DOE/EIS–0458D

DRAFT ENVIRONMENTAL IMPACT STATEMENT

VOLUME II: APPENDICES

DEPARTMENT OF ENERGY
LOAN GUARANTEE TO ROYAL BANK OF SCOTLAND FOR
CONSTRUCTION AND STARTUP OF THE TOPAZ SOLAR FARM
SAN LUIS OBISPO COUNTY, CALIFORNIA

US Department of Energy, Lead Agency
Loan Guarantee Program Office
Washington, DC 20585

In Cooperation with

US Army Corps of Engineers
San Francisco District

March 2011

APPENDICES TABLE OF CONTENTS

Appendix A	Public Scoping
Appendix B	PG&E Connected Action
Appendix C	Farmlands Correspondence and Analysis
Appendix D	Visual Simulation Methodology
Appendix E	Biological Resources, Including Section 7 Consultation
Appendix F	Cultural Resources, Including Section 106 Consultation
Appendix G	Draft Wildfire Management Plan
Appendix H	USACE CWA Section 404 Individual Permit Information
Appendix I	Contractor Disclosure Statement
Appendix J	Distribution List

Appendix A
Public Scoping

required by Section 10(a)(2) of the Federal Advisory Committee Act and is intended to notify the public of their opportunity to attend the open portion of the meeting. The public is being given less than 15 days' notice due to the need to accommodate the members' schedules.

DATES: November 1, 2010

TIMES: Open session: 8:30 a.m. to 4 p.m. The meeting will be closed from 4 p.m. to 4:45 p.m. for the election of a Chair and Vice Chair.

ADDRESSES: 80 F Street, NW., Room 100, Washington, DC 20208.

FOR FURTHER INFORMATION CONTACT: Mary Grace Lucier, Designated Federal Official, National Board for Education Sciences, 555 New Jersey Ave., NW., Room 602 I, Washington, DC 20208; phone: (202) 219–2253; fax: (202) 219–1466; e-mail: *Mary.Grace.Lucier@ed.gov.*

Individuals who use a telecommunications device for the deaf (TDD) may call the Federal Information Relay Service (FRS) at 1–800–877–8339.

SUPPLEMENTARY INFORMATION: The National Board for Education Sciences is authorized by Section 116 of the Education Sciences Reform Act of 2002(ESRAa0, 20 U.S.C 9516. The Board advises the Director of the Institute of Education Sciences (IES) on, among other things, the establishment of activities to be supported by the Institute, on the funding for applications for grants, contracts, and cooperative agreements for research after the completion of peer review, and reviews and evaluates the work of the Institute.

At this time, the Board consists of ten of fifteen appointed members due to the expirations of the terms of former members. The Board shall meet and can carry out official business because the ESRA states that a majority of the voting members serving at the time of a meeting constitutes a quorum.

On November 1, 2010, starting at 8:30 a.m. the Board will approve the agenda and hear remarks from the chair, followed by further remarks from John Easton, IES director. The Board is expected to consider and approve priorities proposed by the director to guide the work of the Institute. A break will take place from 9:45 a.m. to 10 a.m. A presentation on the Privacy Technical Assistance Center will take place from 10 a.m. to 11 a.m., followed by an overview of the proposed agenda for the Regional Educational Laboratories program.

The meeting will break for lunch from 12 noon to 1:15 p.m., following which there will be a presentation and discussion of state of the art approaches to research implementation. A discussion of recently released IES reports will be held from 2:30 p.m. until 4 p.m. The meeting will close to the public from 4 p.m. to 4:45 p.m. for the election of Chair and Vice Chair. The new officers will have a brief opportunity to address the membership about their vision for the Board's role for the next two years, and adjournment is expected at 5 p.m.

A final agenda will be available from Mary Grace Lucier (*see* contact information above) on October 25 and will be posted on the Board Web site *http://ies.ed.gov/director/board/agendas/index.asp.* Individuals who will need accommodations for a disability in order to attend the meeting (*e.g.,* interpreting services, assistance listening devices, or materials in alternative format) should notify Mary Grace Lucier no later than October 20. We will attempt to meet requests for accommodations after this date but cannot guarantee their availability. The meeting site is accessible to individuals with disabilities.

Records are kept of all Committee proceedings and are available for public inspection at 555 New Jersey Ave., NW., Room 602 K, Washington, DC 20208, from the hours of 9 a.m. to 5 p.m., Eastern Standard Time Monday through Friday.

Electronic Access to This Document: You may view this document, as well as all other documents of this Department published in the **Federal Register,** in text or Adobe Portable Document Format (PDF) on the Internet at the following site: *http://www.ed.gov/news/fed-register/index.html.*

To use PDF you must have Adobe Acrobat Reader, which is available free at this site. If you have questions about using PDF, call the U.S. Government Printing Office (GPO), toll free at 1–888–293–6498; or in the Washington, DC, area at (202) 512–1530.

Note: The official version of this document is the document published in the **Federal Register**. Free Internet access to the official edition of the **Federal Register** and the Code of Federal Regulations is available on GPO Access at: *http://www.gpoaccess.gov/nara/index.html.*

Dated: October 19, 2010.

John Q. Easton,

Director, Institute of Education Sciences.

[FR Doc. 2010–26782 Filed 10–21–10; 8:45 am]

BILLING CODE 4000–01–P

DEPARTMENT OF ENERGY

Notice of Intent To Prepare an Environmental Impact Statement for a Proposed Federal Loan Guarantee To Support Construction of the Topaz Solar Farm, San Luis Obispo County, CA

AGENCY: Loan Guarantee Program, Department of Energy.

ACTION: Notice of intent to prepare an environmental impact statement and conduct a public scoping meeting and notice of proposed floodplain action.

SUMMARY: The U.S. Department of Energy (DOE) announces its intent to prepare an environmental impact statement (EIS) pursuant to the National Environmental Policy Act of 1969, as amended (NEPA), the Council on Environmental Quality (CEQ) NEPA regulations, and the DOE NEPA implementing procedures, to assess the potential environmental impacts of its proposed action of issuing a Federal loan guarantee to Topaz Solar Farms, LLC (Topaz) (DOE/EIS–0458). Topaz submitted an application to DOE under the Federal loan guarantee program pursuant to the Energy Policy Act of 2005 (EPAct 2005) to support construction of the Topaz Solar Farm Project located in San Luis Obispo County, California (the Project).

Topaz is a limited liability company that is owned by First Solar, Inc. Topaz proposes to develop the Project on approximately 4,000 acres of land. As proposed, the approximately 550-megawatt electric generation project would include the installation of about nine million photovoltaic (PV) solar modules within approximately 437 arrays and associated electric equipment. At full capacity, the Project would generate enough electricity to power an estimated 160,000 California homes annually. Generated electricity would be sold to Pacific Gas and Electric (PG&E) under a long-term power purchase agreement. The Project would be interconnected into PG&E's existing Morro Bay-Midway 230-kilovolt (kV) transmission line, which runs in an east-to-west direction through the site.

The EIS will evaluate the potential environmental impacts of the issuance of a DOE Loan Guarantee for Topaz's proposed Project and the range of reasonable alternatives. The purposes of this Notice of Intent are to inform the public about DOE's proposed action; invite public participation in the EIS process; announce plans for a public scoping meeting; and solicit public comments for consideration in establishing the scope and content of

the EIS. DOE is hereby providing notice of a proposed action in a floodplain and that DOE will include a floodplain assessment in the EIS. DOE invites those agencies with jurisdiction by law or special expertise to be cooperating agencies.

DATES: The public scoping period will begin with publication of this Notice of Intent and end on November 22, 2010. To ensure that all of the issues related to this proposal are addressed, DOE invites comments on the proposed scope and content of the EIS from all interested parties. Comments must be postmarked or e-mailed by November 22, 2010 to ensure consideration. Late comments will be considered to the extent practicable.

ADDRESSES: Public comments can be submitted electronically or by U.S. Mail. Written comments on the proposed EIS scope should be signed and addressed to the NEPA Document Manager for this project: Ms. Angela Colamaria, Loan Guarantee Program (LP–10), U.S. Department of Energy, 1000 Independence Avenue, SW., Washington, DC 20585. Electronic submission of comments is encouraged due to processing time required for regular mail. Comments can be submitted electronically by sending an e-mail to: *Topaz-EIS@hq.doe.gov.* All electronic and written comments should reference DOE/EIS–0458.

In addition to receiving written comments, DOE will conduct a public scoping meeting in the vicinity of the proposed Project at which government agencies, private-sector organizations, and the general public are invited to provide comments or suggestions with regard to the alternatives and potential impacts to be considered in the EIS. The date, time, and location of the public scoping meeting will be announced in local news media and on the DOE Loan Guarantee Program's "NEPA Public Involvement" Web site (*http://lpo.energy.gov/?page_id=1502*) and the DOE NEPA Web site "Public Participation" Calendar (*http://nepa.energy.gov/calendar.htm*) at least 15 days prior to the date of the meeting.

FOR FURTHER INFORMATION CONTACT: To obtain additional information about this EIS, the public scoping meeting, or to receive a copy of the draft EIS when it is issued, contact Angela Colamaria by telephone: 202–287–5387; toll-free number: 800–832–0885 ext. 75387; or electronic mail: *Angela.Colamaria@hq.doe.gov.* For general information on the DOE NEPA process, please contact: Ms. Carol M. Borgstrom, Director, Office of NEPA Policy and Compliance (GC–54), U.S. Department of Energy, 1000 Independence Avenue, SW., Washington, DC 20585; telephone: 202–586–4600; facsimile: 202–586–7031; electronic mail: *askNEPA@hq.doe.gov;* or leave a toll-free message at 800–472–2756.

SUPPLEMENTARY INFORMATION:

Background

Title XVII of EPAct 2005 established a Federal loan guarantee program for eligible energy projects, and was amended by the American Recovery and Reinvestment Act of 2009, (the Recovery Act) to create Section 1705 of Title XVII (42 U.S.C. 16516), authorizing a new program for rapid deployment of renewable energy projects and related manufacturing facilities, electric power transmission projects, and leading edge biofuels projects. The primary purposes of the Recovery Act are job preservation and creation, infrastructure investment, energy efficiency and science, assistance to the unemployed, and State and local fiscal stabilization. The Section 1705 Program is designed to address the current economic conditions of the nation, in part, through financing renewable energy, transmission and leading edge biofuels projects.

On March 29, 2010, the Royal Bank of Scotland plc, as Lender-Applicant, with Topaz as the borrower, submitted the first part (Part I) of a two-part application to DOE for a Federal loan guarantee under the Solicitation entitled, "Federal Loan Guarantees for Commercial Technology Renewable Energy Generation Projects under the Financial Institution Partnership Program" (Solicitation No. DE–FOA–0000166), issued on October 7, 2009. Topaz submitted Part II of its application on August 10, 2010.

Purpose and Need for Agency Action

The purpose and need for action by DOE is to comply with its mandate under EPAct 2005 by selecting eligible projects that meet the goals of the Act, as summarized above. The EIS will inform DOE's decision on whether to issue a loan guarantee to Topaz to support the proposed Project.

Proposed Action

DOE's proposed action is to issue a loan guarantee to Topaz to support construction of the Topaz Solar Farm. The Project would be located in an unincorporated portion of eastern San Luis Obispo County, California, adjacent to Highway 58 and east of Bitterwater Road. Topaz has options to purchase approximately 10,000 acres of land in the Project area. The Project would be developed on approximately 4,000 to 4,100 acres of land within one of two overlapping study areas:

Study Area A, the southernmost study area, includes approximately 8,000 acres. If the Project is located within Study Area A, the fenced area would be approximately 4,100 acres.

