothermal, solar, or wind resource areas; (3) discuss how the proposed action would support or conflict with the objectives of federal, state, tribal, and local land use plans, policies, and controls in the selected areas; (4) describe the procedures necessary to amend or revise these plans, as necessary, to allow for solar, geothermal, or wind resource development; (5) provide direction on how to balance competing demands for uses; (6) discuss whether any of this land is classified as disturbed, and describe to what extent the land could be used for other purposes; (7) identify how this process relates to and is complementary to the Geothermal Programmatic EIS (PEIS), Wind PEIS, and Solar PEIS and associated SESAs, as well as to the Northern and Eastern Colorado Plan, the Imperial Sand Dunes Management Plan, and other planning efforts in the general area, including the Imperial Irrigation District (IID) Habitat Conservation Plan/Natural Community Conservation Plan; (8) identify how this process fits in with the Desert Renewable Energy Conservation Plan and transmission planning processes; (9) describe impacts from construction and/or expansion of transmission infrastructure in relation to renewable energy

development; and (10) discuss casinos nearby on any tribal land and explain effects of transmission or extraction (geothermal).

One comment recommended that the EIS evaluate the acquisition history of the Catellus lands that were acquired for conservation purposes and suggested these lands should be protected from surface-disturbing activities. Another comment indicated that all the public lands north and east of the Coachella Canal are relatively undisturbed, and suggested that the Coachella Canal be used as the boundary of the evaluation area.

Noise

One comment suggested studies for noise be conducted in the immediate area and for noise carried through mountainous areas and canyons.

Recreation

Several comments were received regarding recreation. Recommendations were that the EIS include a discussion or evaluation of: (1) management of OHV recreation; (2) emissions from OHVs, as well as any mitigation measures to minimize these emissions; (3) disclosure of the impacts to recreational users on the lands identified for renewable energy development; (4) discussion of loss of access to public lands from proposed developments and impacts to recreation, hiking, camping, birding, hunting, rock-hounding, and so forth.

Socioeconomics and Economics

Comments regarding socioeconomics and economics included questions about: (1) how renewable energy would increase the commerce or economic development in the region; (2) the costs and benefits; (3) costs to cover mitigation and/or operation, and maintenance; and (4) how the project would be funded.

Soils and Geology

Two comments were received regarding soils and geology. There was a recommendation that the EIS evaluate the potential for seismic risk and explain how this risk would be evaluated and monitored. Another comment suggested a complete analysis of impacts to the soil from each possible proposed energy development project.

Waste

Three comments were received regarding public health and safety. They suggested that the EIS address the full product life cycle of the project by sourcing photovoltaic (PV) equipment from a company that: (1) minimizes environmental impacts during raw material extraction; (2) manufacturers future project components in a zero waste facility; and (3) provides future component disassembly for material recovery for reuse and recycling. Another comment indicated that the EIS should describe the concentrated dewatered solid waste associated with the evaporation pond(s) and describe whether this waste product would be transported off site for disposal.

5.1.5 Public Comment Period

A 90-day public comment period for the Proposed Action was held from June 30 to September 30, 2011.

5.1.6 Comment Meeting

The BLM held one public comment meeting near the project location, at the Fairfield Inn & Suites, 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 were at the meeting. An open house was held for 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 environmental consulting firm preparing the EIS on behalf of the BLM, Ecology and Environment, Inc. (E & E), explained its role as the third-party consultant, described the project, and discussed the findings in the Draft EIS.

The meeting concluded with a question and answer session. In addition to the chance to ask questions, participants were also given the opportunity to provide written comments or to take a comment form to fill out and mail in at a later date. All meeting materials also contained a project-specific email address to facilitate collection of electronic comments.

The BLM received 26 comment letters on the Draft EIS/Draft Proposed 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. Additionally, Table 1-2 in Chapter 1 lists the commenter, the topic of their comment, and the location of the BLM's response to those comments in the text of the Draft EIS/Draft Proposed CDCA Plan Amendment.

5.1.7 Environmental Impact Statement Mailing List

An EIS mailing list of interested persons was initially assembled from agencies, organizations, and other persons who expressed interest in being added to the mailing list during and after scoping. The mailing list for the Proposed Action was revised to add those persons who provided comments in response to scoping, who requested to be on the mailing list, or who signed a scoping meeting attendance list. Respondents who provided more than one comment letter were listed only once in the mailing list.

5.2 Consultation and Coordination

5.2.1 Federal, State, and Local Agencies

The following federal, state, and local agencies were consulted during preparation of the EIS:

- Department of the Navy;
- U.S. Marine Corps;
- U.S. Bureau of Reclamation;

- California State Lands Commission;
- California Department of Parks and Recreation, Colorado Desert District;
- California State Historic Preservation Office;
- Imperial Irrigation District; and
- Imperial County Planning and Development Services Department.

The following federal agencies provided comments during the scoping period:

- U.S. Environmental Protection Agency;
- U.S. Marine Corps MCI-West; and
- Department of the Navy.

5.2.2 Government-to-Government Consultation Summary

The Federal Government works on a government-to-government basis with Native American tribes. The government-to-government relationship was formally recognized on November 6, 2000, with Executive Order (EO) 13175 (FR Volume 65, page 67249). As a matter of practice, the BLM coordinates with all tribal governments, associated Native American communities and Native American organizations, and tribal individuals whose interests might be directly and substantially affected by activities on public lands. In addition, Section 106 of the National Historic Preservation Act (NHPA) requires federal agencies to consult with tribes that may be affected by any undertaking on tribal lands and for historic properties of significance to the tribes that may be affected by an undertaking (36 CFR Part 800.2 (c)(2)) on BLM-managed public lands. BLM Manual 8120 (BLM 2004a) and BLM Handbook H-8120-1 (BLM 2004b) provide guidance for Native American consultations. The BLM has given substantial consideration to the proper conduct of government-to-government consultations in order to provide for multiple opportunities for tribal consultation.

EO 13175 stipulates that tribes identified as “directly and substantially affected” be consulted by federal agencies during the NEPA process. The BLM sent letters to 17 tribes, chapters, and bands (Table 5-2) and followed up with additional letters, phone calls, emails, and meetings for tribes whose traditional use areas are closest to the West Chocolate Mountains REEA, to determine levels of interest in further discussions regarding the EIS. The BLM El Centro Field Office sent a letter to 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.

Table 5-2 Tribes Consulted for the West Chocolate REEA EIS

Agua Caliente Band of Cahuilla Indians	Fort Yuma Quechan Tribe
Augustine Band of Cahuilla Indians	La Posta Band of Kumeyaay Indians
Cabazon Band of Mission Indians	Los Coyotes Band of Cahuilla and Cupeno
Campo Kumeyaay Nation	Manzanita Band of Kumeyaay Indians
Cocopah Indian Tribe	Santa Rosa Band of Cahuilla Indians
Chemehuevi Reservation	Santa Ysabel Band of Diegueno Indians
Colorado River Indian Tribes	Torres-Martinez Desert Cahuilla Indians
Ewiiaapaayp Band of Kumeyaay Indians	Twenty-nine Palms Band of Mission Indians

As of September 2010, three tribes had responded by letter, e-mail, or telephone, or had met with local BLM personnel. Written responses were received from one tribe or tribal organization either directly in response to the BLM letters or through the NEPA scoping process for the EIS. Two tribes (Fort Yuma Quechan and Los Coyotes Band of Cahuilla and Cupeno Indians) requested further information on the EIS.

Government-to-government consultation is ongoing. The BLM continues to consult with interested tribes and will continue to keep all tribal entities informed about the NEPA process. In addition, the BLM will continue to invite tribes to consult on a government-to-government basis for renewable energy development projects on BLM-administered lands.

5.2.3 Non-Governmental Organizations

The following non-governmental organizations provided comments during the public scoping period:

- Center for Biological Diversity;
- Defenders of Wildlife;
- Desert Protective Council;
- Wildlife Research Institute;
- The Wildlands Conservancy; and
- Sierra Club.

5.3 Administrative Remedies

The BLM and the EPA's Office of Federal Activities will publish separate Notices of Availability (NOAs), in the *Federal Register*, for the Final EIS/Proposed CDCA Plan Amendment when the document is ready to be released to the public. The EPA's notice will initiate a 30-day protest period on the Proposed Plan Amendment to the Director of the BLM in accordance with 43 CFR 1610.5-2.

Following resolution of any protests, the BLM may publish an Approved Plan Amendment and a ROD. Publication and release of the ROD would serve as public notice of BLM's decision on the geothermal lease application, which is appealable in accordance with 43 CFR Part 4.

6 List of Preparers

The following individuals participated in the preparation and review of the Environmental Impact Statement (EIS):

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7 References

1 Introduction

Bureau of Land Management (BLM). 2008. Final Programmatic Environmental Impact Statement for Geothermal Leasing in the Western United States. October 2008.

_____. 2005. Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-Administered Lands in the Western United States, June 2005. FES 05-11. June 2005. Available online: http://windeis.anl.gov/.

_____. 2002. Environmental Assessment for Leasing of Geothermal Resources Managed by the Bureau of Land Management Carson City Field Office. July 2002.

_____. 1980. California Desert Conservation Area (CDCA) Plan, as Amended. U.S. Department of the Interior Bureau of Land Management Desert District, Riverside, California.

California Public Utilities Commission (CPUC). 2010. State of California Public Utilities Commission, San Diego Gas & Electric Company's Sunrise Powerlink Project. Available online: http://www.cpuc.ca.gov/environment/info/aspen/sunrise/sunrise.htm

County of Imperial. 2006. County of Imperial General Plan, Geothermal/Alternative Energy and Transmission Element. Approved October 17, 2006.

Imperial County Air Pollution Control District (ICAPCD). 2009. Imperial County State Implementation Plan for Particulate Matter Less than 10 Microns in Aerodynamic Diameter. Draft Final. July 10, 2009.

Imperial Valley Study Group (IVSG). 2005. Development Plan for the Phased Expansion of Transmission to Access Renewable Resources in the Imperial Valley. Report of the Imperial Valley Study Group. Presented to the California Energy Commission. September 30, 2005.

State of California. 2009. Renewables Portfolio Standard Program Overview. Available online: http://www.cpuc.ca.gov/PUC/energy/Renewables/overview.htm.

U.S. Department of Energy (DOE). 2012. Final Solar Energy Development Programmatic Environmental Impact Statement for Solar Energy Development in Six Southwestern States. FES 12-24, DOE/EIS-0403. July 2012. Available online: http://solareis.anl.gov/documents/fpeis/index.cfm.

_____. 2011. Supplement to the Draft Programmatic Environmental Impact Statement for Solar Energy Development in Six Southwestern States. DES 11-49, DOE/EIS-0403D-S. October 2011. Available online: http://solareis.anl.gov/documents/supp/index.cfm.

_____. 2010. Draft Programmatic Environmental Impact Statement for Solar Energy Development in Six Southwestern States. DES 10-59, DOE/EIS-0403. December 2010. Available online: http://solareis.anl.gov/documents/dpeis/index.cfm.

U.S. Department of Energy (DOE) and Bureau of Land Management (BLM). 2008. Programmatic Environmental Impact Statement, Designation of Energy Corridors on Federal Land in the 11 Western States. DOE/EIS-0386. November 2008. Available online: http://corridoreis.anl.gov/eis/guide/index.cfm.