Study Area B, the northernmost study area, includes approximately 6,300 acres. If the Project is located within Study Area B, the fenced area would be approximately 4,000 acres.

The study areas are larger than what would be needed to develop the project in order to allow flexibility in the final project design. The proposed Project would consist of: A solar field of ground-mounted PV modules that collect solar radiation to produce electricity; an electrical collection system that converts generated power from direct current (DC) to alternating current (AC) and delivers it to the Project substation; the aforementioned Project substation that collects and converts the generated power from 34.5 kV to 230 kV for delivery via a new PG&E switching station to PG&E's existing Morro Bay-Midway 230–kV transmission line; and the aforementioned PG&E switching station that interconnects the Project to PG&E's existing transmission line. After construction, PG&E would own and operate the switching station.

The Project's solar field would consist of 437 solar arrays. Each solar array would generate 1.3 megawatts alternating current of power and would consist of up to 20,000 PV modules and one power conversion station. Each power conversion station would consist of two inverters in an air-conditioned enclosure and one adjacent transformer. Each array would cover approximately seven acres of land.

Eight to twelve miles of overhead 34.5–kV high-capacity collection system lines, with two to four circuits each, would connect the power output from each of the solar arrays to the on-site Project substation. Wooden poles approximately 43 feet high would support these overhead lines.

The Project substation would collect the output and transform it from 34.5 kV to 230 kV. The substation would occupy approximately 4.5 acres and would be adjacent to the PG&E switching station, where the 230–kV output of the substation would be connected and delivered to the Morro Bay-Midway 230–kV transmission line.

The new PG&E switching station would be adjacent to the existing PG&E Morro Bay-Midway 230–kV transmission line. The Morro Bay-Midway 230–kV transmission line traverses the Project site just south of

the PG&E switching station. Two new 100- to 125-foot-high double-circuit lattice steel transmission towers and four steel poles would be installed to accommodate the looping of PG&E's 230–kV line into the switching station. The towers and poles would be within or adjacent to the existing PG&E transmission line right-of-way as well as located on either side of the new PG&E switching station to position the transmission conductors for proper ingress and egress to the station. Construction of the interconnection between the existing Morro Bay–Midway 230–kV line and the new PG&E switching station would be undertaken by PG&E.

Topaz has interconnection agreements in place for the first 400 MW of Project capacity. The California Independent System Operator has determined that network upgrades would be required to accommodate the Project's remaining 150 MW, as well as other generation projects in the region. Network upgrades could include the reconductoring of the 230–kV transmission lines between the new PG&E switching station and the Midway Substation.

As part of the proposed Project, Topaz would construct and operate a solar energy learning center within the Project's site boundary. Topaz would work with local educators to develop exhibits, tours, and educational programs for the center that would complement existing science and sustainability curricula. The center would be able to accommodate several class field trips per day, as well as 100 to 200 visitors per month. The center would be a 30-foot-by-30-foot enclosed building, compliant with the Americans with Disabilities Act, with restrooms, a scale model of the solar facilities, and exhibits on solar power.

Alternatives

In determining the range of reasonable alternatives to be considered in the EIS for the proposed Project, DOE identified the reasonable alternatives that would satisfy the underlying purpose and need for agency action. DOE currently plans to analyze in detail the Project proposed by Topaz and the No Action alternative. Topaz's site selection criteria for the Project included environmental sensitivity, topography, electrical grid system integration, high solar production potential, and disturbed land availability. Topaz determined that the Project area met these criteria because it has a strong solar resource, is adjacent to a transmission line with available capacity, contains relatively flat terrain and consists of previously disturbed, available land. Within the Project area, Topaz identified two Study Areas (Study Area A and Study Area B) that would be suitable for the Project, although construction of the Project would take place on only one Study Area if the Project is approved. DOE will analyze both Study Areas (Study Area A and Study Area B) available to Topaz as options, within the scope of the Project and mitigation measures as appropriate.

Under the No Action alternative, DOE would not provide the loan guarantee to Topaz. In this case, Topaz may have greater difficulty obtaining financing for the Project, which may result in a delay in the start of construction, construction in smaller phases over a longer time period, potentially increased project cost, or could possibly result in the Project not being built. Although Topaz may still pursue the Project without the loan guarantee, as defined above, for purposes of this NEPA analysis, it is assumed that the No Action alternative would include a no Project or no build scenario.

Notice of Proposed Floodplain Action

DOE is hereby providing notice of a proposed DOE action in a floodplain pursuant to DOE Floodplain and Wetland Environmental Review Requirements (10 CFR Part 1022). Overhead electrical lines would need to cross 100-year floodplains (unnamed drainages within the Carrizo Plain, northwest of Soda Lake). Since some of the floodplains on the project site are greater than 200 feet wide and posts are needed every 200 feet to support overhead lines, the installation of some posts within the floodplain is anticipated. DOE will prepare a floodplain assessment as required by DOE regulations. The floodplain assessment will be included as part of the EIS that DOE is preparing for this project. Interested parties may comment during the scoping period following the publication of this NOI and will also be able to comment on the floodplain assessment when the Draft EIS is published.

Preliminary Identification of Environmental Issues

DOE has tentatively identified the following environmental resource areas for consideration in the EIS. This list is neither intended to be all-inclusive nor a predetermined set of potential environmental impacts:

Air quality.
Greenhouse gas emissions and climate change.
Energy use and production.
Water resources, including groundwater and surface waters.
Wetlands and floodplains.
Geological resources.
Ecological resources, including species of special concern and threatened and endangered species such as the San Joaquin kit fox, longhorn fairy shrimp and vernal pool fairy shrimp.
Cultural resources, including historic structures and properties; sites of religious and cultural significance to Tribes; and archaeological resources.
Land use.
Visual resources and aesthetics.
Transportation and traffic.
Noise and vibration.
Hazardous materials and solid waste management.
Human health and safety.
Accidents and terrorism.
Socioeconomics, including impacts to community services.
Environmental justice.
Cumulative impacts.

DOE invites comments on whether other resource areas or potential issues should be considered in the EIS.

Public Scoping Process

To ensure that all issues related to DOE's proposed action are addressed, DOE seeks public input to define the scope of the EIS. The public scoping period will begin with publication of this Notice of Intent and end on November 22, 2010. Interested government agencies, private-sector organizations, and the general public are encouraged to submit comments concerning the content of the EIS, issues and impacts that should be addressed, and alternatives that should be considered. Scoping comments should clearly describe specific issues or topics that the EIS should address to assist DOE in identifying significant issues for analysis. Comments must be postmarked or e-mailed by November 22, 2010 to ensure consideration. (*See* **ADDRESSES** above). Late comments will be considered to the extent practicable. DOE invites those agencies with jurisdiction by law or special expertise to be cooperating agencies in the preparation of this EIS.

A public scoping meeting will be held during the scoping period, at a date, time, and location to be determined. Notice of this meeting will be provided in local news media and on the DOE Loan Guarantee Program's "NEPA Public Involvement" Web site (*http://loanprograms.energy.gov/?page_id=337*) and the DOE's NEPA Web site "Public Participation" Calendar (*http://nepa.energy.gov/calendar.htm*) at least 15 days prior to the date of the meeting. Members of the public and representatives of groups and Federal, State, local, and Tribal agencies are

invited to attend. The meeting will include both a formal opportunity to present oral comments and an informal session during which DOE and Topaz personnel will be available for discussions with attendees. Displays and other forms of information about the proposed agency action, the EIS process, and Topaz's proposed Project will also be available for review. DOE requests that anyone who wishes to present oral comments at the meeting contact Ms. Colamaria by phone or e-mail (*see* **ADDRESSES** above). Individuals who do not make advance arrangements to speak may register at the meeting. Speakers who need more than five minutes should indicate the length of time desired in their request. DOE may need to limit speakers to five minutes initially, but will provide additional opportunities as time permits. Written comments regarding the scoping process can also be submitted to DOE officials at the scoping meeting.

The DOE will use and coordinate the NEPA commenting process to satisfy the public involvement process for Section 106 of the National Historic Preservation Act (16 U.S.C. 470f) as provided for in 36 CFR 800.2(d)(3). Because the Topaz project site is expected to impact waters subject to the jurisdiction of the U.S. Army Corps of Engineers, the project will require a Section 404 Permit. In addition, because the proposed Topaz project may affect listed species under the Endangered Species Act (ESA), DOE will also initiate consultation regarding the project with the U.S. Department of the Interior's Fish and Wildlife Service under Section 7 of the ESA. DOE will also invite Federally-recognized American Indian Tribes that have historic interests in the area to government-to-government consultation regarding the project. Government-to-government consultation will be offered to Indian Tribes, and Tribal concerns, including impacts on Indian trust assets, will be given appropriate consideration. Federal, State, and local governments—along with other stakeholders who may be interested or affected by the DOE's decision on this Project—are invited to participate in the scoping process and, if eligible, may request or be requested by the DOE to participate as a cooperating agency.

Issued in Washington, DC, on October 18, 2010.

Jonathan M. Silver,

Executive Director, Loan Programs Office.

[FR Doc. 2010–26712 Filed 10–21–10; 8:45 am]

BILLING CODE 6450–01–P

DEPARTMENT OF ENERGY

National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling

AGENCY: Department of Energy, Office of Fossil Energy.

ACTION: Notice of open meeting.

SUMMARY: This notice announces an open meeting of the National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling (the Commission). The Commission was organized pursuant to the Federal Advisory Committee Act (Pub. L. 92–463, 86 Stat. 770) (the Act). The Act requires that agencies publish these notices in the **Federal Register**. The Charter of the Commission can be found at: *http://www.OilSpillCommission.gov.*

DATES: November 8, 2010, 9 a.m.–5 p.m., and November 9, 2010, 9 a.m.–5:30 p.m.

ADDRESSES: Grand Hyatt Washington, 1000 H St., NW., Washington, DC 20001; telephone number: 1–202–582–1234.

FOR FURTHER INFORMATION CONTACT: Christopher A. Smith, Designated Federal Officer, Mail Stop: FE–30, U.S. Department of Energy, 1000 Independence Avenue, SW., Washington, DC 20585; telephone (202) 586–0716 or facsimile (202) 586–6221; e-mail: *BPDeepwaterHorizon Commission@hq.doe.gov.*

SUPPLEMENTARY INFORMATION:

Background: The President directed that the Commission be established to examine the relevant facts and circumstances concerning the root cause of the BP Deepwater Horizon explosion, fire, and oil spill and to develop options to guard against, and mitigate the impact of, any oil spills associated with offshore drilling in the future.

The Commission is composed of seven members appointed by the President to serve as special Government employees. The members were selected because of their extensive scientific, legal, engineering, and environmental expertise, and their knowledge of issues pertaining to the oil and gas industry. Information on the Commission can be found at its Web site: *http://www.OilSpillCommission.gov.*

Purpose of the Meeting: Inform the Commission about the progress of the Chief Counsel's investigation into the Macondo well blowout. The Commission will hear a presentation from the Chief Counsel and statements from industry and academic experts. The Commission will also have the opportunity to hear from representatives of companies involved in the events leading to the blowout.