U.S. Fish and Wildlife Service (USFWS). 2011. Withdrawal of Proposed Rule to List the Flat-Tailed Horned Lizard as Threatened. Federal Register Vol. 76, No. 50. March 15, 2011.

_____. 2010. Bald Eagle Management Guidelines and Conservation Measures. Updated March 31, 2010. Available online: http://www.fws.gov/midwest/eagle/guidelines/bgepa.html.

_____. 2003. Flat-tailed Horned Lizard Rangewide Management Strategy 2003 Revision. An Arizona-California Conservation Strategy. Flat-tailed Horned Lizard Interagency Coordinating Committee May 2003.

2 Alternatives

Bureau of Land Management (BLM). 2010. Solar Energy Development Draft Programmatic Environmental Impact Statement. December 2010.

_____. 2002. BLM Instructional Memorandum 2002-174 Oil and Gas Leasing Stipulations.

CalEnergy. 2003. CalEnergy's Affiliate Testimony to the Notice of Intent Hearing to the CEC at the Notice of Intent on Unit 6.

Haase, S. 2010. Personal communication (email) between Scott Haase, National Renewable Energy Laboratory (NREL), and David McIntyre, Ecology and Environment, Inc., regarding solar modeling data. September and October 2010.

Olson, T. 2008. Southwestern Willow Flycatcher Breeding Habitat Evaluation at the Salton Sea. September 2008.

3 Affected Environment

3.1 Air Quality

Bureau of Land Management (BLM). 2008. Land Use Planning Handbook.

California Air Resource Board (CARB). 2010. Ambient Air Quality Standards (State and Federal). Available online: http://webcache.googleusercontent.com/search?q=cache:http://www.arb.ca.gov/research/aaqs/aaqs2.pdf. Accessed February 2, 2010.

_____. 2009. Greenhouse Gas Inventory Data; year 2000-2006. Available online: http://webcache.googleusercontent.com/search?q=cache:http://www.arb.ca.gov/cc/inventory/data/tables/ghg_inventory_scopingplan_2009-03-13.pdf. Accessed December 16, 2009.

_____. 2007. Regulation for the Mandatory Reporting of Greenhouse Gas Emissions. Available online: http://webcache.googleusercontent.com/search?q=cache:http://www.arb.ca.gov/regact/2007/ghg2007/frofinoal.pdf. Accessed May 21, 2010.

California Energy Commission (CEC). 2006. Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2004. Staff Final Report CEC-600-2006-013-SF. December 2006.

County of Riverside. 2008. County of Riverside General Plan Chapter 9: Air Quality Element. As amended in December 2008.

ENVIRON International Corporation. 2009. 2009 Imperial County State Implementation Plan for Particulate Matter Less Than 10 Microns in Aerodynamic Diameter. Draft Final. Available online: http://www.imperialcounty.net/AirPollution/Attainment%20Plans/CURRENT%20SIP%20CHAPTERS/PM10/Final%20Draft%202009%20PM10%20SIP%20PUBLIC%20HEARING.pdf. Accessed December 16, 2009.

International Panel on Climate Change (IPCC). 2007. Climate Change 2007: The Physical Science Basis, Summary for Policy Makers, Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. February 2007.

San Diego Gas and Electric (SDG&E). 2006. Sunrise Powerlink Project. Chapter 4 Environmental Setting Air Quality. Available online: http://www.sdge.com/sunrisepowerlink/info/PEA/Chapter_4/4_11_air_quality.pdf Accessed December 16, 2009.

Soucier, M. 2010. Personal communication. APC Division Manager, Imperial County Air Pollution Control District (ICAPCD). February 2, 2010.

South Coast Air Quality Management District (SCAQMD). 2003. 2003 Coachella Valley PM_{10} State Implementation Plan (CVSIP). August 2003.

Union of Concerned Scientists. 2006. Electricity: The Energy Gap. Available online: http://www.climatechoices.org/impacts_electricity/index.html. Accessed December 15, 2009.

U.S. Environmental Protection Agency (EPA). 2010. National Ambient Air Quality Standards (NAAQS). http://www.epa.gov/air/criteria.html. Accessed May 20, 2010.

_____. 2011. Air Actions in Imperial County, California. http://www.epa.gov/region9/air/imperial/. Accessed March 28, 2011.

Western Regional Climate Center (WRCC). 2007. Brawley 2 SW, California (041048), Period of Record Monthly Climate Survey: 5/6/1910 through 9/30/2007. Available online: http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca1048 Accessed December 15, 2009.

3.2. Noise

Baker, S. 2008. Noise and Vibration. October 2009. 23 pp.

Bureau of Land Management (BLM). 2003. Final Environmental Impact Statement for the Imperial Sand Dunes Recreation Area Management Plan and Proposed Amendment to the California Desert Conservation Plan 1980. May 2003.

_____. 2002. Environmental Assessment and Draft Plan Amendment, Western Colorado Desert Routes of Travel Designation. U.S. Department of the Interior Bureau of Land Management California Desert District, El Centro, California. October 2002.

_____. 1980. California Desert Conservation Area (CDCA) Plan, as Amended. U.S. Department of the Interior Bureau of Land Management Desert District, Riverside, California.

California Department of Health Services, Office of Noise Control. 1976. Guidelines for Preparation and Content of Noise Elements in General Plans.

County of Imperial. 1993. County of Imperial General Plan, Noise Element. Prepared by Planning/Building Department.

Earthworks. 2010. Noise Resources: Types of Noise. In Brüel and Kjær, 2000, Environmental Noise Handbook.

Federal Transit Administration. 2006. Transit Noise and Vibration Impact Assessment. May 2006.

Global Security. 2009. Yuma Training Range Complex. Available online: http://www.globalsecurity.org/military/facility/yuma-trc.htm. Accessed February 3, 2010.

Meeks, D. 2009. Personal Communication with Dallas Meeks, Outdoor Recreation Planner, BLM El Centro Field Office. December 29, 2009.

National Parks Service (NPS). 2009. Explore Natural Sounds- Effects of Noise. Available online: http://www.nature.nps.gov/naturalsounds/impacts/. Accessed February 3, 2010.

Scharf, L. and J. Scharf. 1999. Sound Testing: Decibel Levels for Stock & Modified Mufflers. Dirt Wheels. December 1999.

U.S. Environmental Protection Agency (EPA). 1974. Protective Noise Levels Condensed Version of EPA Levels Document source: Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.

3.3 Topography, Geology, and Geologic Hazards

Alles, D.L. 2007. Geology of the Salton Trough. Western Washington University.

Babcock, E.A. 1974. Geology of the Northeast Margin of the Salton Trough, Salton Sea, California. Geological Society of America Bulletin. Volume 85, March 1974, Number 3, p. 321-332.

Baldwin, J., M. Payne, and L. Lewis. 1997. Field Trip along the San Andreas Fault, from Whitewater to Bombay Beach, Salton Trough, California. In Baldwin, J., Lewis, L., Payne, M., and G. Roquemore, editors, Field Trip Guidebook No. 25 published by South Coast Geological Society, Santa Ana.

Barker, C.E. 1995. Salton Trough Province (016). In Gautier, D.L., Dolton, G.L., Takahashi, K.I., and Varnes, K.L., editors, 1995 National assessment of United States oil and gas resources--results, methodology and supporting data: U.S. Geological Survey Digital Data Series DDS-30, Release 2.

California Department of Water Resources (DWR) and California Department of Fish and Game (CDFG). 2006. Salton Sea Ecosystem Restoration Draft Programmatic Environmental Impact Report. Chapter 16: Paleontologic Resources. October 2006. 14 pp.

Cassiliano, M.L. 2002. Revision of the Stratigraphic Nomenclature of the Plio-Pleistocene Palm Spring Group (New Bank), Anza-Borrego Desert, Southern California. Proceedings of the San Diego Society of Natural History, No. 38, 30 April 2002, pp. 1-30.

California Building Code (CBC). 2007. California Building Code, Title 24, Part 2, Chapter 16 - Structural Design, Section 1613 – Earthquake Loads.

California Department of Conservation (CDC). 2006. Probabilistic Seismic Hazards Mapping. Available online: http://www.consrv.ca.gov/cgs/rghm/pshamap/pshamap.asp.

County of Imperial. 2003. Imperial County General Plan. Seismic and Public Safety Element.

_____. 1996. County of Imperial General Plan, Seismic and Public Safety Element.

Crull, S., A.M. Hoover and H.M. Wagner. 2008. An Archaeological and Paleontological Mitigation Monitoring Report for Tract 31714, the Coachella 150 Project, City of Coachella, Riverside County, California. Prepared on KHovanian/Forecast Homes Prepared by L & L Environmental, Inc., Corona, California.

Dibblee, T.W. 2008. Geologic Map of the Durmid 15 Minute Quadrangle, Riverside and Imperial Counties, California. Dibblee Geology Center Map #DF-376, edited by John A. Minch. San Barbara Museum of Natural History.

_____. 1984. Stratigraphy and Tectonic of the San Felipe Hills, Borrego Badlands, Superstition Hills and Vicinity. In Rigsby, C.A., editor, The Imperial Basin – Tectonics, Sedimentation, and Thermal Aspects. Published by the Pacific Section, Society of Economic Paleontologists and Mineralogists, Los Angeles, California.

_____. 1954. Geology of the Imperial Valley Region, California: California Division of Mines Bulletin 170, Chapter II, Part 2, pp. 21-28, Plate 2.

Dorsey, R. 2006. Stratigraphy, Tectonics, and Basin Evolution in the Anza-Borrego Desert Region. In Jefferson, G.T. and L. Lindsay, editors, Fossil Treasures of the Anza-Borrego Desert. Sunbelt Publications, San Diego. pp. 89-106.

Eiders, W.A. 1979a. Historical Preface: Man and the nature on the Colorado Delta. In Eiders, W.A., editor, Geology and Geothermics of the Salton Trough prepared for the Geological Society of America 92nd Annual Meeting, San Diego, California. University of California, Riverside Campus Museum Contribution. November 1979. Number 5: v-viii.

_____. 1979b. The Geological Background of the Geothermal Fields of the Salton Trough. In Eiders, W.A., editor, Geology and Geothermics of the Salton Trough prepared for the Geological Society of America 92nd Annual Meeting, San Diego, California. University of California, Riverside Campus Museum Contribution. November 1979. Number 5: 1-19.

Gastil, R.G., D.L. Kimbrough, and P.L. Abbott. 1996. In Abbott, P.L. and D.C. Seymour, editors, Sturzstroms and Detachment Faults, Anza-Borrego Desert State Park, California. South Coast Geological Society, Santa Ana, California.

Jefferson, G.T. 2010. Chocolate Mountains Bureau of Land Management Geothermal Leases: Paleontologic Resources Record Search and Estimate of Formation Sensitivity. Unpublished manuscript, Stout Research Center, Anza-Borrego Desert State Park, pp. 1-4. on file at the Sanberg Group, Inc., Whittier.

_____. 1991a. A catalogue of late Quaternary vertebrates from California: Part one, nonmarine lower vertebrate and avian taxa. Natural History Museum of Los Angeles County. Technical Report Number 7: 1-129.

_____. 1991b. A catalogue of late Quaternary vertebrates from California: Part two, Mammals. Natural History Museum of Los Angeles County. Technical Report Number 7: 1-129.

_____. 1989. Late Pleistocene and earliest Holocene fossil localities and vertebrate taxa from the western Mojave Desert. In Reynolds, J., editor, The west-central Mojave Desert. Quaternary studies between Kramer and Afton Canyon. Redlands, San Bernardino County Museum Association, Special Publication. pp. 27-40.

Jennings, C.W. 1967. Geologic Map of California, Salton Sea Sheet. California Division of Mines and Geology, 1:250000.

Jenning, S. and G.R. Thompson. 1986. Diagenesis of Plio-Pleistocene sediments of the Colorado River Delta, southern California. Journal of Sedimentary Petrology 56(1): 89-98.

Kirby, S.M., S.U. Janecke, R.J. Dorsey, B.A. Housen, V.E. Langenheim, K.A. McDougall, and A.N. Steely. 2007. Pleistocene Brawley and Ocotillo Formations: Evidence for strike-slip deformation along San Felipe and San Jacinto Fault Zones, Southern California. Journal of Geology, Volume 115, pp. 43-62.

Lawrence Livermore. 2008. Groundwater Availability within the Salton Sea Basin

Li, C.L., C.F. You, T.L. Ku, X.M. Xu, H.P. Buchheim, N.J. Wau, R.M. Wang, and M.L. Shen. 2007. Isotope and geochemical evidence of palaeoclimate changes in the Salton Basin, California during the past 20 yrk: 2 ^{87}SR/^{86} ratio in lake tufa as an indicator of connection between the Colorado River and Salton Basin. In Lake Systems L Sedimentary archives climate change and tectonics, EGU General Assembly. Palaeography, Palaeoclimatology, Palaeoecology. March 24, 2008. Volume 259(2-3): 198-212.

Maloney, N.J. 1986. Coastal Landforms of Holocene Lake Cahuilla, Northerneast, Salton Basin, California. In Guptil P.D., R.W. Ruff, and E.M. Gath, editors, Geology of the Imperial Valley, California. Annual Field Trip Guidebook No. 14, South Coast Geological Society. pp. 151-158.

Norris, R.M. and R.W. Webb. 1990. Geology of California. Second Edition. New York. John Wiley and Sons.

Proctor, R.J. 1968. Geology of the Desert Hot Springs-Upper Coachella Valley Area, California. California Division of Mines and Geology. Special Report 94.

Quinn, H.M. 2000. Petroglyphs in tufa along the western shoreline of Holocene Lake Cahuilla. Abstract for the Coachella Valley Archaeological Society Symposium, May 2000 at the Palm Springs Desert Museum.

Reynolds, R.E. 1989. Paleontologic monitoring and salvage, Imperial Irrigation District Transmission Line, Riverside and Imperial County, California: Final Report. Prepared by the San Bernardino County Museum, Redland for Mission Power Engineering Company, Irvine, California. 258 pp.

San Diego State University (SDSU). No date. Ancient Lake Cahuilla, Excerpted from Geology of the Imperial Valley, A Monograph by Eugene Singer.

Southern California Earthquake Data Center (SCEDC). 2010. Fault Map – Southern Region and Historic Earthquakes in Southern California.

Sykes, G. 1937. The Colorado River Delta. American Geographical Society Special Publication, No. 19. American Geographical Society. New York, New York.

U.S. Environmental Protection Agency (EPA). 2007. California Regional Water Quality Control Board Colorado River Basin Region Order No. R7-2006-0007 Waste Discharge Requirements for County of Imperial, Owner/Operator Salton City Class III Municipal Solid Waste Management Facility, Southwest of Salton City– Imperial County.

U.S. Geological Survey (USGS). 2008. Earthquakes Hazards Program/Quaternary Fault and Fold Database.

_____. 2004. Surficial Geology GIS Data. Downloaded from USGS website March 9, 2010.

U.S. Geological Survey (USGS) Salton Seismic-Imaging Project (SSIP). 2010. A Survey to Evaluate Earthquake Hazards and Structure of the Earth's Crust in Imperial and Coachella Valleys. May 4, 2010.

Van de Kamp, P.C. 2006. Holocene continental sedimentation in the Salton Basin, California: A reconnaissance. Geological Society of America Bulletin, 84(3):827-848, abstract.

Wagner, H.M. 2007. Final Report on Coachella 150, unpublished manuscript on file at L & L Environmental, Inc., Corona, California.

Waters, M.R. 1983. Late Holocene lacustrine chronology and archaeology of ancient Lake Cahuilla, California. Quaternary Research, Volume 19: 373-387.

_____. 1980. Lake Cahuilla: Late Quaternary lacustrine history of the Salton Trough, California. Master of Science Thesis, Department of Geosciences, University of Arizona College of Earth Sciences, Department of Geosciences, Research Reports. 1979-1980.

Whistler, D.P., E.B. Lander, and M.A. Roeder. 1995. Diverse Record of Microfossils and Fossil Plants, Invertebrates, and Small Vertebrates from the Late Holocene Lake Cahuilla Beds, Riverside County, California. In Remeika, P. and A. Sturz. Paleontology and Geology of the Western Salton Trough Detachment, Anza-Borrego Desert State Park, California. Field Trip Guidebook and Volume for the 1995 San Diego Association of Geologists Field Trip to Anza Borrego Desert State Park. Volume 1: 109-118.

Winker, C.D. and S.M. Kidwell. 1986. Paleocurrent evidence for lateral displacement of the Pliocene Colorado River Delta by the San Andreas fault system, southeastern California. Geology. 14(9): 788-791.

Worster, D. 1985. Rivers of empire: Water, aridity, and the growth of the American West.

3.4 Soils

California Farm Bureau Federation. 2009. Imperial County Farm Bureau Website. Accessed March 8, 2010.

County of Imperial. 2007. Imperial County Flood Management Program. February 2007. Available online: http://www.co.imperial.ca.us/emergencyplans/floodmitigationplan.pdf.

_____. 1996. County of Imperial General Plan, Conservation and Open Space Element.

Farmland Mapping and Monitoring Program (FMMP). 2009. GIS Metadata. Accessed March 25, 2010.

Natural Resources Conservation Service (NRCS). 2008. Soil Unit Descriptions. Soil Survey Area: Imperial County, California, Imperial Valley Area. Survey Area Data: Version 5, July 25, 2008.

Soil Science Society of America. 2010. Glossary of Soil Science Terms. Accessed January 12, 2010.

State of California. 2008. California Codes, Public Resources Code, Section 600-615. Accessed January 13, 2010.

_____. 2007a. Williamson Act Program. Accessed March 8, 2010.

_____. 2007b. FMMP Program Background. Accessed March 8, 2010.

STATSGO 1994. State Soil Geographic GIS data set.

U.S. Department of Agriculture (USDA). 2009. Overview of the Soil and Water Resources Conservation Act. Accessed January 12, 2010.

3.5 Water Resources

Alles, D.L. 2007. Geology of the Salton Trough. Western Washington University.

Alward, R. and R. Shatz. 2009. Imperial Irrigation District (IID) Appendix B: Desalination/Groundwater Development Feasibility Study, Integrated Water Resources Management Plan, Volume 1. Draft IID Plan. September 2009.

Bureau of Land Management (BLM). 2002. Environmental Assessment and Draft Plan Amendment, Western Colorado Desert Routes of Travel Designation. U.S. Department of the Interior Bureau of Land Management California Desert District, El Centro, California. October 2002.

_____. 1980. California Desert Conservation Area (CDCA) Plan, as Amended. U.S. Department of the Interior Bureau of Land Management Desert District, Riverside, California.

California Department of Water Resources (DWR) 2003. California's Groundwater. Bulletin No. 118: East Salton Sea Groundwater Basin.

_____. 1975. California's Groundwater. Bulletin No. 118. 135 pp.

_____. 1954. Ground Water Occurrence and Quality, Colorado River Basin Region. Water Quality Investigations Report No. 4. 59 pp.

California Environmental Protection Agency (CalEPA). 2011. California Environmental Protection Agency Regional Water Quality Control Board, Colorado River Basin Region, Salton Sea Transboundary Watershed.

_____. 2000. California Environmental Protection Agency Regional Water Quality Control Board, Colorado River Basin Region, Staff Report: Water Quality Issues in the Salton Sea Transboundary Watershed. September 2000.

California State Parks. 2010. Salton Sea State Recreation Area. Available online: www.parks.ca.gov/default.asp?page_id=639. Accessed February 12, 2010.

Colorado River Basin Salinity Control Forum. 1999. Colorado River Basin Salinity Control Forum.

Federal Emergency Management Agency (FEMA). 2010. Mapping Information Platform. Available online: https://hazards.fema.gov/femaportal/wps/portal/NFHLWMSkmzdownload. Accessed March 25, 2010.

Imperial Irrigation District (IID). 2010. Water Department. Available online: www.iid.com/Water. Accessed February 12, 2010.

_____. 2009. Integrated Water Resources Management Plan, Volume 1. Draft IID Plan. September 2009.

_____. 2008. 2007 Water Conservation Plan. El Centro, California.

Jennings, C.W. 1967. Geologic Map of California: Salton Sea Sheet. Olaf P. Jenkins Edition. California Department of Conservation, Division of Mines and Geology. Scale 1: 250,000.

Lawrence Livermore National Laboratory. 2008. Groundwater Availability within the Salton Sea Basin.

Newmark, R.L., P.W. Kasameyer, and L.W. Younker. 1988. Preliminary report on shallow research drilling in the Salton Sea Region.

Salton Sea Authority. 2010. About the Sea. Available online: www.saltonsea.ca.gov/thesea.htm. Accessed February 12, 2010.

State of California. 2010. Geothermal Well Location Database. Department of Conservation, Division of Oil, Gas and Geothermal Resources. Available online: http://www.conservation.ca.gov/dog/geothermal/maps/Pages/index.aspx. Accessed February 1, 2011.

State of California Regional Water Quality Control Board (RWQCB). 2004. Colorado River Basin Region, Watershed Management Initiative, Strategic Planning Chapter. October 2004.

U.S. Department of Interior (DOI). 2007. Record of Decision: Colorado River Interim Guidelines for Lower Basin Shortages and the Coordinated Operations for Lake Powell and Lake Mead. Washington, DC. December 2007.

U.S. Fish and Wildlife Service (USFWS). 2010. GIS data for Classification of Wetlands and Deepwater Habitats of the United States. U.S. Department of the Interior, Fish and Wildlife Service, Washington, DC. FWS/OBS-79/31. October 1, 2010. Available online: http://www.fws.gov/wetlands/Data/DataDownload.html. Accessed February 2, 2011.

U.S. Geological Service (USGS). 1999. National Hydrography Database GIS Data. Available online: http://nhd.usgs.gov/data.html. Accessed February 1, 2011.

3.6 Vegetation

Beier, P. and S. Loe. 1992. A checklist for evaluating impacts to wildlife movement corridors. Wildlife Society Bulletin 20: 434-440.

Bureau of Land Management (BLM). 2009. Weeds Website. Available online: http://www.blm.gov/wo/st/en/prog/more/weeds.html.

_____. 2008. Herd Areas and Herd Management Areas. Available online: http://www.blm.gov/ca/st/en/prog/wild_horse_and_burro/hma-main.html. Accessed February 14, 2011.

_____. 2006. Wild Horse and Burro Herd Area Statistics – FY 2006. Available online: http://www.wildhorseandburro.blm.gov/statistics/2006/California.pdf. Accessed February 14, 2011.

_____. 1980. California Desert Conservation Area (CDCA) Plan, as Amended. U.S. Department of the Interior Bureau of Land Management Desert District, Riverside, California.