Tentative Agenda: The meeting is expected to start on November 8, 2010 at 9 a.m. Presentations to the Commission are expected to begin shortly thereafter and will conclude at approximately 5 p.m. The meeting will continue on November 9, 2010 at 9 a.m. with presentations to the Commission. Public comments can be made on November 9, 2010 from 5 p.m. to 5:30 p.m. The final agenda will be available at the Commission's Web site: *http://www.OilSpillCommission.gov.*

Public Participation: The meeting is open to the public, with capacity and seats available on a first-come, first-serve basis. The Designated Federal Officer is empowered to conduct the meeting in a fashion that will facilitate the orderly conduct of business.

Approximately one-half hour will be reserved for public comments on the second day of the hearing. Time allotted per speaker will be three minutes. Opportunity for public comment will be available on November 9, 2010 tentatively from 5 p.m. to 5:30 p.m. Registration for those wishing to request an opportunity to speak opens onsite on November 9, 2010 at 8 a.m. Speakers will register to speak on a first-come, first-serve basis. Members of the public wishing to provide oral comments are encouraged to provide a written copy of their comments for collection at the time of onsite registration.

Those not able to attend the meeting may view the meeting live on the Commission Web site: *http://www.OilSpillCommission.gov.* Those individuals who are not able to attend the meeting, or who are not able to provide oral comments during the meeting, are invited to send a written statement to Christopher A. Smith, Mail Stop FE–30, U.S. Department of Energy, 1000 Independence Ave., SW., Washington, DC 20585, or e-mail: *BPDeepwaterHorizion Commission@hq.doe.gov.*

Minutes: The minutes of the meeting will be available at the Commission's Web site: *http://www.OilSpillCommission.gov* or by contacting Mr. Smith. He may be reached at the postal or e-mail addresses above.

Accommodation for the hearing impaired: A sign language interpreter will be onsite for the duration of the meeting.

UNITED STATES DEPARTMENT OF ENERGY
PUBLIC SCOPING MEETING
Topaz Solar Farm Project
ENVIRONMENTAL IMPACT STATEMENT

The U.S. Department of Energy (DOE) will conduct a meeting to obtain public comments regarding its proposed action of issuing a Federal loan guarantee to Topaz Solar Farms, LLC (Topaz) to support construction of the Topaz Solar Farm Project located in San Luis Obispo County, CA. DOE will use the public comments to define the scope of an Environmental Impact Statement (EIS) that will assess the potential environmental impacts of the proposed project. In addition, DOE intends to offer the U.S. Army Corps of Engineers, and any other eligible agency, cooperating agency status in the preparation of the EIS. Topaz proposes to develop the Project on approximately 4,000 acres of land. As proposed, the approximately 550 MW electric generation project would include the installation of about nine million photovoltaic solar modules within approximately 437 arrays and associated electric equipment. At full capacity, the Project would generate enough electricity to power an estimated 160,000 California homes annually.

Members of the public are invited to attend to obtain information about the proposed project and make comments. DOE and project personnel will be available for informal discussions prior to the presentation of oral comments.

DATE: Tuesday, November 16, 2010
OPEN HOUSE & INFORMAL Q & A SESSION: 5:00 pm
PRESENTATION OF PROJECT DESCRIPTION & ORAL COMMENTS: 7:00 p.m.
PLACE: Carrisa Plains Heritage Association Community Center – 10750 Carrisa Highway (Highway 58), approximately one mile east of Soda Lake Road

Individuals wishing to present oral comments may either register in advance by notifying DOE via phone or e-mail as indicated below or register at the meeting. Comments presented at the meeting or received at DOE by November 22, 2010, will be considered in preparing the EIS.

Angela F. Colamaria Loan Guarantee Program Office (LP-10) U.S. Department of Energy 1000 Independence Avenue, SW Washington, DC 20585	**Office:** 202-287-5387 **Toll-free:** 1-800-832-0885 **Fax:** 202-586-4052 **Electronic mail:** Angela.Colamaria@hq.doe.gov

From: Topaz-EIS [mailto:Topaz-EIS@Hq.Doe.Gov]
Sent: Friday, November 12, 2010 9:49 AM
To: Topaz-EIS
Subject: NOTICE OF PUBLIC MEETING FOR TOPAZ SOLAR FARM, SAN LUIS OBISPO COUNTY

This email is to notify you of a public meeting regarding the proposed Topaz Solar Farm, in San Luis Obispo County, CA. The Department of Energy (DOE) is considering whether to give a Federal loan guarantee to the project sponsor.

The DOE intends to prepare an environmental impact statement (EIS) pursuant to the National Environmental Policy Act, to assess the potential environmental impacts of its proposed action of issuing a Federal loan guarantee to Topaz Solar Farms, LLC (Topaz) (DOE/EIS-0458). Topaz submitted an application to DOE under the Federal loan guarantee program pursuant to the Energy Policy Act of 2005 (EPAct 2005) to support construction of the Topaz Solar Farm Project located in San Luis Obispo County.

Members of the public are invited to attend the scoping meeting to obtain information about the proposed project and make comments. DOE and project personnel will be available for informal discussions prior to the presentation of oral comments.

DATE: Tuesday, November 16, 2010
OPEN HOUSE & INFORMAL Q & A SESSION: 5:00 pm
PRESENTATION OF PROJECT DESCRIPTION & ORAL COMMENTS: 7:00 p.m.

PLACE: Carrisa Plains Heritage Association Community Center – 10750 Carrisa Highway (Highway 58), approximately one mile east of Soda Lake Road

Individuals wishing to present oral comments may either register in advance by notifying Angela Colamaria via phone or e-mail, as indicated below, or register at the meeting.

Written comments can be signed and mailed to the address below, or submitted electronically to Topaz-EIS@hq.doe.gov by November 22, 2010.

Comments presented at the meeting or received at DOE by November 22, 2010, will be considered in preparing the EIS.

You are receiving this notice because you have previously expressed interest in this project, or may be affected by this project. If you would like to be removed from this mailing list, please reply to this email with REMOVE in the subject line.

For questions, written comments, or to sign up for oral comments please contact:

Angela F. Colamaria
U.S. Department of Energy
Loan Programs Office
Environmental Compliance Division
1000 Independence Avenue, S.W., LP-10
Washington, DC 20585

Direct: (202) 287-5387
Fax: (202)586-7809
Email: angela.colamaria@hq.doe.gov

Appendix B
PG&E Connected Action

Appendix 4A

Transmission Upgrades to PG&E Solar-Midway 230 kV Transmission Line

Prepared for

County of San Luis Obispo
Department of Planning and Building
San Luis Obispo, California 93408

Prepared by

Aspen Environmental Group

January 2011

Contents

1. Introduction Ap.4A-1

2. Description of PG&E Upgrades Ap.4A-2

2.1 Project Description Ap.4A-2

2.2 Land Uses Along Transmission Line Right-of-Way Ap.4A-8

2.3 Construction Methods Ap.4A-9

2.4 Construction Requirements Ap.4A-15

2.5 Applicant Proposed Measures Ap.4A-20

3. Environmental Impact Analysis Ap.4A-43

3.1 Introduction Ap.4A-43

3.2 Aesthetic Resources Ap.4A-44

3.3 Agriculture Ap.4A-47

3.4 Air Quality Ap.4A-49

3.5 Climate Change and Greenhouse Gas Ap.4A-55

3.6 Biological Resources Ap.4A-58

3.7 Cultural and Paleontological Resources Ap.4A-85

3.8 Geology, Mineral Resources, and Soils Ap.4A-96

3.9 Hazards and Hazardous Materials Ap.4A-99

3.10 Land Use and Recreation Ap.4A-105

3.11 Noise Ap.4A-108

3.12 Population and Housing Ap.4A-110

3.13 Public Services, Utilities, and Service Systems Ap.4A-111

3.14 Transportation and Circulation Ap.4A-116

3.15 Water Resources Ap.4A-123

Figures for Appendix 4A Ap.4A-125

4. References Ap.4A-126

Appendix 4A
Transmission Upgrades to PG&E Solar-Midway 230 kV Transmission Line

1. Introduction

The California Independent System Operator (CAISO) has determined that transmission line upgrades would be required to deliver the energy generated by two proposed solar projects on the Carrizo Plain (the proposed California Valley Solar Ranch [CVSR] Project and the Topaz Solar Farm [Topaz] Project) to the transmission grid.[1] Specifically, an approximately 35-mile segment of the PG&E Morro Bay–Midway 230 kilovolt (kV) transmission line would be required to be reconductored. Reconductoring is the process of installing new conductor wires on existing towers, with the possibility of modifying or replacing some towers, in order to increase the capacity of an existing transmission line. In addition to reconductoring, two new switching stations (also called switchyards) would be required to connect the 230 kV transmission lines from the solar project sites to PG&E's existing Morro Bay–Midway 230 kV transmission lines. The Caliente Switching Station would be constructed for the CVSR project and the Solar Switching Station would be constructed for the Topaz project.

The CVSR project is proposed by High Plains Ranch II, LLC, a wholly owned subsidiary of SunPower Corporation Systems (SunPower). SunPower proposes to construct and operate a 250 megawatt (MW) photovoltaic (PV) solar power plant on land zoned "Agriculture" in California Valley, an unincorporated community on the Carrizo Plain in eastern San Luis Obispo County. The project includes solar arrays that would cover nearly 1,900 acres, an electric substation, switching station, operations and maintenance facilities, public viewing areas, and an approximately 2.8-mile 230 kV generation tie-line. The Topaz project is proposed by Topaz Solar Farms LLC, a wholly owned subsidiary of First Solar, Inc. First Solar proposes to construct and operate a 550 MW PV solar power plant approximately 4 miles northwest of the CVSR site along Highway 58 and east of Bitterwater Road.

The switching stations and reconductoring projects are reasonably foreseeable projects that would be required as a result of construction of the proposed CVSR and Topaz projects. This analysis is being prepared for two reasons. First, sections 15165 and 15378 of the California Environmental Quality Act (CEQA) Guidelines require that an Environmental Impact Report (EIR) describe the impacts of the "whole of the action," including impacts associated with reasonably foreseeable projects required to implement the proposed project. This disclosure is made by the County of San Luis Obispo (County) as part of its consideration of the CVSR and Topaz projects. Second, in order for the PG&E upgrades to be constructed, they must comply with the California Public Utilities Commission's (CPUC) General Order 131-D (GO 131-D) permitting requirements. It is anticipated that the CPUC will be able to use this document to satisfy CEQA requirements in its own subsequent evaluation of PG&E's switching station and reconductoring projects. As soon as possible after the County's environmental review is completed, PG&E anticipates complying with GO 131-D's Notice of Construction (NOC) requirements or filing an Application for a Permit to Construct (PCT) or an Application for a Certificate of Public Convenience and Necessity (CPCN) with the CPUC, depending on final project scope and CPUC guidance. If one or more

[1] To interconnect the projects to the Morro Bay–Midway No. 1 and 2 lines requires an interconnection application that is processed under CAISO's Large Generator Interconnection Procedure, which is a part of CAISO's Tariff approved by the Federal Energy Regulatory Commission. For details regarding the CAISO's Large Generator Interconnection Procedure see Tariff Appendix U at http://www.caiso.com/docs/2002/06/11/2002061110300427214.html.

PTC or CPCN application is required, the CPUC would review and make a decision on PG&E's application(s) for reconductoring of the PG&E Solar-Midway 230 kV transmission line and/or the two switching stations.

2. Description of PG&E Upgrades

This section identifies the specific transmission line segment that would be reconductored by PG&E, and provides an overview of the reconductoring process. It describes the basic work involved in reconductoring a transmission line, as well as specific designs (when known) for the reconductoring project (project or proposed project).

Attached to this appendix (Appendix 4) are additional documents that supplement the project description and impact analysis. These are:

Appendix 4B.1 Switchyard Alternatives Overview Map
Appendix 4B.2 Switchyard Alternatives Grading and Drainage Plans
Appendix 4C Passive Repeater Foundation Layout
Appendix 4D Air Quality Assessment
Appendix 4E.1 Biological Resources Report
Appendix 4E.2 Addendum 2 to Biological Resources Report
Appendix 4E.3 Botanical Survey Report
Appendix 4F Parcel Survey Tracking Table
Appendix 4G PG&E Response to County Comments Memo

2.1 Project Description

Reconductoring

Reconductoring would occur on both circuits of the PG&E Morro Bay–Midway double-circuit 230 kV transmission line between a new 230kV PG&E switching station (Solar Switching Station) at the point of interconnection of the Topaz Solar Farm Project and the existing Midway Substation in Kern County. The existing transmission line extends from PG&E's Morro Bay Substation in the City of Morro Bay, San Luis Obispo County, California to PG&E's Midway Substation in the City of Buttonwillow, Kern County, California. However, only the portion of the line between the solar energy projects on the Carrizo Plain and Midway Substation would be reconductored, as shown in Figure Ap.4A-1. This segment includes both the Caliente Switching Station (for the CVSR Project) and the Solar Switching Station (for the Topaz Project). In all, approximately 35 miles of the transmission line would be reconductored, ranging in elevation from 80 feet above mean sea level (msl) (at the Midway Substation) to 3,600 feet above msl (in the Temblor Range). Figure Ap.4A-1 shows an overview of the entire project and Figures Ap.4A-2a through Ap.4A-2f provide additional detail. Note that all figures are provided in separate files on the Draft EIR CD, and are listed at the end of this document.

The 35-mile portion of the existing transmission line proposed for reconductoring is supported by 171 lattice steel towers (LST), some of which would require modification or replacement to accommodate the new conductors, which are heavier and operate at a higher temperature than the existing conductors. The specific number of towers to be replaced has not yet been determined by PG&E. The existing 1113 AA conductor is 1.0440 lbs/foot and the replacement 954 ACSS conductor would be 1.2270 lbs/foot.

Most of these towers are double-circuit towers, with the exception of eight single-circuit transposition towers, two single-circuit substation dead-end structures at Midway Substation, and one double-circuit tubular steel pole (TSP) at Midway Substation. The average height of existing towers is approximately 118 feet, and the average height of towers with proposed extensions would be approximately 127 feet.

PG&E's right-of-way (ROW) for the existing transmission line between the Solar Switching Station and the Midway Substation varies between 75 and 128 feet wide. For approximately 6 miles extending westerly from the Topaz Solar Farm on the Carrizo Plain, the transmission line is adjacent to a ROW with a 115 kV transmission line. The wider sections of ROW within the 230 kV transmission corridor are located near transposition towers (where the positions of the conductors are changed at four separate sites along the path). The transmission line segment to be reconductored would begin at the Solar Switching Station required for interconnection of the Topaz Solar Farm to the PG&E 230 kV transmission system.

The Solar Switching Station would be located north of the existing PG&E transmission line corridor within the Topaz Solar Farm boundary. As shown on Figure Ap.4A-1, the station would be approximately one mile north of Highway 58 on the Carrizo Plain in an unincorporated portion of eastern San Luis Obispo County at an elevation of 2,030 feet above msl. The County released the Draft EIR for the Topaz Solar Farm in October 2010.

From the Solar Switching Station at Milepost (MP) 0, the reconductored transmission line follows a path due east for 7.2 miles, passing within 325 feet of a residence at MP 0.5, crossing Soda Lake Road at MP 1.5, and looping into the proposed CVSR Project switching station (Caliente Switching Station) in the vicinity of MP 7. The up to 9-acre switching station would be located south of the existing PG&E 230 kV transmission line and the existing PG&E 115 kV transmission line. The location of the switching station is subject to change based on final site selection.

At MP 7.3, the transmission line turns east-southeast for 3.0 miles and crosses the Temblor Range into Kern County at MP 10.3. The line then proceeds east for 4.7 miles and northeast for 3.5 miles, crossing a number of tributaries of Salt Creek between MP 11 and MP 16. The transmission line then turns due east for 1.2 miles, northeast for 0.4 miles, and east again for another 14.1 miles, crossing Lost Hills Road at MP 21.7, Highway 33 (West Side Highway) at MP 22.8, a petroleum pipeline at MP 27.2, the California Aqueduct at MP 29.0, Highway 58 at MP 29.5, and the West Side Canal (Kern River Flood Canal) at MP 29.8. The transmission line turns northeast for 0.4 miles and then north for 0.4 miles, once again crossing Highway 58 at MP 30.0 before entering Midway Substation at MP 35.0 and elevation 80 feet above msl. A detailed illustration of the route is included on Figures Ap.4A-2a to Ap.4A-2f.

Switching Stations

Solar Switching Station (Topaz Project)

The Topaz Solar Farm would interconnect with PG&E transmission lines using a three-bay, six-position breaker and a half configuration switching station (see Figure Ap.4A-3). No alternative sites to the proposed Solar Switching Station are considered.

PG&E's Switching Station, called the Solar Switching Station, would contain nine 230 kV gas-insulated circuit breakers. Two positions of this switching station would be used to connect the Topaz Solar Farm output to the switching station and the remaining four positions would be used to loop the PG&E line through the switching station. The PG&E Solar Switching Station work area would be approximately 600 by 650 feet (9 acres) with a buffer zone and would be enclosed by a fence separate from the adjacent Topaz Solar Farm substation. The switching station would require additional area for the incoming and existing transmission line, the dimensions with the transmission line would be 880 by 715 feet. PG&E would install night lighting at the switching station for security purposes.

To interconnect the Topaz Solar Farm, both circuits of the Morro Bay–Midway 230 kV double-circuit line would be looped from the transmission corridor into the new Solar Switching Station adjacent to the transmission corridor and then back to the transmission corridor. The loop lines would be approximately 200 to 400 feet in length. A total of four new circuits would be constructed between the existing transmission corridor and the new switching station (two in and two out of the switching station) with two circuits per tower line.
Two new double-circuit lattice steel transmission towers and four tubular steel poles would be installed to accommodate the looping of PG&E's 230 kV line into the Solar Switching Station. It is expected that the two lattice structures would be located within or adjacent to the existing PG&E transmission line ROW. The four tubular steel poles would be located on either side of the new PG&E Solar Switching Station to position the transmission conductors for proper ingress and egress to the station.

Caliente Switching Station Alternatives (CVSR Project)

The proposed CVSR switching station, called the Caliente Switching Station, would potentially be located south of the existing PG&E 230 kV and 115 kV transmission corridor and would loop into both circuits of the Morro Bay–Midway 230 kV double-circuit transmission line, similar to the Topaz Solar Farm. The 230 kV interconnection switching station would be designed and constructed by PG&E. It would be based on their current standards and specifications, which meet or exceed generally accepted industry practices. The fenced switching station area would be approximately 500 feet by 600 feet, subject to final siting and engineering. It would be surfaced with a combination of concrete pads, compacted road base for internal access roads and compacted earth. The overall work area for the switching station would be approximately 600 feet by 650 feet (9 acres). PG&E would install night lighting at the switching station for security purposes. Figure Ap.4A-4b illustrates the location of the six switching station alternatives. At the time of publication of the Draft EIR, the preferred location for the Caliente Switching Station is Alternative 3; however, for the purposes of this document all switching station options are analyzed at a similar level of detail. PG&E would own and operate the switching station, which would be located on a separate parcel, which would be created through a separate process with the County.

The area of interconnection between the CVSR project and the PG&E transmission line is within and adjacent to the San Andreas Fault zone. In order to avoid active fault traces, PG&E and SunPower are currently evaluating six potential sites for the Caliente Switching Station. These six alternative sites are illustrated in Figure Ap.4A-4b and detailed engineering plans for the six alternative sites are shown in

Appendix 4B. Appendix 4B also includes estimated scopes of work, expected to be undertaken by PG&E, required for the interconnection of the proposed switching station to the existing, double-circuit 230-kV transmission line. SunPower notes that because the entire PG&E 230 kV transmission line would loop through the Caliente Switching Station, the seismic concerns relate to the integrity of the entire 230 kV line and not only the electricity generated at the CVSR solar facility.

The six sites are generally characterized as follows:

- Site 1 (the originally proposed switching station) is adjacent to the east side of the Alquist-Priolo Fault Hazard Zone for the San Andreas Fault on relatively flat land. Of the six sites, Site 1 is nearest the hazard zone. Site 2 is approximately 600 feet from the hazard zone and sites 3 through 6 are 1,000 or more feet from the hazard zone.
- Sites 1, 2, and 3 are east of the fault zone and Sites 4, 5, and 6 west of it.
- Sites 1 and 2 are at a similar elevation (approximately 200 feet higher than Sites 4, 5, and 6).
- Site 3 it is located on a sloping site on a hill east of the other sites and is located between the existing 230 kV and 115 kV transmission lines.
- Sites 4, 5, and 6 are at approximately the same elevation and are nearly adjacent to each other.

Switching Station M3

Switching Station Site 3 is the preferred switching station location due to its distance from the San Andreas Fault. SunPower submitted additional information on this site with its comment letter on the Draft EIR, including a series of project layout and other design changes, to reduce or avoid impacts from the Switching Station Site 3 option. SunPower's modified design features are referred to collectively herein as the "Switching Station M3." These features are discussed in detail below.

The Switching Station M3 would be generally in the same location as the previously proposed Site 3, situated just south of the existing PG&E Morro Bay–Midway 230 kV transmission line and north of the existing PG&E 115 kV transmission line (see Figure Ap.4A-4c). Consistent with the original proposed design, the switching station would be surfaced with a combination of concrete pads, compacted road base for internal access roads, and compacted earth. Night lighting would be installed at the switching station for security purposes.

As initially proposed, the Caliente Switching Station was described as a 6.9-acre fenced switching station in a 9-acre work area, located immediately south of the existing PG&E Morro Bay–Midway 230 kV transmission line.

- The design of the switching station has been modified to reduce the footprint to a 4.7-acre fenced switching station (compared to 6.9 acres).
- The fenced switching station area would be approximately 430 feet by 479 feet (reduced from 500 feet by 600 feet), subject to final siting and engineering.

Site Grading. As initially proposed, preparation for construction of the switching station at Switching Station Site 3 would have required extensive grading and cut-and-fill, with approximately 287,500 cubic yards of cut and 38,400 cubic yards of fill, with a net export (after compaction is considered) of approximately 243,340 cubic yards of soil. The DEIR indicated that the excess soil from the grading of the switching station would be exported to the Twisselman Aggregate Surface Mine. However, this large amount of exported material would require design changes at the mine, which may not have been feasible.

Changes to the layout and design of the switching station would significantly reduce the amount of grading and cut-and-fill that would be required for the Switching Station M3. As a result, the earthwork requirement for its construction would be balanced, and the need to export soil has been eliminated. The total area of disturbance from construction of the Switching Station M3 also is reduced from 15.0 to 14.0 acres. Figure Ap.4A-4d illustrates the conceptual grading and plan drawing of the Switching Station M3.