California Department of Fish and Game (CDFG). 1988. A Guide to Wildlife Habitats of California. K.E. Mayer and W.F. Laudenslayer, Jr., editors. 166 pp. Available online: http://www.dfg.ca.gov/biogeodata/cwhr/wildlife_habitats.asp.

California Invasive Plant Council (CIPC). 2006. Invasive Plants. Available online: http://www.cal-ipc.org/.

Neibergs, Alex. 2012. Personal communication (email) between A. Neibergs, BLM Wild Horse and Burro Specialist, Ridgecrest Field Office, and David McIntyre, Ecology and Environment, Inc. regarding burros in the West Chocolate Mountains REEA. January 12, 2012.

Sawyer, J.O., and T. Keeler-Wolf. 2009. A Manual of California Vegetation. Second edition. California Native Plant Society. Sacramento, California.

South Coast Wildlands. n.d. South Coast Linkages at a Glance, Protecting Southern California's Natural Heritage for Future Generations. Available online: http://www.scwildlands.org/pressroom/presskit/5.%20Linkages%20At%20a%20Glance.pdf.

Tetra Tech. 1999. A Study on Seepage and Subsurface Inflows to the Salton Sea and Adjacent Wetlands.

United States Forest Service (USFS). 1998. Ecological Subregions of California Section and Subsection Descriptions, Colorado Desert Region. Available online: http://www.fs.fed.us/r5/projects/ecoregions/322c.htm.

Western Regional Climate Center (WRCC). 2010. Brawley 2 SW. Available online: www.wrcc.dri.edu/cgi-bin/cliRECtM.pl?ca1048. Accessed February 12, 2010.

3.7 Fish and Wildlife

Bureau of Land Management (BLM). 2003. Environmental Assessment, Plan Amendment, Finding of No Significant Impact, and Decision Record for the Adoption of the Flat-tailed Horned Lizard Rangewide Management Strategy, 2003 Revision, An Arizona-California Conservation Strategy. EA Number: CA-67-EA05-01. U.S. Department of the Interior Bureau of Land Management Desert District, El Centro California Field Office.

_____. 2002. Proposed Northern and Eastern Colorado Desert Coordinated Management Plan and Final Environmental Impact Statement. July 2002.

California Department of Fish and Game (CDFG). 2010. Life History Accounts and Range Maps - California Wildlife Habitat Relationships System. Available online: http://www.dfg.ca.gov/biogeodata/cwhr/cawildlife.aspx. Accessed May 15, 2010.

CaliforniaHerps.com. 2010. Couch's spadefoot. Available online: http://www.californiaherps.com/frogs/pages/s.couchii.html. Accessed Feb 23, 2010.

Moyle, P.B. 2002. Inland Fishes of California. University of California Press, Berkeley, California. 502 pp.

Moyle, P.B. and J.J. Cech, Jr. 2004. Fishes: An Introduction to Ichthyology. Prentice Hall, Upper Saddle River, New Jersey. 726 pp.

National Audubon Society. 2012. Important Bird Areas in the U.S. Available at http://iba.audubon.org/iba/prioritySiteIndex.do?priority=Global.

Salton Sea Authority. 2010. Environmental Issues Around the Sea.

U.S. Fish and Wildlife Service (USFWS). 2010. Request for Comments on the Application for Site Certification for the Proposed Summit Ridge Wind Project, Wasco County, Oregon. September 20, 2010.

United States Forest Service (USFS). 1998. Ecological Subregions of California Section and Subsection Descriptions, Colorado Desert Region. Available online: http://www.fs.fed.us/r5/projects/ecoregions/322c.htm.

3.8 Special Status Species

AECOM. 2012. Burrowing Owl 2012 Survey Data Summary (Memorandum), from Michael Anguiano, Wildlife Biologist, AECOM, to Bruce Wilcox, Imperial Irrigation District. May 7, 2012.

Bureau of Land Management (BLM). 2011. Peirson´s Milkvetch. Available online: http://www.blm.gov/ca/st/en/fo/elcentro/pmilkvetch.html. Accessed February 9, 2011.

_____. 2010. Special Status Plants. Available online: http://www.blm.gov/ca/st/en/prog/ssp.html. Updated December 21, 2010.

_____. 2003. Environmental Assessment, Plan Amendment, Finding of No Significant Impact, and Decision Record for the Adoption of the Flat-tailed Horned Lizard Rangewide Management Strategy, 2003 Revision, An Arizona-California Conservation Strategy. EA Number: CA-67-EA05-01. U.S. Department of the Interior Bureau of Land Management Desert District, El Centro California Field Office.

_____. 2002. Proposed Northern and Eastern Colorado Desert Coordinated Management Plan and Final Environmental Impact Statement. July 2002.

California Department of Fish and Game (CDFG). 2010. California Wildlife Habitat Relationships (CWHR) Life History Accounts and Range Maps. Available online: http://www.dfg.ca.gov/biogeodata/cwhr/cawildlife.aspx. Accessed February 12, 2010.

_____. 2008. Survey Results for the Emergency Helicopter Sheet Survey in the West Chocolate Mountains, Section 2507, Aerial Gunnery Range of Imperial County (Memorandum), from Gerald P. Mulcahy, Associate Wildlife Biologist, Inland Desert Region (6). May 26, 2008.

CaliforniaHerps.com. 2010. A Guide to Reptiles and Amphibians of California. Available online: http://www.californiaherps.com/. Accessed February 12, 2010.

California Native Plant Society (CNPS). 2011. Inventory of Rare and Endangered Plants (online edition, v7-11jan). California Native Plant Society. Sacramento, California. Available online: http://www.cnps.org/inventory.

_____. 2010. Inventory of Rare and Endangered Plants. Edition v7-10a 1-19-10. Available online: http://cnps.site.aplus.net/cgi-bin/inv/inventory.cgi. Accessed February 12, 2010.

California Natural Diversity Database (CNDDB). 2011. Rare Find 4. Available online: http://www.cnps.org/cnps/rareplants/treasurehunt/maps.php. Accessed January 27, 2011.

_____. 2010. Home page. Available online: http://www.dfg.ca.gov/biogeodata/cnddb/. Accessed February 15, 2010.

Native Plant Conservation Program (NPCP) and Oregon Department of Agriculture. 2007. Status Evaluation of Astragalus tricarinatus (triple-ribbed milkvetch). October 18, 2007.

Reiser, C.H. 1994a. Rare Plants of San Diego County: San Diego Button Celery (Eryngium aristulatum Jeps. ssp. parishii [Coult. & Rose] Math. & Const.). Aquafir Press, Imperial Beach, California. Available online: http://sandiego.sierraclub.org/rareplants/093.html. Accessed February 9, 2011.

Reiser, C.H. 1994b. Rare Plants of San Diego County: Mexican Flannelbush (Fremontodendron mexicanum A Davids.). Aquafir Press, Imperial Beach, California. Available online: http://sandiego.sierraclub.org/rareplants/101.html. Accessed February 9, 2011.

Sutton, R. 1999. The Desert Pupfish of the Salton Sea: A Synthesis. Prepared for the Salton Sea Authority, La Quinta, California by the Bureau of Land Reclamation, Denver, Colorado.

United States Fish and Wildlife Service (USFWS). 2012. Southwestern Willow Flycatcher (*Empidonax traillii extimus*). Last update September 28, 2012. Available online: http://www.fws.gov/nevada/protected_species/birds/species/swwf.html. Accessed October 17, 2012.

_____. 2010. Endangered Species Program. Available online: http://www.fws.gov/endangered/wildlife.html. Accessed February 24, 2010.

_____. 1998. Vernal Pools of Southern California Recovery Plan. September 3, 1998.

_____. 1991. Endangered and threatened wildlife and plants: The razorback sucker,(Xyrauchen texanus). Determined to be an endangered species. Federal Register 56(205):54957-54967.

3.9 Cultural Resources

Bathke, J.P. 2012. Letter received by BLM as comment on the Draft EIS. Letter dated March 12, 2012.

Bureau of Land Management (BLM). 2004. 8110 - Identifying and Evaluating Cultural Resources. Bureau of Land Management.

_____. 2002. Environmental Assessment and Draft Plan Amendment, Western Colorado Desert Routes of Travel Designation. U.S. Department of the Interior Bureau of Land Management California Desert District, El Centro, California. October 2002.

Cleland, J.H. 2004. Ethnographic Trail Systems as Large-Scale Cultural Landscapes: Preservation and Management Issues. In Exploring the Boundaries of Historic Landscape Preservation, Proceeding of the Twenty-Ninth Annual Meeting of the Alliance for Historic Landscape Preservation. Clemson University Digital Press.

Laylander, D. 2010. A Class I Cultural Resources Inventory for the West Chocolate Mountains Geothermal Leasing Project, Imperial County, California. ASM Affiliates, Inc.

_____. 1997. The Last Days of Lake Cahuilla: The Elmore Site. Pacific Coast Archaeological Society Quarterly 33(1-2):1-138.

Parker, Patricia L., and T. F. King. 1998. National Register Bulletin: Guidelines for Evaluating and Documenting Traditional Cultural Properties. U.S.. Department of the Interior National Park Service, National Register, History and Education, National Register of Historic Places.

Russell, J.C., C.M. Woods, and J. Underwood. 2002. An Assessment of the Imperial Sand Dunes as a Native American Cultural Landscape. Prepared for BLM, El Centro. Prepared by EDAW, Inc., San Diego.

Shaefer, J. 1994. The Challenge of Archaeological Research in the Colorado Desert: Recent Approaches and Discoveries. Journal of California and Great Basin Anthropology 16:60-80.

3.10 Paleontology

Babcock, E.A. 1974. Geology of the Northeast Margin of the Salton Trough, Salton Sea, California. Geological Society of America Bulletin. March 1974. 85(3): 321-332.

Baldwin, J., M. Payne and L. Lewis. 1997. Southern San Andreas Fault, Whitewater to Bombay Beach, Salton Trough, California. In Baldwin, J., L. Lewis, M. Payne, and G. Roquemore, editors, Field Trip Guidebook No. 25. South Coast Geological Society, Santa Ana, California.

Bureau of Land Management (BLM). 2007. Potential Fossil Yield Classification (PFYC). Instruction Memorandum 2008-009.

California Geological Survey (CGS). 2002. California Geomorphic Provinces. Note 36. Revised December 2002.

Dibblee, Jr., T.W. 1954. Geology of the Imperial Valley Region, California. California Division of Mines Bulletin 170, Chapter II, Part 2. Plate 2. pp. 21-28.

Force, C., 1991. Late Pleistocene-early Holocene woodrat (*Neotoma sp*.) dental remains from Kokoweef Cave, San Bernardino County, California. In Reynolds, J., editor, Crossing the borders: Quaternary studies in eastern California and southwestern Nevada. Redlands, San Bernardino County Museum Special Publication Mojave Desert Quaternary Research Center. pp. 104-106.

Gensler, P., M.A. Roeder, and G.T. Jefferson. 2006. The Fossil Lower Vertebrates: Fish, Amphibians, and Reptiles. In Jefferson, G.T. and L. Lindsay, editors, Fossil Treasures of the Anza-Borrego Desert. Sunbelt Publications, San Diego, California. pp. 139-150.

Goodwin, H.T. and R.E. Reynolds. 1989. Late Quaternary Sciuridae from Low Elevations in the Mojave Desert, California. The Southwestern Naturalist 34(4): 506-512.