Temporary Switching Station Equipment. The Caliente Switching Station would be completed during the first phase of construction of the CVSR Project. However, in order for SunPower to begin operation as soon as the first tracker systems or solar modules are deployed and can generate solar power, a timely interconnection with PG&E's existing Morro Bay–Midway 230 kV transmission line is required. SunPower would install some switching station equipment as a temporary connection prior to PG&E's construction of the permanent switching station facilities.[2]

All temporary equipment would be installed within the Switching Station M3 site. The only exception to this is that there would be a temporary, approximately 322-foot, single-circuit "tap" transmission line connecting the temporary switching station equipment within Switching Station Site 3 to the PG&E Morro Bay to Midway No. 1 230 kV transmission line. To accomplish the temporary interconnection, PG&E would install three poles between their existing lattice take-off tower and the temporary switching station 230 kV dead-end structure within the Switching Station M3 site.

The impact analysis in Section 3 below incorporates the Switching Station M3 design features in place of the previously addressed Site 3, where specific reference is made to this location.

Switching Station Equipment

Two short transmission line segments would be required to connect the proposed switching station to the existing Morro Bay–Midway double-circuit 230 kV transmission line. These line segments would require facilities modifications on the 230 kV and potentially on the 115 kV lines, as described below.

Modifications to the existing PG&E 115 kV transmission line facilities could include the following:

- Remove two (2) existing 115 kV towers;
- Install two (2) low profile, horizontally configured towers.

Modifications to the existing Morro Bay–Midway 230 kV double-circuit transmission line facilities could include the following:

- Install two (2) new 230 kV dead-end towers;
- Remove one (1) existing tangent lattice tower.

Construction of new 230 kV transmission line facilities would include the following:

- Install two (2) new tangent double-circuit, steel monopole towers midway between the existing Morro Bay–Midway 230 kV transmission line and the proposed switching station (one tangent tower would be required in each line segment);

[2] The DEIR already anticipates the installation of such temporary electrical facilities at the switchyard – see DEIR page 14: "Temporary facilities include … electrical equipment within the substation and switchyard."

- Install two (2) double-circuit, steel monopole dead-end towers and one (1) single-circuit, steel monopole tower near the proposed Caliente Switching Station;

Heights of all proposed tower modifications and new towers would be determined based on the heights of existing conductors and the need to provide clearance above ground and to any obstructions, based on the CPUC's General Order 95 and the National Electrical Safety Code (NESC). Pending detailed engineering design, the proposed towers may be up to 150 feet in height. This height would be required if it is determined that the 230 kV interconnect lines should pass over the 115 kV line located between the switching station and the 230 kV line without modifying the existing 115 kV structures.

Optical Ground Wire

A new optical ground wire (OPGW) would be installed between the Solar Switching Station and Midway Substation. The OPGW is both a static line and a fiber optic communication line. It would be installed along with a pure static line on the top of the towers using a small "tent-like" structure for mounting to the tower tops.

Microwave Tower and Reflector

PG&E would install an approximately 175-foot tall microwave tower at the Caliente Switching Station site and at the Solar Switching site. The microwave tower would be a self supporting unpainted lattice steel structure. The microwave antennas are typically grey.

At least one microwave reflector would be required off-site. Depending on the final locations of the switching stations, it is possible that one microwave reflector would suffice for both switching stations. However, the number and location(s) of the microwave reflector(s) would be determined based on the final location of the switching stations. The location of the microwave reflector for the Solar Switching Station is unknown at this time. PG&E has identified locations for the Caliente Switching Station microwave reflector based on the switching stations alternatives. Impacts of the microwave reflector for the Solar Switching Station, if required, are assumed to be similar to those of the microwave reflector required for the Caliente Switching Station. The reflector would be mounted on a structure approximately 30 feet tall and would be approximately the size of a billboard. A typical microwave reflector is approximately 10 feet by 24 to 32 feet (Microflect, 1970). It would be painted to blend in with the surrounding landscape.

PG&E is considering two site options for the Caliente Switching Station. Microwave reflector option A would be used for the Caliente Switching Station Alternatives 1, 2, 4, 5, and 6. Microwave reflector option B would be used for the Caliente Switching Station Alternative 3. The two microwave reflector option locations are shown on Figure Ap.4A-4e. Images of a typical microwave tower and a typical microwave reflector are shown below.

Microwave Tower

Microwave Reflector

2.2 Land Uses Along Transmission Line Right-of-Way

The area around the transmission line corridor and switching stations is primarily undeveloped along the westernmost 30 miles of the route of the Solar-Midway segment. Only two residential structures are located near the reconductoring project, the closest of which is approximately 325 feet from the ROW. Petroleum settling ponds associated with active petroleum extraction activities are located directly adjacent to and south of the ROW at MP 22 to MP 24. Active agricultural operations occur within and adjacent to the ROW. These are grazing and dryland grain cultivation operations west of MP 30.8 and irrigated crop production east of MP 30.8. Portions of the ROW have been disturbed by vegetation management practices beneath the existing transmission line, by the construction of access roads, and by ongoing maintenance activities. Between where the line crosses Highway 58 near MP 30 until it enters the Midway Substation at about MP 35, the transmission line parallels Highway 58 (Jeppi Road) approximately 0.3 miles to the south of the road. Between MP 31 and MP 33.4, the highway has scattered individual homes along its northern side. From MP 33.4 until it enters the Midway Substation near MP 35, the alignment is approximately 0.3 miles south of the town of Buttonwillow, which is primarily on the north side of the highway.

Existing land uses along the approximately 35-mile transmission line segment are shown on Figures Ap.4-2a through Ap.4-2f, and land uses are defined by milepost in Table Ap.4-1.

Table Ap.4-1. PG&E Transmission Upgrades Project - Existing Land Uses

Location	Location(s)	Land Use Classifications	Specific Land Uses
MP 0–2.7	County of San Luis Obispo	Agriculture, Public Facilities and Utilities	Tracy Lane, Grazing, Dryland Grain Production, Soda Lake Road, Unnamed Drainages
MP 2.7–10.3	County of San Luis Obispo	Agriculture	Grazing, Unnamed Drainages
MP 10.3–21.7	County of Kern	Agriculture	Grazing, Salt Creek, Lost Hills Road, Petroleum Pipeline, Temblor Creek, Unnamed Drainages
MP 21.7–22.8	County of Kern, Caltrans (State Highway 33)	Agriculture, Public Facilities and Utilities	Grazing, State Highway 33, Lost Hills Road, Natural Gas Pipeline
MP 22.8 - 30.8	County of Kern, Caltrans (State Highway 58)	Agriculture, Public Facilities and Utilities	Grazing, Crop Production, State Highway 58, Petroleum Pipelines, Natural Gas Pipeline, California Aqueduct, Unnamed Drainages
MP 30.8-35.0	County of Kern, Caltrans (State Highway 58)	Agriculture, Public Facilities and Utilities	Crop Production, West Side Canal, (Kern River Flood Canal), Unnamed Canals, Elk Grove Road, Unnamed Road, Palomas Road, Buttonwillow Drive, Mirasol Avenue, Southern Pacific Railroad, State Highway 58, Midway Substation

2.3 Construction Methods

Reconductoring

In general, reconductoring is accomplished by disconnecting an old conductor and using it to pull a sock line (rope) through travelers or sheave blocks (temporary pulleys) mounted on each tower, until the sock line reaches the end of the section to be reconductored. Workers climb the tower or use a helicopter to access the tower in order to place the travelers on each tower and route the old conductor through the travelers. Once in place, the sock line is then used to pull the new conductors into place. An alternative is to connect the old conductor directly to the new conductor and use it to pull the new conductor into place.

The work would involve 20-person work crews on each end of the segment being replaced. Crews would generally be equipped with large tractor/trailer units used to feed out the new line or wind in the old line on trailer-mounted spools. Two or three utility trucks carrying tools and other materials would also be employed. One crew would set up at a “pull site” near a tower at one end of the pull, and the other crew would set up a “tension site” near a tower at the other end of the pull. As a safety precaution, ground rods (copper rods, 5/8-inch in diameter and long enough to be driven to firm ground with approximately one foot protruding above ground) would be installed on each end of designated pull sites prior to pulling and tensioning work and removed once work is complete. Ground rods would also be attached to any equipment used near an energized conductor. The tensioning crew would employ a tensioner truck, which carries a large drum winch that is used to put rear tension on the conductor being pulled. Each pull is generally one to five miles in length, and each conductor is pulled separately (one phase of each circuit per pull) until all three phases of a circuit are in place. The tensioning site crew would access the tower and disconnect the old conductor. The old conductor would be attached to a sock line or directly, to the new conductor located on spools on tensioner trucks.

The pull site crew would also climb each tower or be transported to the tower arms via helicopter, disconnect the old conductors, and attach them to take up spools on trucks below the tower. Other crews would set up temporary netting structures across busy roads and other areas as needed to protect those areas in the unlikely event that a conductor breaks and falls to the ground.

Once all protective structures are in place and the pull and tension sites are ready, the pulling crew would begin to wind the old conductors onto spools mounted on trucks, thereby pulling the sock line (or new conductor) through the pulleys. The tensioning crew would keep the old conductor taut, preventing it from sagging to the ground or into other objects in the right-of-way. If a sock line is used, once the sock line is in place, the crews would repeat the process, winding the sock line onto a take-up reel, thereby pulling the new conductor in place. Once the new conductor is in place, it would be disconnected from the pulleys, relocated to a higher position (if a cage top tower extension was installed), and permanently mounted to the end of new insulator strings.

Generally, new conductors are pulled through one to five miles of transmission towers at a time, depending on the length of conductor on the reels, the presence of angle towers, and the availability of suitable set-up locations.

Because the work is overhead between the pull and tensions sites, the potential for environmental impact is generally nonexistent between the two sites. Therefore, this analysis focuses particularly on examining potential effects at the pulling and tensioning sites and other locations that could be disturbed by truck movement or helicopter operations. Activities between the pull and tension sites are generally restricted to (1) accessing the towers (by pick-up truck to the tower then climbing, by truck-mounted aerial bucket, or by helicopter) to place pulleys, remove the old conductor, and fasten the new conductor once stringing is completed; and (2) work on the tower structure to repair or replace spars that are damaged, or to replace insulators.

Though the exact locations of pull and tension sites are not known at the time of publication of this Draft EIR, Figures Ap.4-2a to Ap.4-2f show the full range of anticipated pull and tension sites along the 230 kV corridor and Table Ap.4-2 includes preliminary estimates of ground disturbance for the work areas. Some of the criteria used in selecting the final pull and tension sites include: accessibility for vehicles; presence of a flat or nearly flat land in-line along the ROW for equipment set-up; and land use, habitat, environmental, or cultural factors that may restrict work at various locations. Pulling and tensioning would normally take place at “dead-end” sites, which are towers where the transmission line is physically connected to the tower rather than merely passing through insulator clamps. In general, they are located where one spool of conductor is spliced to the next spool. Dead-end sites are generally located at angle towers (where the alignment changes direction), but also can be located at towers that are in-line with the route, such as where the conductor is spanning long distances across canyons or gorges. Dead-end towers have significant structural strength and resist the forces of pulling. Pull and tension sites could also be established in-line between standard suspension towers where needed to limit the pulling distance or to address areas that have limited access or set-up restrictions. Along the route, pull and tension sites would be located approximately 1 to 6 miles apart.

During reconductoring, work crews replace the insulator strings connected to the towers. This work involves accessing the towers by climbing, truck-mounted aerial bucket, or helicopter in order to get personnel and material to the appropriate position on the tower. For the reconductoring project, depending on terrain and work required by helicopter, approximately nine landing zones would be used. Crews would then remove the old insulator strings and install new ones. The new insulators would be delivered by aerial bucket truck and trailer or by helicopter and held in place by the aerial bucket or rigging attached to the tower. The towers would also be inspected for corrosion prior to reconductoring

and, if necessary, would be repaired. Repairs can include corrosion removal by mechanical means, re-galvanizing, and repainting.

Construction equipment would mostly be refueled at landing zones or construction yards along the transmission line. Equipment may be refueled along the transmission line if necessary. This would occur at least 100 feet from drainages, with secondary containment and appropriate clean up equipment onsite in case of a spill.

Once the old conductors and insulators are removed, they would be recycled or disposed of in an appropriate landfill facility.

Tower Replacement

The specific towers and locations of towers that would be replaced are unknown at the time of publication of this Draft EIR. For the purposes of the environmental analysis, it is assumed that 10 percent of the 171 LSTs (17 towers) would be replaced. Replacement LSTs would generally be erected within 75 feet of the original tower and would be sited to avoid sensitive resources.

Exact pull and tension site locations are also unknown at the time of publication of this Draft EIR. As pull and tension sites are generally flexible, their locations would be selected by PG&E upon completion of the biological reconnaissance surveys and cultural resources surveys for the reconductoring project to minimize impacts to sensitive resources. Figures Ap.4-2a to Ap.4-2f show the preliminary locations of potential tension and pull sites; however, the exact locations would be developed during detailed project engineering. Depending on the terrain and the number of angles and dead-end towers, approximately 17 pull and tension sites and 3 construction work areas at road crossings would be used. In addition, there would be a work area at each switching station and 6 helicopter landing zones (see Table Ap.4-2). Some pull and tension sites may also be used as staging areas and landing zones. Towers either would be constructed and erected at the tower site using a crane or constructed offsite and transported to the site by helicopter.

The new LSTs would require the installation of new tower foundations, which are typically poured concrete piers. For each lattice structure, four holes would be drilled using a truck- or track-mounted excavator equipped with augers of various sizes depending on the diameter and depth requirements of the hole to be drilled. The final depth of each foundation pier would be determined by soil and geologic conditions and by the design requirements of the tower structure. Each foundation would extend approximately 2 feet above the ground surface for bolting the tower in place.

Drilling, rock hauling, or the use of a rock anchoring or a mini-pile system may be required if solid rock is encountered. The rock anchoring or mini-pile system would be used in areas where site access is limited and sufficient rock is available for proper rock anchoring. Such anchoring systems may also be used where economically and technically justified. In environmentally sensitive areas, a HydroVac, which uses water pressure and a vacuum, may be used to excavate material into a storage tank. In areas where it is not possible to operate large drilling equipment due to access or environmental constraints, hand digging using compressed air tools may be required. Soil excavated for foundations dug by hand would be distributed locally. At some of these sites it may be necessary to deliver and remove equipment, material, and personnel via helicopter.

At the LST component fabrication plant, structural members would be bundled and shipped by rail or truck to the construction yards, and then trucked to the individual tower sites (if the crane method is to be used) or a central assembly yard (if the helicopter method is to be used). For towers that are to be erected using the crane method, LSTs would be assembled at laydown areas at each site, and then

erected and bolted to the foundations. Tower assembly would begin with the hauling and stacking of bundles of steel at tower locations. This activity would require use of several tractors with 40-foot trailers and a rough terrain forklift. After steel is delivered and stacked, crews would proceed with assembly of leg extensions, body panels, boxed sections, and bridges. The steel work would be completed by a combined erection and torquing crew with a lattice boom crane. The construction crew may opt to install insulators and travelers at this time. Ground disturbance would generally be limited to work areas around towers to be replaced, typically 200 feet by 200 feet for individual towers and 300 feet by 300 feet for centralized laydown areas or landing zones.

A minimum 80 ton crane would be used to assemble tower sections in areas where road access is available to tower sites and impacts to biological and cultural resources would be minimal. The crane pad would be set up in-line, within approximately 100 feet to the side of the existing transmission tower.

A helicopter would be used to erect towers at tower sites inaccessible by crane due to terrain or avoidance measures for sensitive resources. Use of helicopters for installation eliminates land disturbance associated with crane pads, tower site laydown areas, and vehicle traffic from steel delivery to structure sites. All construction work in remote work sites would be completed by hand with the assistance of portable compressors, portable hydraulic accumulators, portable concrete mixers, or buckets of ready-mix concrete that would be flown into the tower sites. Remote work sites would be located on disturbed land to avoid biological or cultural impacts or where impacts could be reduced to a less-than-significant level with appropriate measures incorporated.

Temporary guard structures would be used if necessary to protect roadways should a non-energized line fall during reconductoring. Guard structures typically consist of two or four wooden poles and cross beams attached to the tow poles. They are generally installed in pairs with a net strung between them, but in some cases a net would not be required. A line truck would be used to auger and set the wood poles. Guard structure poles would be removed following reconductoring and the holes backfilled.

The use of helicopters for the erection of LSTs would be in accordance with PG&E specifications and would be similar to methods detailed in the Code of Safe Practices (CSP Section 11), 2002 Edition, and the PG&E Helicopter Operations Manual, which was completed by PG&E and its International Brotherhood of Electrical Workers (IBEW) Union in 2002.

The operations area of the helicopters would be limited to helicopter staging areas near construction locations (landing zones) that are considered safe locations for take-off and landing and the transmission line corridor. Final siting of helicopter fly yards and staging areas would be conducted with the input of the helicopter contractor, affected private landowners, and land management agencies. Each staging area would be a maximum of 300 feet by 300 feet.

Helicopter fueling would occur at landing zones, and offsite at an existing licensed refueling facilities or airports using the helicopter contractor's fuel truck. Fueling would be supervised by the helicopter fuel service provider, and SWPPP measures would be followed, as applicable. The helicopter and fuel truck would stay overnight at a local airport or at a staging area if adequate security is in place.

Tower Modifications

The height of approximately every other tower (approximately 85 towers) would be raised by approximately 20 feet in order to accommodate the new conductor and simultaneously satisfy conductor ground clearance requirements. The new conductor would be about the same diameter and weight as the existing conductor, but it would operate at higher operating temperatures, which would

cause it to sag more than the existing conductor. In addition, certain towers may require modification of their foundations or superstructures to accommodate the new, higher-temperature conductor as the new conductor would contain a steel core that enables higher tensioning between towers.

To strengthen tower foundations, concrete from the existing footings is broken away to expose the steel reinforcements. A new/replacement concrete footing, called a grade beam, is poured between each existing footing. Superstructures are typically strengthened by replacement, modification, or addition of pieces of steel lattice, as determined by engineering analysis specific to each tower. In a worst case situation, a new, stronger replacement tower with new foundations would need to be installed, in-line, within approximately 50 to 75 feet of the existing tower.

Two methods are used to raise the heights of towers, including:

- adding “mid-cage” or base extensions to the towers, or
- adding “cage-top” extensions to the top of the tower.

The first method requires lifting the tower at the middle of the cage. A tower lift crane is staged in-line next to the tower, and its four arms are clamped to the four outside tower support legs. The tower support legs are unbolted from the lower tower section mid-cage (below the crane attachment points), the tower is lifted, and the mid-cage extension is installed. Once the mid-cage extension is installed and secured to the lower tower section, the crane is detached, leaving the tower in its new elevated position. If a tower lift crane cannot be used, tower leg extensions can be completed at ground level using a larger crane, manual construction techniques, track style equipment, or helicopters. A level area of approximately 25 by 40 feet would be graded immediately adjacent to the tower to serve as a crane pad. Temporary wood pole support(s) (shoo-fly) would be constructed adjacent to the tower to support the conductors while the crane lifts the tower. The tower extension would then be installed, the conductors replaced, and the temporary wood pole supports removed.

The second method entails installing the new extension at the top of the tower with the use of a crane or helicopter. The cage top extension is installed on the top of the tower, above all the cross arms. For the crane method, a level area of about 25 by 40 feet would be graded immediately adjacent to the tower to serve as a crane pad. Existing conductors would be left in place. During a helicopter cage top extension installation, one 230kV circuit would remain energized and the other de-energized, but if a crane lifts the cage top into place on the tower, both 230kV circuits would be de-energized. Once the cage top extensions are installed on a string of towers, the conductors would be de-energized and elevated to their new position. The new insulator strings and conductor pulleys would be installed at this time to facilitate the reconductoring activities that follow. The old tower arms and insulator strings would be removed once the conductors are relocated to their new positions. Figure Ap.4-5 shows typical support structures and dead end towers with cage top extensions.

Complete tower replacement would occur where mid-cage, base, or cage top extensions are deemed to be too difficult.

Access Road Modification

Existing access roads would be maintained and widened as required for construction activities. Access roads serving towers requiring modification or replacement and roads serving associated pull and tension sites, laydown areas, and landing zones would be evaluated for vegetation removal, repair, and restoration requirements. The roads would be required to be large enough to accommodate large bucket trucks and semi-truck traffic for delivery of material and large equipment (e.g., cranes, graders,

and dozers). Access roads would typically be graded with a six-wheel road grader and/or a D-6 bull dozer to a standard 10-foot width, with possible 12-foot-wide sections required at sharp road angles. PG&E would use temporary bridges to span sensitive water crossings during the wet season. Gravel would not typically be used except to stabilize soft underlying soils.

Switching Stations

Construction of the Solar and Caliente Switching Stations and the interconnection between the existing Morro Bay–Midway 230 kV line and the new stations would be undertaken by PG&E. Construction of transmission facilities would be scheduled roughly in parallel with the switching station construction to ensure adequate transmission line capacity is available when the new switching stations become active.

Construction of the loop lines would include disturbance at locations where excavation for tower and pole locations would occur and towers and poles would be installed. Wheeled vehicles for transportation of conductor spools, and line-pulling and tensioning equipment would traverse the transmission line construction area.

Construction activities related to grading, creation of access roads, and cut-and-fill requirements would be generally similar among Caliente Switching Station alternative sites 1 and 2, and between sites 4, 5, and 6, due to similar, relatively flat terrain, existing land use, and proximity to existing dirt roads among the two groupings of site locations. Construction requirements for site 3 would differ from any of the other site locations due to steepness of terrain, elevation, and distance from existing dirt roads. However, the revised design for Switching Station Site M3 would not require export of cut or fill material.

Optical Ground Wire

A new optical ground wire (OPGW) would be installed between the Solar Switching Station and Midway Substations. The OPGW is both a static line (lightning protection) and a fiber optic communication line. It would be installed along with a pure static line on the top of the towers using a small "tent-like" structure for mounting to the tower tops. The static wire and OPGW would be installed at the same time the new conductors would be installed on the tower line and pulled in a similar fashion. Installation of the static wire and OPGW would be finished by the end of the reconductoring project. Figure Ap.4A-5 shows typical support structures and dead end towers with cage top and fiber optic line extensions.

Ground Disturbance

Estimated ground disturbance associated with access roads, switching stations, tension and pull sites, land zones, line and roadway crossings, and other components are preliminarily estimated in Table Ap.4A-2 below and would be finalized during final project engineering and design.

The work areas for each of the anticipated 17 pull sites would be approximately 300 feet by 300 feet (2.1 acres each, 35.7 acres total), and would be located within the ROW outside of the existing access road footprint. Each of the switching stations would require an approximately 9-acre work area and access roads would disturb approximately 27.2 acres. In addition, landing zones, powerline and roadway crossings, and fiber optic stringing would disturb approximately 21 additional acres.