Jefferson, G.T. 2010a. Chocolate Mountains Bureau of Land Management Geothermal Leases: Paleontologic Resources Record Search and Estimate of Formation Sensitivity. Unpublished manuscript, Stout Research Center, Anza-Borrego Desert State Park. pp. 1-4.

_____. 2010b. Personal communication (telephone) between G.T. Jefferson, Paleontologist, Anza Borrego Desert State Park, and Mark A. Roeder, Senior Paleontologist, The Sanberg Group, Inc. January 2010.

_____. 1995. Salton Sea SRA, Paleontological Resources Inventory and Management Recommendations. Unpublished manuscript, Stourt Research Center, Anza-Borrego Desert State Park. pp. 1-6.

_____. 1991a. A catalogue of late Quaternary vertebrates from California: Part one, nonmarine lower vertebrate and avian taxa. Natural History Museum of Los Angeles County. Technical Report Number 7: 1-129.

_____. 1991b. A catalogue of late Quaternary vertebrates from California: Part two, Mammals. Natural History Museum of Los Angeles County. Technical Report Number 7: 1-129.

_____. 1989. Late Pleistocene and earliest Holocene fossil localities and vertebrate taxa from the western Mojave Desert. In Reynolds, J., editor, The west-central Mojave Desert. Quaternary studies between Kramer and Afton Canyon. Redlands, San Bernardino County Museum Association, Special Publication. pp. 27-40.

Jennings, C.W. 1967. Geologic Map of California, Salton Sea Sheet. California Division of Mines and Geology, 1:250000.

Kirby, S.M., S.U. Janecke, R.J. Dorsey, B.A. Housen, V.E. Langenheim, K.A. McDougall, and A.N. Steely. 2007. Pleistocene Brawley and Ocotillo Formations: Evidence for strike-slip deformation along San Felipe and San Jacinto Fault Zones, southern California. Journal of Geology, Volume 115: 43-62.

Maloney, N.J. 1986. Coastal Landforms of Holocene Lake Cahuilla, Northerneast, Salton Basin, California. In Guptil P.D., R.W. Ruff, and E.M. Gath, editors, Geology of the Imperial Valley, California. Annual Field Trip Guidebook No. 14, South Coast Geological Society. pp. 151-158.

Mead, J.I. and L.K. Murray. 1991. Late Pleistocene vertebrates from the Potosi Mountain packrat midden, Spring Range, Nevada. In Reynolds, J., editor, Crossing the borders: Quaternary studies in eastern California and southwestern Nevada. Redlands, San Bernardino County Museum Special Publication Mojave Desert Quaternary Research Center. pp. 124-126.

Norris, R.M. and R.W. Webb. 1990. Geology of California. Second Edition. New York. John Wiley and Sons.

Randall, K. 2010. Records and Literature Search, San Diego Natural History Museum. Letter report on file at Sanberg Group, Inc.

Remeika, P. 2006. Ancestral Woodlands of the Colorado River Delta Plain. In Jefferson, G.T. and L. Lindsay, editors, Fossil Treasures of the Anza-Borrego Desert. Sunbelt Publications, San Diego, California. pp. 75-88.

Reynolds, R.E. 1989. Paleontologic monitoring and salvage, Imperial Irrigation District Transmission Line, Riverside and Imperial County, California: Final Report. Prepared by the San Bernardino County Museum, Redland for Mission Power Engineering Company, Irvine, California. 258 pp.

Reynolds, R.E. and R.L. Reynolds. 1991. The Pleistocene beneath our feet: near-surface Pleistocene fossils in inland southern California basins. In Woodburne, M.O., S.F.B. Reynolds, and D.P. Whistler, editors, Inland Southern California: the last 70 million years. Redlands, San Bernardino County Museum. Special Publication 38(3&4): 41-43.

Reynolds, R.E., R.L. Reynolds, and C.J. Bell. 1991. The Devil Peak Sloth. In Reynolds, J., editor, Crossing the borders: Quaternary studies in eastern California and southwestern Nevada. Redlands, San Bernardino County Museum Special Publication Mojave Desert Quaternary Research Center. pp. 115-116.

Salton Sea. 2006. Ecosystem Restoration Draft PEIR. 2006. Chapter 16, Paleontological Resources. pp. 1-16.

Waters, M.R. 1983. Late Holocene lacustrine chronology and archaeology of ancient Lake Cahuilla, California. Quaternary Research, Volume 19: 373-387.

_____. 1980. Lake Cahuilla: Late Quaternary lacustrine history of the Salton Trough, California. Master of Science Thesis, Department of Geosciences, University of Arizona College of Earth Sciences, Department of Geosciences, Research Reports. 1979-1980.

Whistler, D.P. 1991. Quien Sabe Cave, middle to late Holocene fauna from Ivanpah Mountains, San Bernardino County, California. In Reynolds, J., editor, Crossing the borders: Quaternary studies in eastern California and southwestern Nevada. Redlands, San Bernardino County Museum Special Publication Mojave Desert Quaternary Research Center. pp. 107-109.

3.11 Visual Resources

Bureau of Land Management (BLM). 1986. Manual 8400. Visual Resource Management.

_____. 1980. California Desert Conservation Area (CDCA) Plan, as Amended. U.S. Department of the Interior Bureau of Land Management Desert District, Riverside, California.

California Department of Transportation (Caltrans). 2010. California Scenic Highway Mapping System: Imperial County. Available online: http://www.dot.ca.gov/hq/LandArch/scenic_highways/index.htm. Accessed March 21, 2011.

Otak, Inc. 2010. Visual Resource Inventory. El Centro Field Office. September 2010.

3.12 Lands and Realty

Bureau of Land Management (BLM). 2010. Imperial Sand Dunes Draft Recreation Area Management Plan and Draft Environmental Impact Statement Volume I of II. El Centro Field Office. March 2010.

_____. 2009a. Rights-of-Way. Available online: http://www.blm.gov/wo/st/en/prog/energy/cost_recovery_regulations.html. Accessed January 4, 2010.

_____. 2009b. BLM Geocommunicator Map Page. Updated November 20, 2009. Available online: http://www.geocommunicator.gov/blmMap/Map.jsp?MAP=Energy. Accessed December 23, 2009.

_____. 2008a. Final Programmatic Environmental Impact Statement for Geothermal Leasing in the Western United States. October 2008.

_____. 2008b. West Wide Energy Corridor (WWEC). Appendix K: Section 368 Energy Corridor Revisions. Final West-Wide Energy Corridor PEIS. November 2008.

_____. 2008c. Federal Land Transaction Facilitation Act. Available online: http://www.blm.gov/ca/st/en/prog/lands/fltfa.html. Accessed December 21, 2009.

_____. 2005. Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-Administered Lands in the Western United States, Chapters 3 and 4. FES 05-11. June 2005. Available online: http://nepa.energy.gov/nepa_documents/otheragency/fes0511/index.html. Accessed January 19, 2011.

_____. 1980a. California Desert Conservation Area (CDCA) Plan, as Amended. U.S. Department of the Interior Bureau of Land Management Desert District, Riverside, California.

_____. 1980b. Final Environmental Impact Statement and Proposed Plan Appendix-Volume G. September 1980.

California Department of Fish and Game (CDFG). 2009. Renewable Energy in California: Implementing the Governors Renewable Energy Executive Order - Conservation Planning and the Desert Renewable Energy Conservation Plan.

California State Lands Commission (CSLC). 2010. Personal Communication with Jim Porter, Public Land Management Specialist. February 9, 2010.

_____. 2008. Special Staff Report Potential Hazards on State School Lands. January 2008.

County of Imperial. 2003. Land Use Element of the Imperial County General Plan.

Federal Aviation Administration (FAA). 2012. Los Angeles Sectional Aeronautical Chart (map). 91st Edition. Effective June 28, 2012 through December 13, 2012.

Imperial Irrigation District (IID). 2006. Planning Agreement by and Among Imperial Irrigation District, the California Department of Fish and Game, and the United States Fish and Wildlife Service regarding the Imperial Valley Natural Community Conservation Plan and Habitat Conservation Plan.

U.S. Department of Energy (DOE) and Bureau of Land Management (BLM). 2008. Summary of Public Scoping Comments Received during the Scoping Period for the Solar Energy Development Programmatic Environmental Impact Statement.

3.13 Human Health and Safety/Hazardous Materials

County of Imperial. 2007. Imperial County Multi-Jurisdictional Hazard Mitigation Plan. January 2007.

_____. 1993a. Imperial County Seismic and Public Safety Element. May 1993.

_____. 1993b. Final Program EIR for the County of Imperial General Plan. October 1993.

County of Imperial Office of Emergency Services. 2007. Imperial County Operational Area Emergency Operations Plan. July 2007. Available online: http://www.co.imperial.ca.us/EmergncyPlans/EmergencyPlanOperationsRevJuly2007.pdf. Accessed March 30, 2010.

Naval Air Station System Modernization (NASMOD). 2008. Aviation Basing Study for the Introduction of the Joint Strike Fighter. Table 2-13: Breakdown of Airspace Usage by Umbrella.

Salvation Mountain. 2004. Leonard Knight - The Man, the Mountain, the Art. Available online: http://www.salvationmountain.us. Accessed April 11, 2010.

State Water Resources Control Board (SWRCB). 2009. Geotracker. Available online: http://www.geotracker.waterboards.ca.gov/. Accessed February 5, 2010.

U.S. Environmental Protection Agency (EPA). 2010. Title 40: Protection of Environment Part 261—Identification and Listing of Hazardous Waste, Subpart C—Characteristics of Hazardous Waste. Available online: http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr;sid=4990e762d7b81851bef18f82dc851826;rgn=div5;view=text;node=40%3A25.0.1.1.2;idno=40;cc=ecfr#40:25.0.1.1.2.3. Accessed December 8, 2010.

3.14 Energy and Minerals

Bureau of Land Management (BLM). 2010a. Minerals Web Page. Available online: http://www.blm.gov/id/st/en/prog/lands_and_realty/minerals.html. Accessed May 13, 2010.

_____. 2010b. BLM Geocommunicator Home Page. Available online: http://www.geocommunicator.gov/GeoComm/index.shtm. Accessed March 25, 2010.

_____. 2009. BLM Geocommunicator Map Page. Available online: http://www.geocommunicator.gov/blmMap/Map.jsp?MAP=Energy. Data last published November 20, 2009. Accessed December 23, 2009.

California Energy Commission (CEC). 2002. California Hydro-Electricity Outlook for 2002.

County of Imperial. 2006. County of Imperial General Plan, Geothermal/Alternate Energy and Transmission Element. Approved October 17, 2006.

Erukanure, E. 2009. Personal communication with Efe Erukanure, Geologist, BLM El Centro Field Office. December 29, 2009.

Steward, D. 2010. Personal communication with Daniel Steward, Resources Branch Chief, BLM El Centro Field Office. March 25, 2010.

U.S. Bureau of Reclamation (BOR). 2005. Bureau of Reclamation Hydroelectric Powerplants Operated by Others.

3.15 Recreation

Bureau of Land Management (BLM). 2010. Imperial Sand Dunes Home Page. Available online: http://www.blm.gov/ca/st/en/fo/elcentro/recreation/ohvs/isdra.html. Accessed May 14, 2010.

_____. 2002. Environmental Assessment and Draft Plan Amendment, Western Colorado Desert Routes of Travel Designation. U.S. Department of the Interior Bureau of Land Management California Desert District, El Centro, California. October 2002.