Table Ap.4A-2. Preliminary Areas of Disturbance by Work Area

Work Area	County	Dimensions & Site Description
Solar Switching Station Work Area	SLO	• 600 feet x 650 feet (9.0 acres)
Caliente Switching Station Work Area	SLO	• 600 feet x 650 feet (9.0 acres)
Tension/Pull (T/P) Sites	SLO and Kern	• 300 feet x 300 feet (2.1 acres) each • Approximately 22 T/P sites required (9 in SLO County and 13 in Kern County; 35.7 acres total)
Landing Zones	SLO and Kern	• 300 feet x 300 feet work area next to PG&E warehouse (2.1 acres) in SLO County • Triangle shape layout (4.5 acres) in SLO County • 300 feet x 300 feet (2.1 acres) in Kern County • 75 feet x 200 feet (0.3 acres) in Kern County • 150 feet x150 feet (0.5 acres) in Kern County • 300 feet x 300 feet (2.1 acres) in Kern County
Access Roads	SLO and Kern	• Approximately 27.2 acres total
Single Distribution Line Crossing	Kern	• 50 feet x 50 feet potential disturbance (0.4 acres) each • Approximately 7 separate distribution line crossings required
Two Distribution Line Crossings	Kern	• 100 feet x 50 feet potential disturbance (0.6 acres) • Approximately 5 separate double distribution line crossings required
Foreign Line Crossing	Kern	• 100 feet x 50 feet potential disturbance (0.1 acres)
Caneras-Taft 70 kV and Temblor-Kernridge 115 kV Transmission Line Crossings	Kern	• 100 feet x 50 feet potential disturbance (0.1 acres)
Belridge Tap 70 kV Transmission Line Crossing	Kern	• 75 feet x 50 feet potential disturbance (0.1 acres)
Diablo Midway #2 500 kV Transmission Line Crossing	Kern	• 100 feet x 50 feet potential disturbance (0.1 acres)
Fiber Line Stringing	Kern	• 1,250 feet x 30 feet (0.9 acres)
Road Crossing Work Areas	Kern	• Highway 33: 75 feet x 50 feet potential disturbance (0.1 acres) • Highway 58: 50 feet x 50 feet potential disturbance (0.1 acres) • Highway 58: 7.0 acres

Source: PG&E, 2010; updated April 9, 2010.

2.4 Construction Requirements

Equipment and Personnel

Reconductoring work, including tower replacement and modification, would be completed primarily by PG&E employees. Some work would likely be contracted out, including helicopter and crane operations, foundation construction, specialty transport, grading and earth work. The construction activities related to this project are expected to take approximately 20 months to complete.

The maximum estimated number of personnel required for construction labor would be approximately 50 individuals. Table Ap.4A-3 summarizes required construction equipment and its intended use for construction of access roads, laydown areas, and landing zones and the replacement or removal of towers. Table Ap.4A-4 presents the equipment work requirements for reconductoring, including the anticipated duration of equipment use. The equipment to be used for switching station construction is listed in Table Ap.4A-5.

Table Ap.4A-3. Solar-Midway 230 kV Reconductoring Equipment and Intended Use

Equipment	Use
1/2-ton pickup trucks	Transport construction personnel
3/4-ton pickup trucks	Transport construction personnel
Crew-cab trucks (3/4 to 1 ton)	Transport construction personnel
Jeep vehicles	Construction and environmental inspectors
Road grader, six wheel	Site grading
Dozer with sheepsfoot	Grading/shaping and soil compaction/tensioning support
Powered road roller	Subgrade compaction
ASV mower	Vegetation clearing
Water trucks	Dust and fire control
Cranes	Tower installation and reconductoring (one at each end)
2-ton flat bed trucks	Haul materials
Flat-bed boom truck	Haul and unload materials
Dump trucks (5 to 10 ton)	Haul spoil and import materials
Construction trucks and trailers (2 to 60 ton)	Haul materials
Tiltbed and lowboy trailers	Haul equipment
Rigging truck	Haul tools and equipment
Mechanic truck	Service and repair equipment
Shop vans	Store tools
Crawler-mounted auger	Excavate foundations
D6 and D8 Bulldozer	Site grading and excavation
Puller (semi-truck and trailer)	Pull conductor wire
Tensioner (semi-truck and trailer)	Pull conductor wire
Helicopters (Bell 500 Long Ranger, Bell 205 Huey, Sikorsky Skycrane)	Tower installation/transport , cage top transport/installation, personnel and material delivery
Semi with wire reel trailer	Haul wire
Air compressor	Operate air tools
Air tampers	Compact soil around foundations
Portable generators	Power tools for tower assembly
Fuel trucks	Refuel equipment (helicopters)
Aerial lift trucks	String conductor wire
Fork Lift	Manage and assemble material at laydown area.
2 large bucket trucks	Pulling sites, insulator replacement, reconductoring
Water Truck	Dist control and compaction at grading locations.
2 standard line bucket trucks	Reconductoring activities
Fire Suppression Equipment	Laydown Areas, Landing Zones

Table Ap.4A-4. Solar-Midway 230 kV Reconductoring Equipment Work Requirements

Equipment	Number	Hours/ Day	Days/ Week	Months Used**	Total Project Hours	Total Equipment Hours
Reconductoring						
Cranes (80 ton)	2	7	4	8	963	1,926
Pick-up trucks	4	4	4	8	550	2,202
Standard line trucks	4	7	4	8	963	3,853

Table Ap.4A-4. Solar-Midway 230 kV Reconductoring Equipment Work Requirements

Equipment	Number	Hours/ Day	Days/ Week	Months Used**	Total Project Hours	Total Equipment Hours
Large line bucket trucks	2	7	4	8	963	1,926
Dozer	1	6	4	8	826	826
Semi truck w/reel haulers	2	5	4	8	688	1,376
Bell 500 helicopter	1	8	4	1.2	165	165
Bell 205 helicopter	1	8	4	2.2	303	303
Semi-flat bed delivery truck	1	4	3	8	413	413
Tensioner/take-up reel semi truck	2	5	4	8	688	1,376
Tower Work						
Fork lift	1	3	4	12	619	619
Crane	1	3	4	12	619	619
Generators	2	10	4	12	2,064	4,128
Crew trucks	2	5	4	12	1,032	2,064
Fueling truck	1	3	4	5	258	258
Compressor	1	6	4	4	413	413
Sikorsky Skycrane*	1	8	4	1	32	32
Bell 500 helicopter	1	8	4	1.6	220	220
Bell 205 helicopter	1	8	4	2	275	275
Concrete truck	1	8	2	4	275	275
Mechanic truck	1	1	1	12	206	206
Truck w/ scrap trailer	1	2	1	12	103	103
Track mounted foundation auger	1	6	2	4	206	206
Semi truck w/ lowboy transportation	1	4	3	6	310	310
Shared Equipment						
Water truck*	1	6	4	10	1,032	1,032
Grader*	1	9	4	5	774	774
ASV mower*	1	9	4	4	619	619
Front-end loader*	1	2	3	5	219	129
Dump truck*	1	5	3	5	323	323

* Assumes equipment needed for 10 percent tower replacement, or approximately 17 towers.
**Not necessarily consecutive months; total project months.

Table Ap.4A-5. PG&E Carrizo to Midway Project Switching Station Equipment List

Equipment	Equipment Pieces	URBEMIS Name
Solar Switching Station (First Solar)		
60 Ton Crane	N/A	Cranes
Back Hoe	N/A	Excavators
Forklift	N/A	Forklifts
Generator	N/A	Generator Sets
Water Truck	2	Water Trucks
Dozer/Ripper	1	Rubber Tired Dozers
Sheep's Foot Compactor	1	Surfacing Equipment
Grader	1	Graders

Table Ap.4A-5. PG&E Carrizo to Midway Project Switching Station Equipment List

Equipment	Equipment Pieces	URBEMIS Name
Roller	1	Rollers
Loader	1	Rubber Tired Loaders
Skip Loader	1	Rubber Tired Loaders
Paddle Wheel Earthmover	1	Scrapers
Transport Trucks*	N/A	NA
1 Ton Truck*	N/A	NA
Transport Trucks (End Dumps & Belly Dumps)*	10	NA
Fuel Truck*	1	NA
Work Trucks**	N/A	NA
Caliente Switching Station (SunPower)		
60 Ton Crane	N/A	Cranes
Back Hoe	N/A	Excavators
Forklift	N/A	Forklifts
Generator	N/A	Generator Sets
Water Truck	2	Water Trucks
Dozer/Ripper	1	Rubber Tired Dozers
Sheep's Foot Compactor	1	Surfacing Equipment
Grader	1	Graders
Roller	1	Rollers
Loader	1	Rubber Tired Loaders
Skip Loader	1	Rubber Tired Loaders
Paddle Wheel Earthmover	1	Scrapers
Transport Trucks*	N/A	NA
1 Ton Truck*	N/A	NA
Transport Trucks (End Dumps & Belly Dumps)*	10	NA
Fuel Truck*	1	NA
Work Trucks**	N/A	NA

Schedule

As described above, reconductoring work, including tower replacement and modification, is expected to last approximately 20 months. According to current plans, construction would begin in August 2011 and would be substantially complete by February 2013. Construction would proceed as follows:

- **Access road modifications.** Beginning in August 2011, access roads serving towers to be modified or replaced and associated tension and pull sites, laydown areas, and landing zones would be graded and widened, as required for construction activities. Road modifications would take approximately 1 month to complete.
- **Fly yards and staging areas.** Beginning in August 2011, crews would spend several days bringing equipment and materials to staging areas within the substations or laydown area/fly yard locations. A given fly yard would be in use during work on the corresponding section of the transmission line. Helicopters would be used for both tower modification work and replacement of conductors along

the line, especially in biologically-sensitive and difficult-to-access areas. Populating fly yards and staging areas would take approximately 1 month.

- **Tower work.** Beginning in August 2011, tower replacement and modification would occur along the transmission line in advance of reconductoring. The duration of tower replacement and modification work would be approximately 18 months. Construction work on towers would follow multiple steps over the course of several visits to the tower site, as described chronologically below:
  - Initial evaluation and site preparation for construction;
  - Installation of required tower extensions or tower replacement;
  - Raising of existing conductor to new conductor height on the towers;
  - Installation of travelers and insulators on all towers;
  - Reconductoring of the line;
  - Removal of travelers and placement of conductors on the insulators ("clipping" the conductors);
  - Removal of all unused arms and associated equipment below the new conductor.

  Tower work would be complete by approximately February 2013.
- **Guard structures.** From June 1, 2011 to January 1, 2012, any required guard poles (with or without nets) would be placed prior to pulling and tensioning any section of line crossing a state highway or other obstacle in which guard poles and/or nets are deemed necessary. Guard poles and nets would be placed and removed during the dry season to avoid access during the wet season in biologically sensitive areas. Guard poles and nets would be removed between or April 1, 2012 and November 1, 2012.
- **Reconductoring.** Reconductoring would occur over the course of 12 months, beginning by August 2011, and would be completed in sections as towers are raised or replaced. Because the line that would be under construction is an active transmission line, the timing of pulling and tensioning would depend on load conditions and the ability to take the line out of service. This activity would be restricted to low load conditions when line clearances could be achieved and would be complete by December 2012. In some cases, one side (one circuit) of the 230 kV line may be de-energized to enable reconductoring work on that side of the corridor while the other side (second circuit) of the 230 kV line would remain energized. Some work activities may require both circuits to be de-energized. This would be scheduled with PG&E's Transmission Operations group in coordination with the CAISO.
- **Restoration.** Restoration of any temporarily disturbed areas would occur within one year of disturbance for all sites. For access roads modified for construction, these would be re-established with an emphasis on long-term erosion control to support long-term operations and maintenance activities. This may involve seeding roads with a native seed mix and/or installing water bars on steep slopes. Road restoration would be in compliance with the General Construction Stormwater National Pollutant Discharge Elimination System (NPDES) Permit. Final restoration of all temporary work sites is expected to occur no later than December of 2013.
- **Switching Stations.** The area used for the switching stations would be cleared and graded during the start of the construction period for the solar projects. Stations would be constructed after the site preparation activities are completed. The switching stations would be completed during the first year of installation, allowing the proposed solar projects to begin operation as soon as the first tracker systems or solar modules are deployed and can generate solar power.