_____. 1980. California Desert Conservation Area (CDCA) Plan, as Amended. U.S. Department of the Interior Bureau of Land Management Desert District, Riverside, California.

County of Imperial. 2008. County of Imperial General Plan, Parks and Recreation Element. Prepared by Planning and Development Services Department, County of Imperial. Approved January 29, 2008.

3.16 Special Management Areas

Bureau of Land Management (BLM). 2009. Omnibus Public Land Management Act of 2009.

_____. 2008. Draft 2008 Education Strategy Project. Off Highway Motor Vehicle Recreation Grants. Palm Springs South Coast Field Office

_____. 2002. Environmental Assessment and Draft Plan Amendment, Western Colorado Desert Routes of Travel Designation. U.S. Department of the Interior Bureau of Land Management California Desert District, El Centro, California. October 2002.

_____. 1980. California Desert Conservation Area (CDCA) Plan, as Amended. U.S. Department of the Interior Bureau of Land Management Desert District, Riverside, California.

_____. No date. North Algodones Dunes Wilderness.

State of California. 2009. Project Description for Grants and Cooperative Agreements Program - 2008/2009. Bureau of Land Management (BLM) Palm Springs South Coast Field Office. Application Restoration, Dos Palmas Fence. June 2, 2009.

3.17 Social and Economic Conditions

AP.org. 2011. Associated Press Interactive: AP Economic Stress Index. Available online: http://hosted.ap.org/specials/interactives/_national/stress_index/. Accessed February 11, 2011.

Begley, D. 2008. State numbers show Riverside County's growth slows. The Press-Enterprise. December 17, 2008.

Berkman, L. 2008a. Inland home foreclosures remain at record pace. The Press-Enterprise. April 23, 2008.

_____. 2008b. Inland foreclosures not letting up. The Press-Enterprise. March 13, 2008.

Bowker, J., D. English, and H. Cordell. 1999. Projections of outdoor recreation participation to 2050. In Outdoor Recreation in American Life: A National Assessment of Demand and Supply Trends. H. Cordell, editor. Sagamore Publishing, Champaign, Illinois.

Bureau of Land Management (BLM). 2010. History of the Imperial Sand Dunes. Available online: http://www.blm.gov/ca/st/en/fo/elcentro/recreation/ohvs/isdra/dunesinfo/history.html. Accessed January 10, 2010.

_____. 2008. Final Programmatic Environmental Impact Statement for Geothermal Leasing in the Western United States. Volume I: Programmatic Analysis. October 2008.

_____. 2007. Truckhaven Geothermal Leasing Area Draft Environmental Impact Statement. El Centro Field Office. February 2007.

California Department of Finance (DOF). 2009a. E-4 Population Estimates for Cities, Counties and the State, 2001-2009, with 2000 Benchmark. Available online: http://www.dof.ca.gov/research/demographic/reports/estimates/e-4_2001-07/documents/E-4_2009%20Internet%20Version.xls. Accessed January 10, 2010.

_____. 2009b. E-5 City/County Population and Housing Estimates, Revised 2001-2009 with 2000 Benchmark. Available online: http://www.dof.ca.gov/research/demographic/reports/estimates/e-5_2001-06/documents/E-5_2008%20Internet%20Version.xls. Accessed January 10, 2010.

_____. 2007. Population Projections for California and its Counties 2000-2050. Available online: http://www.dof.ca.gov/research/demographic/reports/projections/p-1/documents/P-1%20Report%20Tables.xls. Accessed January 10, 2010.

California Department of Parks and Recreation. 2009. California State Parks Quick Facts: California State Parks' Off-Highway Motor Vehicle Recreation Division. January 6, 2009. Available online: http://www.parks.ca.gov/pages/23509/files/OffHighwayVehicle12-7-09.pdf. Accessed January 10, 2010.

California Employment Development Department (EDD). 2010a. Industry Employment and Labor Force – by Annual Average, March 2008 Benchmark. For Imperial, Riverside, and California. Available online: http://www.calmis.ca.gov/file/indhist/ecen$haw.xls; http://www.calmis.ca.gov/file/indhist/rivehaw.xls; http://www.calmis.ca.gov/file/indhist/cal$haw.xls. Accessed January 21, 2010.

_____. 2010b. Occupations with the Most Job Openings, 2006-2016. For Imperial, Riverside, and California. Available online: http://www.calmis.ca.gov/file/occproj/ecen$occmost.xls; http://www.calmis.ca.gov/file/occproj/rive$occmost.xls; http://www.calmis.ca.gov/file/occproj/cal$occmost.xls. Accessed January 10, 2010.

_____. 2010c. Occupational Projections, 2006-2016. For Imperial, Riverside, and California. Available online: http://www.calmis.ca.gov/file/occproj/ecen$occproj.xls; http://www.calmis.ca.gov/file/occproj/rive$occproj.xls; http://www.calmis.ca.gov/file/occproj/cal$occproj.xls. Accessed January 10, 2010.

_____. 2010d. Current Unemployment Rates for California and All Counties and Cities and Sub-County Places. Available online: http://www.calmis.ca.gov/file/lfmonth/countyur-400c.pdf; http://www.calmis.ca.gov/file/lfmonth/allsubs.xls. Accessed January 10, 2010.

_____. 2009. El Central MSA: Imperial County – Industry Employment & Labor Force by Month. Available Online: http://www.calmis.ca.gov/file/indhist/ecen$hws.xls. Accessed December 14, 2010.

California State Parks. 2012. Major Themes Working Paper: Ocotillo Wells SVRA General Plan. San Diego, California. January 2012.

City of Brawley. 2010. City of Brawley. Available online: http://www.cityofbrawley.com/?q=node/1. Accessed June 8, 2010.

City of Calexico. 2007. City of Calexico General Plan.

City of Calipatria. 2010. Community – Calipatria. Available online: http://www.calipatria.com/community/. Accessed June 8, 2010.

City of Coachella. 2010. Official website. Available online: http://www.coachella.org/index.aspx. Accessed June 8, 2010.

_____. 2008. Thriving Newsletter. Spring.

City of El Centro. 2004. City of El Centro General Plan. February 2004.

City of Holtville. 2010. State of the City Address. January 2010.

City of Imperial. 2010. Welcome to the City of Imperial. Available online: http://imperial.ca.gov/section.php?id=1. Accessed June 8, 2010.

City of Indio. 2010. Official website. City of Indio: Mission Statement. Available online: http://www.indio.org/index.aspx?page=68. Accessed June 8, 2010.

City of La Quinta. 2010. City of La Quinta: Welcome. Available online: http://www.la-quinta.org/Index.aspx?page=240. Accessed June 8, 2010.

City of Westmorland. 2010. City of Westmorland – Home. Available online: http://www.cityofwestmorland.net/ Accessed June 8, 2010.

Coachella Valley Association of Governments (CVAG). 2010. CVAG Chronicle. April 2010.

Council on Environmental Quality (CEQ). 1997. Environmental Justice: Guidance Under the National Environmental Policy Act. December 10, 1997.

County of Imperial. 2009. Imperial County 2008 Agricultural Crop and Livestock Report. June 2009. Available online: http://www.co.imperial.ca.us/ag/Crop%20&%20Livestock%20Reports/archives_1907-2009.htm. Accessed March 21, 2011.

_____. 2008. Comprehensive Annual Financial Report (CAFR). County of Imperial: General Purpose Financial Statements for the Fiscal Year End June 30, 2008 Available online: http://www.co.imperial.ca.us/Budget/Defaultnew.htm. Accessed March 22, 2011.

_____. 2006. County of Imperial General Plan, Geothermal/Alternative Energy and Transmission Element. October 2006.

_____. 1993. Final Program EIR for the County of Imperial General Plan, Project Description.

Danelski, D. 2010. Environmentalists want a renewable-energy firm to move its solar project to avoid tortoises. The Press-Enterprise. January 9, 2010. Available online: http://www.pe.com/localnews/environment/stories/PE_News_Local_W_tortoises10.47097cd.html. Accessed January 10, 2010.

Day, N. 2009. What happened to Riverside County? NuWire Investor. May 4, 2009. Available online: http://www.nuwireinvestor.com/articles/what-happened-to-riverside-county-52909.aspx.

Desertdutch.org. 2010. Free Campgrounds in Southern California. Available online: http://www.desertdutch.org/slabcity.htm. Accessed January 10, 2010.

Dowd, M.J. 1956. History of Imperial Irrigation District and Development of Imperial Valley. Imperial, California: Imperial Irrigation District. p. 24.

DuBry, T. 2001. Slab City: Squatters' Paradise? Journal of the Southwest. December 22, 2001.

GlobalSecurity. 2010. Naval Air Facility El Centro. Available online: http://www.globalsecurity.org/military/facility/el-centro.htm. Accessed June 4, 2010.

Hartwigsen, G. and R. Null. 1991. Full-timers: Who are these older people who are living in their RVs? In L.A. Pastalan (editor), Optimizing Housing for the Elderly: Homes not Houses. Hayworth Press, Binghamton, New York. pp. 134-135.

HDR/HLB Decision Economics, Inc. 2007. Imperial Valley – Mexicali Economic Delay Study: Final Report. November 19, 2007. Available online: http://www.co.imperial.ca.us/IVAG/ProjectBriefs/IVAG%20Final%20Report.pdf. Accessed March 22, 2011.

Henderson, T. 1968. Imperial Valley. Neyenesch Printers, Inc. San Diego, California. pp. 49, 85.

Hill, E.G. 2008. Restoring the Salton Sea. Published by the Legislative Analyst's Office. January 2008.

Hoefer, M., N. Rytina, and B.C. Baker. 2010. Estimates of the Unauthorized Immigrant Population Residing in the United States: January 2009. Office of Immigration Statistics, U.S. Department of Homeland Security. January 2010.

ICF International. 2006. Estimating the State Fuel Tax Paid on Gasoline Used in the Off-Highway Operation of Vehicles for Recreation. Survey Results. Prepared for California State Parks. September 2006. Available online: http://www.parks.ca.gov/pages/1140/files/fuel%20tax%20survey%20report.pdf.

Imperial Irrigation District (IID). 2010a. Official website. Available online: http://www.iid.com/About/FrequentlyAskedQuestions. Accessed June 3, 2010.

_____. 2010b. 2010 Integrated Resource Plan. Resource Planning.

_____. 2006. About IID, Mission/Vision Statements, Community Investment Policy, and General History. Available online: http://www.iid.com/About/AboutIID. Accessed June 7, 2010.

Imperial Valley Association of Governments (IVAG). 2010. County of Imperial – IVAG. Available online: http://www.co.imperial.ca.us/IVAG/. Accessed June 8, 2010.

Imperial Valley Economic Development Corporation (IVEDC). 2007. Home and About Us. Available online: http://www.ivedc.com. Accessed June 7, 2010.

Imperial Valley Vegetable Growers Association (IVVGA). 2010. Available online: http://ivvga.info/About_Us.html. Accessed June 7, 2010.

Jones, J. 2009. Desert offers escape from day-to-day life. San Diego Union Tribune. November 26.

Journeyman Pictures. 2002. Slab City – USA. Documentary film. Produced by ABC Australia. Available online: http://www.youtube.com/watch?v=ZRuv1BXEi_w. Accessed January 10, 2010.

Laflin, P. 1998. Coachella Valley California. The Donning Company Publishers, Virginia Beach, Virginia.

LaMonica, M. 2009. As alternative energy grows, NIMBY turns green. CNET News. November 11, 2009. Available online: http://news.cnet.com/8301-11128_3-10392309-54.html. Accessed January 10, 2010.

LeDuff, Charlie. 2004. Parked in the desert, waiting out the winter of life. New York Times. December 14, 2004.

Naval Air Facility El Centro (NAFEC). 2007. Naval Air Facility El Centro Economic Impact. December 2007.

Norris, F. and R.L. Carrico. 1978. A History of Land Use in the California Desert Conservation Area. Prepared for Desert Planning Staff, Bureau of Land Management by WESTEC Services, Inc. p. 57.

Olson, D. 2008. Salvation Mountain near Niland moving many drawn by its 'Into the Wild' cameo. The Press-Enterprise. May 31, 2008.

Pritchard, J. 2004. State's growth continues shift southward, eastward. The Press-Enterprise. April 9, 2004.

Riverside County. 2009a. Riverside County 2008 Agricultural Production Report.

_____. 2009b. County of Riverside, California Comprehensive Annual Financial Report (CAFR) for Fiscal Year Ending June 30, 2009. December 9, 2009. Available online: http://www.auditorcontroller.org/opencms/topics_interest/CAFR.html. Accessed March 30, 2011.

_____. 2003. Riverside County Integrated Project. Vision Statement. Available online: http://www.rctlma.org/genplan/content/gp/chapter02.html. Accessed June 8, 2010.

Sahagun, Louis. 2009. Environmental concerns delay solar projects in California desert. Los Angeles Times. October 18, 2009. Available online: http://www.latimes.com/news/local/la-me-solar19-2009oct19,0,2039806,print.story. Accessed January 10, 2010.

Sierra Club. 2010. Home Page. Available online: http://www.sierraclub.org/energy/. Accessed January 10, 2010.

Sorensen, S. 1988. A Hot Place in the Sun, Slab City. Reader 17(9):10. March 10, 1988.

Southern California Association of Governments (SCAG). 2010. Your Guide to SCAG 2009-2010.

Steffen, D. 2009. Off-road enthusiasts enjoy Thanksgiving outdoors in Imperial County. Imperial Valley Press Online. November 26, 2009.

Summit Blue Consulting. 2008. Renewable Energy Feasibility Study Final Report. Submitted to Imperial Irrigation District. April 2008.

Tempest, R. 2002. Celebrating freedom: Off-roading mecca at crossroads. Los Angeles Times. July 5, 2002.

University of California at Los Angeles (UCLA). 2009. UCLA Anderson Forecast 2009 Economic Outlook. December 9, 2009. Available online: http://www.uclaforecast.com. Accessed January 10, 2010.

U.S. Bureau of Economic Analysis (BEA). 2009. Local Area Personal Income Tables: California. Available online: http://www.bea.gov/regional/reis/default.cfm?selTable=CA1-3&section=2. Accessed December 14, 2009.

U.S. Census Bureau. 2009. American Community Survey 2006-2008. Available online: http://factfinder.census.gov/servlet/DatasetMainPageServlet?_program=DEC&_submenuId=datasets_1&_lang=en. Accessed January 10, 2010.

_____. 2000a. Decennial Census Summary File 1. Available online: http://factfinder.census.gov/servlet/DatasetMainPageServlet?_program=DEC&_submenuId=datasets_1&_lang=en. Accessed January 10, 2010.

_____. 2000b. Decennial Census Summary File 3. Available online: http://factfinder.census.gov/servlet/DatasetMainPageServlet?_program=DEC&_submenuId=datasets_1&_lang=en. Accessed January 10, 2010.

U.S. Department of Agriculture (USDA) National Agricultural Statistics Service. 2011. 2007 Census of Agriculture - County Profile: Imperial County, California Available online: http://www.agcensus.usda.gov/Publications/2007/Full_Report/Census_by_State/California/index.asp. Accessed March 22, 2011.

U.S. Department of Energy (DOE) and Bureau of Land Management (BLM). 2008. Summary of Public Scoping Comments Received during the Scoping Period for the Solar Energy Development Programmatic Environmental Impact Statement. Available online: http://solareis.anl.gov/documents/docs/Scoping_Summary_Report_Solar_PEIS_Final.pdf Accessed January 10, 2010.

Veiga, A. 2005. Inland Empire emerges as national population hub, economic engine of California. Associated Press Archive. May 3, 2005.

3.18 Transportation

Bureau of Land Management (BLM). 2002. Environmental Assessment and Draft Plan Amendment, Western Colorado Desert Routes of Travel Designation. U.S. Department of the Interior Bureau of Land Management California Desert District, El Centro, California. October 2002.

_____. 1980. California Desert Conservation Area (CDCA) Plan, as Amended. U.S. Department of the Interior Bureau of Land Management Desert District, Riverside, California.

California Department of Transportation (Caltrans). 2008. All Traffic Volumes on CSHS. Traffic and Vehicle Data Systems Unit.

County of Imperial. 2010. Department of Public Works. Traffic Data provided by Traffic Engineer Neil Jorgenson on April 26, 2010.

_____. 2003. County of Imperial General Plan, Circulation/Scenic Highways Element. Imperial County Planning and Development Services, El Centro, California.

Pacheco, G. 2010. Personal communication (Memorandum) between George Pacheco, County of Imperial, Right-of-Way Technician, and Julie Stout, Ecology and Environment, Inc., regarding West Chocolate Mountains Area Road Classifications. May 19, 2010.

4 Environmental Consequences

4.1 Air Quality and Climate

Bureau of Land Management (BLM). 2010a. Amargosa Farm Road Solar Project Final EIS, Chapter 4: Environmental Effects. DOI No. FES 10-53. October 2010. Available online: http://www.blm.gov/pgdata/etc/medialib/blm/nv/field_offices/las_vegas_field_office/energy/amargosa_farm_road10.Par.59854.File.dat/Preliminary%20Pages.pdf.

_____. 2010b. Lucerne Valley Solar Project Final EIS, Section 4.1: Air Quality and Climate. July 2010. Available online: http://www.blm.gov/ca/st/en/fo/barstow/chevron_energy_solutions.html.

_____. 2008. Final PEIS for Geothermal Leasing in the Western U.S. October 2008.

_____. 2005. Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-Administered Lands in the Western United States. Volume 1. Chapter 4: Affected Environment. June 2005.

California Energy Commission (CEC). 2010. Staff Assessment for the Blythe Solar Power Project. Appendix AIR-1 – Greenhouse Gas Emissions, June 2010.

Imperial County Air Pollution District (ICAPCD). 2007. CEQA Air Quality Handbook. Guidelines for the Implementation of the California Environmental Quality Act of 1970, as amended. November 2007.

Solano County. 2010. Shilo III Wind Energy Project Draft EIS. Prepared for Solano County Department of Resource Management. June 2010.

South Coast Air Quality Management District (SCAQMD). 2009. Air Quality Significance Thresholds.

4.2 Noise

Bell, L., and H. Bell. 1994. Industrial Noise Control: Fundamentals and Applications. 2nd edition. Marcel Decker, Inc., New York.

Bureau of Land Management (BLM). 2011. Environmental Assessment of Geothermal Lease Nomination, Gunnison County, Colorado. DOI-BLM-CO-S060-2010-0030-EA. March 2011. U.S. Department of the Interior, Bureau of Land Management, Gunnison, Colorado.

_____. 2010a. Amargosa Farm Road Solar Project Final EIS, Chapter 4: Environmental Effects. DOI No. FES 10-53. October 2010. Available online: http://www.blm.gov/pgdata/etc/medialib/blm/nv/field_offices/las_vegas_field_office/energy/amargosa_farm_road10.Par.59854.File.dat/Preliminary%20Pages.pdf.

_____. 2010b. Lucerne Valley Solar Project Final EIS, Section 4.2: Noise. July 2010. Available online: http://www.blm.gov/ca/st/en/fo/barstow/chevron_energy_solutions.html.

_____. 2008. Final PEIS for Geothermal Leasing in the Western U.S. October 2008.

_____. 2007. Truckhaven Geothermal Leasing Final EIS. October 2007.

California Energy Commission (CEC). 2009. Salton Sea Geothermal Unit 6 (SSU6) Power Plant Project, Section 5.8: Noise. Amendment for Application for Certification 02-AFC-02. February 2009.

Daggett Ridge Wind Energy Project. 2009. R/W GRANT CACA – 43088. Amended April 27, 2009.

Federal Highway Administration (FHWA). 2006. FHWA Highway Construction Noise Handbook, Chapter 3: Effects of Construction Noise. August 2006. Available online: http://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/index.cfm.

Federal Transit Administration (FTA). 2006. Transit Noise and Vibration Impact Assessment. May 2006.

General Electric. 1999. Ventilated Dry-Type Transformers (EPO#555). October 20, 1999.

Shasta County Department of Resource Management. 2007. Draft Environmental Impact Report for the Hatchet Ridge Wind Project. December 2007.

Shell Wind Energy. 2010. Noise Assessment. Hermosa West Wind Farm Project. Prepared by ERM. March 2010.

Solar Millennium. 2010. Amargosa – Farm Road Solar Project.

Solano County. 2010. Shilo III Wind Energy Project Draft EIS. Prepared for Solano County Department of Resource Management. June 2010.

U.S. Environmental Protection Agency (EPA). 1971. Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances. NTID300.1. December 31, 1971.

4.3 Topography, Geology and Geologic Hazards

California Department of Conservation (CDC). 2006. Ground Motions for User Selected Site, Probabilistic Seismic Hazards Mapping Ground Motion.

_____. 1974a. California Geological Survey. Special Studies Zones, Harpers Well Quadrangle. July 1974.

_____. 1974b. California Geological Survey. Special Studies Zones, Shell Reef Quadrangle. July 1974.

California Department of Water Resources (DWR). 2003. California's Groundwater. Bulletin No. 118: East Salton Sea Groundwater Basin.

County of Imperial. 2007. Imperial County Flood Management Program. February 2007. Available online: http://www.co.imperial.ca.us/emergencyplans/floodmitigationplan.pdf.

Majer, E.L. 2007. Induced Seismicity and Enhanced Geothermal Systems. Center for Computational Seismology, Ernest Orlando Lawrence Berkeley National Laboratory, Berkeley, California.

Massonnet D., T. Holzer, and H. Vadon. 1997. Land subsidence caused by the East Mesa Geothermal Field, California, observed using SAR interferometry, Geophysical. Research Letters. 24(8): 901-904.

Miller, C.D. 1989. Potential Hazards from Future Volcanic Eruptions in California: USGS Bulletin 1847.

National Park Service (NPS). 2003. Geothermal Energy Development Overview. NPS Western Energy Summit January 21-23, 2003. Available online: www2.nature.nps.gov/grd.

U.S. Department of Energy (DOE). 2010. Draft Programmatic Environmental Impact Statement for Solar Energy Development in Six Southwestern States. Chapter 3: Overview of Solar Energy Power Production Technologies, Development, and Regulation. December 2010. 58 pp.

4.5 Water Resources

Alward, R. and R. Shatz. 2009. Imperial Irrigation District (IID) Appendix B: Desalination/Groundwater Development Feasibility Study, Integrated Water Resources Management Plan, Volume 1. Draft IID Plan. September 2009.

California Department of Water Resources (DWR). 2003. California's Groundwater Bulletin 118: East Salton Sea Groundwater Basin.

Federal Emergency Management Agency (FEMA). 2010. Mapping Information Platform. Available online: https://hazards.fema.gov/femaportal/wps/portal/NFHLWMSkmzdownload. Accessed March 25, 2010.

Imperial Irrigation District (IID). 2009. Draft Integrated Water Resources Management Plan, Volume 1, September 2009.

Oak Ridge National Laboratory. 1979. The Impacts of Deep Geothermal Fluid Production on Shallow Groundwater Systems. Environmental Sciences Division. Oak Ridge, TN. Prepared for the United States Department of Energy.

U.S. Department of Energy (DOE). 2006. Energy Demands on Water Resources: Report to Congress on the Interdependency of Energy and Water. Washington, DC.

U.S. Environmental Protection Agency (EPA). 2004. Restoring and Sustaining the Salton Sea: Supporting Science and Environmental Data Collection and Analysis. March 12, 2004.

4.7 Fish and Wildlife

Bureau of Land Management (BLM). 2008. Final PEIS for Geothermal Leasing in the Western U.S. October 2008.

_____. 2003. Environmental Assessment, Plan Amendment, Finding of No Significant Impact, and Decision Record for the Adoption of the Flat-tailed Horned Lizard Rangewide Management Strategy, 2003 Revision, An Arizona-California Conservation Strategy. EA Number: CA-67-EA05-01. U.S. Department of the Interior Bureau of Land Management Desert District, El Centro California Field Office.

Kunz, T.H., E.B. Arnett, W.P. Erickson, A.R. Hoar, G.D. Johnson, R.P. Larkin, M.D. Strickland, R.W. Thresher, and M.D. Tuttle. 2007. Ecological Impacts of Wind Energy Development on Bats: Questions, Research Needs, and Hypotheses. Frontiers in Ecology and Environment 5(6):315-324.

U.S. Fish and Wildlife Service (USFWS). 2008. Environmental Assessment to Implement a Desert Tortoise Recovery Plan Task: Reduce Common Raven Predation on the Desert Tortoise. March 2008.

4.8 Special Status Species

AECOM. 2012. Burrowing Owl 2012 Survey Data Summary (Memorandum), from Michael Anguiano, Wildlife Biologist, AECOM, to Bruce Wilcox, Imperial Irrigation District. May 7, 2012.

Arnett, E.B., W.K. Brown, W.P. Erickson, J.K. Fiedler, B.L. Hamilton, T.H. Henry, A. Jain, G.D. Johnson, J. Kerns, R.R. Koford, C.P. Nicholson, T.J. O'Connell, M.D. Piorkowski, and R.D. Tankersley, Jr. 2008. Patterns of Bat Fatalities at Wind Energy Facilities in North America. Journal of Wildlife Management 72(1):61-78.

Arnett, E.B., M.M.P. Huso, J.P. Hayes, and M. Schirmacher. 2010. Effectiveness of changing wind turbine cut-in speed to reduce bat fatalities at wind facilities. A final report submitted to the Bats and Wind Energy Cooperative. Austin, Texas, Conservation International.

Baerwald, E.F. and R.M.R. Barclay. 2009. Geographic variation in activity and fatality of migratory bats at wind energy facilities. Journal of Mammalogy 90(6):1341-1349.

Baerwald, E.F., G.H. D'Amours, B.J. Klug, and R.M.R. Barclay. 2008. Barotrauma is a significant cause of bat fatalities at wind turbines. Current Biology 18:695–696.

Boarman, W.I. 2002. Desert Tortoise (Gopherus agassizii) species description. Available online: www.blm.gov/ca/pdfs/cdd_pdfs/dta.pdf. Accessed December 10, 2010.

Bureau of Land Management (BLM). 2010. California Desert Conservation Area Plan Amendment/Final Environmental Impact Statement for Ivanpah Solar Electric Generating System. FEIS-10-31. July 2010.BLM, Needles Field Office, Needles, California.

_____. 2008. Final PEIS for Geothermal Leasing in the Western U.S. October 2008.

_____. 2003. Environmental Assessment, Plan Amendment, Finding of No Significant Impact, and Decision Record for the Adoption of the Flat-tailed Horned Lizard Rangewide Management Strategy, 2003 Revision, An Arizona-California Conservation Strategy. EA Number: CA-67-EA05-01.

_____. 2002. California Leaf-Nosed Bat (Macrotus californicus). Available online: http://www.blm.gov/ca/forms/wildlife/details.php?metode=serial_number&search=2459. Accessed April 11, 2011.

California Department of Fish and Game (CDFG). 2010. Available online: http://www.dfg.ca.gov/biogeodata/cwhr/cawildlife.aspx. Accessed February 12, 2010.

CaliforniaHerps.com. 2010. A Guide to Reptiles and Amphibians of California. Available online: http://www.californiaherps.com/. Accessed February 12, 2010.

California Natural Diversity Database (CNDDB). 2010. Home page. Available online: http://www.dfg.ca.gov/biogeodata/cnddb/. Accessed February 15, 2010.

Cryan, P.M and R.M.R. Barclay. 2009. Causes of Bat Fatalities at Wind Turbines: Hypotheses and Predictions. Journal of Mammalogy 90(6):1330-1340.

Ehrlich, P.R., D.S. Dobkin, and D. Wheye. 1988. The Birder's Handbook. Simon and Schuster/ Fireside Books. New York, New York.

Kerns, J. and P. Kerlinger. 2004. A study of bird and bat collision fatalities at the Mountaineer Wind Energy Center, Tucker County, West Virginia. FPL Energy and Mountaineer Wind Energy Center Technical Review Committee. Cape May, New Jersey. Curry and Kerlinger LLC.

Klute, D.S., L.W. Ayers, M.T. Green, W.H. Howe, S.L. Jones, J.A. Shaffer, S.R. Sheffield, and T.S. Zimmerman. 2003. Status Assessment and Conservation Plan for the Western Burrowing Owl in the United States. U.S. Department of Interior, Fish and Wildlife Service, Biological Technical Publication FWS/BTP-R6001-2003, Washington, D.C.

Kunz, T.H., E.B. Arnett, W.P. Erickson, A.R. Hoar, G.D. Johnson, R.P. Larkin, M.D. Strickland, R.W. Thresher, and M.D. Tuttle. 2007. Ecological Impacts of Wind Energy Development on Bats: Questions, Research Needs, and Hypotheses. Frontiers in Ecology and Environment 5(6):315-324.

United States Fish and Wildlife Service (USFWS). 2008. Environmental Assessment to Implement a Desert Tortoise Recovery Plan Task: Reduce Common Raven Predation on the Desert Tortoise. March.

Wehausen, J.D. 1999. Nelson Bighorn Sheep (Ovis Canadensis nelsoni) species description. Available online: www.blm.gov/ca/pdfs/cdd_pdfs/Bighorn1.PDF. Accessed December 10, 2010.

Western Bat Working Group (WBWG). 2005. Species Accounts. Available online: http://www.wbwg.org/speciesinfo/species_accounts/species_accounts.html. Accessed February 14, 2011.

Wind Turbine Guidelines Advisory Committee. 2010. Consensus recommendations on developing effective measures to mitigate impacts to wildlife and their habitats related to land-based wind energy facilities. Prepared by Kearns and West for the U.S. Department of Interior, Washington, D.C.

4.9 Cultural Resources

Laylander, D. 2010. A Class I Cultural Resources Inventory for the West Chocolate Mountains Geothermal Leasing Project, Imperial County, California. ASM Affiliates, Inc.

4.11 Visual Resources

Bureau of Land Management (BLM). 1986. Manual 8400. Visual Resource Management.

_____. 1980. California Desert Conservation Area (CDCA) Plan, as Amended. U.S. Department of the Interior Bureau of Land Management Desert District, Riverside, California.

4.14 Energy and Minerals

Steward, D. 2010. Personal communication with Daniel Steward, Resources Branch Chief, BLM El Centro Field Office. March 25, 2010.

4.17 Social and Economic Resources

Bureau of Land Management (BLM). 2010. Imperial Sand Dunes Draft RAMP/Draft EIS. March 2010. Available online: http://www.blm.gov/pgdata/etc/medialib/blm/ca/pdf/elcentro/planning/2010.Par.0245.File.dat/ISDRA-DraftRMPEIS-Vol1.pdf.

_____. 2008. Final PEIS for Geothermal Leasing in the Western U.S. October 2008.

Edelstein, M.R. 2004. Contaminated Communities: Coping with Residential Toxic Exposure, 2nd ed. Westview Press, Boulder, Colorado.

Freudenburg, W.R. and R. Gramling. 1994. Oil in Troubled Waters: Perception, Politics, and the Battle Over Offshore Drilling. SUNY Series in Environmental Public Policy. State University of New York Press, Albany, New York.

Leistritz, F.L and S.H. Murdock. 1981. The Socioeconomic Impact of Resource Development: Methods for Assessment. Social Impact Assessment Series, No. 6. Westview Press, Boulder, Colorado.

MIG, Inc. 2010. IMPLAN Software and Data for 2008 for Imperial County and Riverside County, California.

National Renewable Energy Laboratory (NREL). 2010. Jobs and Economic Development Impact (JEDI), Economic Forecasting Model for Photovoltaic, CSP Trough, and Wind Energy Projects.

Neron-Bancel, T. 2008. Geothermal Revenue Under the Energy Policy Act of 2005: Income Distribution at Federal, State, and County Levels. December 14, 2008. Prepared for Geothermal Energy Association, Washington, DC. 14 pp. Available online: http://www.geo-energy.org/reports/Geothermal_Revenue_Under_the_Energy_Policy_Act_of_2005_Final.pdf.

Renewable Energy Policy Project (REPP). 2010. Geothermal Energy: a REPP Issue Brief. Available online: www.repp.org/geothermal/geothermal_brief_economic.html. Accessed November 29, 2010.

Slovic, P., J.H. Flynn, and M. Layman. 1991. Perceived Risk, Trust, and the Politics of Nuclear Waste. Science 254 (December 13, 1991): 1603-1607.

4.18 Transportation

County of Imperial. 2003. Circulation and Scenic Highways Element. Imperial County Public Works Department. Approved December 16, 2003.

Solar Millennium, LLC. 2008. Updated Plan of Development, Amargosa – Farm Road Solar Project. BLM Land Use Application, File #NVN-84359. Revised Submission November 26, 2008.

4.19 Cumulative Impacts Analysis

Jefferson, G. T. 1991a. A Catalogue of Late Quaternary Vertebrates from California: Part One, Nonmarine Lower Vertebrate and Avian Taxa. Natural History Museum of Los Angeles County Technical Report No. 5.

Jefferson, G.T. 1991b. A Catalogue of late Quaternary Vertebrates from California: Part Two, Mammals. Natural History Museum of Los Angeles County Technical Report No. 7.

U.S. Department of Energy (DOE). 2010. Draft Programmatic Environmental Impact Statement for Solar Energy Development in Six Southwestern States. DES 10-59, DOE/EIS-0403. December 2010. Available online: http://solareis.anl.gov/documents/dpeis/index.cfm.

_____. 2006. Energy Demands on Water Resources: Report to Congress on the Interdependency of Energy and Water. Washington, DC.

5 Consultation and Coordination

Bureau of Land Management (BLM). 2004a. BLM Handbook H-8120, Tribal Consultation under Cultural Resources Authorities. December 3, 2004

_____. 2004b. BLM Handbook H-8120-1, General Procedural Guidance for Native American Consultation. December 3, 2004.

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