2.5 Applicant Proposed Measures

PG&E proposes to implement specific measures during construction and operation to ensure that the upgrades would create minimal environmental impacts and be constructed in a manner consistent with applicable rules and regulations. These measures are proposed for implementation during the design, construction, and operation of the project in order to avoid or minimize potential environmental impacts, and are called Applicant Proposed Measures.

Applicant Proposed Measures (APMs) listed in Table Ap.4A-6 are considered part of the reconductoring project and are considered in the evaluation of environmental impacts in Section 3 of this appendix. CPUC approval would be based on PG&E adhering to the project as described in this appendix, including this project description and all APMs.

Table Ap.4A-6 details each APM by environmental issue area. After publication of the Draft EIR, this appendix was revised to recognize all measures to reduce impacts as APMs. As a result, Table Ap.4A-6 now presents all of the APMs defined in the Draft EIR as well as most of the mitigation measures that were presented in the Draft EIR. All are now considered APMs, and all of the measures in Table Ap.4A-6 have been accepted by PG&E.

The conversion of mitigation measure into APMs is not presented in tracked changes (strikeout/under-line) in this document. To increase readability, all mitigation measures have been moved into table Ap.4A6, and then changes to individual measure are tracked to show where changes have been made. Also, the mitigation measure numbers that were used in the Draft EIR are presented in parentheses below the new APM identifier in the first column of the table.

Table Ap.4A-6. PG&E Applicant Proposed Measures – Solar-Midway Reconductoring

	Aesthetic Resources
AE-1 (MM AE-2.1)	**Prepare and implement an exterior lighting plan**. The Applicant shall develop and implement an exterior lighting plan. The plan shall define the height, location, and intensity of all exterior lighting. All lighting fixtures shall be positioned 'down and into' the development and shielded so that neither the lamp nor the related reflector interior surface is visible from surrounding properties and key viewing areas. All lighting poles, fixtures, and hoods shall be dark colored.
AE-2 (MM AE-2.2)	**Paint microwave reflector to reduce visibility**. Fourteen days prior to ordering the microwave reflector, PG&E shall provide the County and its consultants a palate from which to select the color for the proposed microwave reflector. The microwave reflector shall be painted a neutral, subdued color to match the existing natural background and lessen its visual impact and glare as seen from public vantage points and improving cross-plain views from State Highway 58.
	Agricultural Resources
LU-1	**Agriculture impacts avoidance.** To avoid potential impacts to agriculture, PG&E will work with farmers and ranchers to conduct its work between their harvest and planting periods where and whenever possible. In areas containing permanent crops (i.e., grape vines, tree orchard, etc.) that must be removed and replaced to gain access to poles sites for construction purposes, PG&E will provide compensation to landowners for crop loss and other reasonable and associated costs as soon as practicable after completion of construction. Access across active crop areas will be negotiated with the owners in advance of any construction activities.
AG-1 (MM AG-1.1)	**Coordinate construction activities with agricultural landowners.** Prior to commencement of transmission line construction/ground disturbing activities, PG&E shall coordinate with property owners on such lands to (1) schedule construction activities so as to minimize disruption to agricultural operations; and (2) ensure that any areas damaged or disturbed by construction are restored to a condition that closely approximates conditions that existed prior to disturbance. This may include activities such as soil preparation, regrading, and reseeding. Prior to commencement of ground disturbing activities, PG&E shall submit to the CPUC the dates when landowners are notified of the start of construction.

Table Ap.4A-6. PG&E Applicant Proposed Measures – Solar-Midway Reconductoring

AG-2 (MM AG-2.1)	**Mitigate the loss of state-designated prime farmland through permanent preservation of off-site farmlands.** The Applicant shall mitigate for the permanent loss of state-designated prime farmland on an acre for acre basis, and shall provide evidence to the CPUC that an open space easement or other farmland conservation mechanism has been granted in perpetuity to a qualifying entity approved by the CPUC. The easement shall provide conservation acreage at a ratio of 1:1 for direct permanent impacts.
	Air Quality
AIR-1 (SLO County)	**Implement SLOAPCD's Standard Mitigation Measures, as appropriate and necessary, for Construction Equipment:** • Maintain all construction equipment in proper tune according to manufacturer's specifications. • Fuel all off-road and portable diesel powered equipment with CARB certified motor vehicle diesel fuel (non-taxed version suitable for use off-road). • Use diesel construction equipment meeting CARB's Tier 2 certified engines or cleaner off-road heavy-duty diesel engines, and comply with the State off-Road Regulation. • Use on-road heavy-duty trucks that meet the CARB's 2007 or cleaner certification standard for on-road heavy-duty diesel engines, and comply with the State On-Road Regulation. • Limit idling of all on and off-road diesel equipment to 5 minutes or less. Post signs in the designated queuing areas and or job sites to remind drivers and operators of the 5 minute idling limit. • Prohibit diesel idling within 1,000 feet of sensitive receptors. • Avoid staging and queuing areas within 1,000 feet of sensitive receptors. • Electrify equipment when feasible. • Substitute gasoline-powered in place of diesel-powered equipment, where feasible.
AIR-1 (Kern Co.)	**Implement Best Management Practices (BMPs) to Reduce Construction Tailpipe Emissions:** If applicable and feasible, PG&E will implement the following measures to reduce already less-than-significant tailpipe emissions from diesel-powered construction equipment in Kern County. These measures include: • Maximize the use of diesel construction equipment meeting CARB's 1996 or newer certification standard for off-road heavy-duty diesel engines. • Use emission control devices at least as effective as the original factory-installed equipment. • Locate stationary diesel-powered equipment and haul truck staging areas as far as practicable from sensitive receptors. • Substitute gasoline-powered for diesel-powered equipment when feasible.
AIR-2	**Minimize Greenhouse Gas Emissions during Construction:** PG&E will incorporate the following measures into its construction plans to further reduce already less-than-significant GHG emissions: • Encourage construction workers to carpool by establishing carpooling to construction sites where feasible to do so. • Encourage recycling of construction waste.

Table Ap.4A-6. PG&E Applicant Proposed Measures – Solar-Midway Reconductoring

AIR-3 (MM AQ-1.1)	**Reduce Construction Vehicle Emissions (NOx, ROG, and DPM).** During all construction/ground disturbing activities, the Applicant shall implement the following methods to reduce vehicle emissions (NOx, ROG, and DPM) from construction equipment: a. Maintain all construction equipment in proper tune according to manufacturer's specifications; b. Fuel all off-road and portable diesel powered equipment with CARB certified motor vehicle diesel fuel (non-taxed version suitable for use off-road); c. Use diesel construction equipment meeting CARB's Tier 2 certified engines or cleaner off-road heavy-duty diesel engines (e.g., Tier 3 and Tier 4, where feasible), and comply with the State Off-Road Regulation (CCR Title 13, Article 4.8, Chapter 9, Section 2449); d. Use on-road heavy-duty diesel trucks that meet the CARB's 2007 or cleaner certification standard for on-road heavy-duty diesel engines, and comply with the State On-Road Regulation; e. Construction or trucking companies with fleets that do not have engines in their fleet that meet the engine standards identified in the above two measures (e.g., captive or NOx exempt area fleets) may be eligible by providing alternative compliance; f. All on- and off-road diesel equipment shall not idle for more than 5 minutes. Signs shall be posted in the designated queuing areas and/or job sites to remind drivers and operators of the 5 minute idling limit; g. PG&E will apply a "common sense" approach to vehicle use; if a vehicle is not required for use immediately or continuously for construction activities, its engine will be shut off. Construction foremen will include briefings to crews on vehicle use as part of pre-construction conferences; h. Staging and queuing areas within San Luis Obispo County shall not be located within 1,000 feet of sensitive receptors; i. Electrify equipment when feasible (i.e., concrete batch plant); j. Use alternatively fueled construction equipment on-site where feasible, such as compressed natural gas (CNG), liquefied natural gas (LNG), propane or biodiesel.
AIR-4 (MM AQ-1.2)	**Develop Construction Activity Management Plan (CAMP**). Prior to issuance of permits and commencement of construction/ground disturbing activities, the Applicant shall develop a Construction Activity Management Plan (CAMP) and submit it to the San Luis Obispo County APCD for their review and approval. This shall include verification by the County of APCD's approval. The CAMP shall include, but not be limited to, the following elements: a. A Dust Control Management Plan that encompasses all, but is not limited to, dust control measures that were listed above in the "dust control measures" section; b. Schedule construction truck trips during non-peak hours to reduce peak hour emissions; and c. Phase construction activities, if appropriate.

Table Ap.4A-6. PG&E Applicant Proposed Measures – Solar-Midway Reconductoring

AIR-5 (MM AQ-1.3)	**Reduce Fugitive Dust.** Prior to issuance of construction permits and during construction/ground disturbing activities, the proposed project shall implement the following measures to minimize nuisance impacts and to significantly reduce fugitive dust emissions: a. Reduce the amount of the disturbed area where possible; b. Use of water trucks or sprinkler systems in sufficient quantities to prevent airborne dust from leaving the site. Increased watering frequency would be required whenever wind speeds exceed 15 mph. Reclaimed (non-potable) water should be used whenever possible; c. All dirt stock pile areas shall be sprayed daily as needed; d. Permanent dust control measures identified in the approved project revegetation and landscape plans shall be implemented as soon as possible following completion of any soil disturbing activities; e. Exposed ground areas that are planned to be reworked at dates greater than one month after initial grading shall be sown with a fast germinating, non-invasive grass seed and watered until vegetation is established; f. All non-road disturbed soil areas not subject to revegetation shall be stabilized using approved chemical soil binders, jute netting, or other methods approved in advance by the APCD; g. All roadways, driveways, sidewalks, etc. to be paved shall be completed as soon as possible. In addition, building pads shall be laid as soon as possible after grading unless seeding or soil binders are used; h. Vehicle speed for all construction vehicles shall not exceed 15 mph on any unpaved surface at the construction site; i. Cover all trucks hauling dirt, sand, soil, or other loose materials or maintain at least two feet of freeboard (minimum vertical distance between top of load and top of trailer) in accordance with CVC Section 23114; j. Implement manual street sweeping of ingress/egress points from unpaved roads onto paved streets; k. Sweep streets at the end of each day if visible soil material is carried onto adjacent paved roads. Water sweepers with reclaimed water shall be used where feasible; l. Present all of these fugitive dust mitigation measures on grading and building plans; and m. The contractor or builder shall designate a person or persons to monitor the fugitive dust emissions and enhance the implementation of the measures as necessary to minimize dust complaints, reduce visible emissions below 20 percent opacity, and to prevent transport of dust offsite. The name and telephone number of such persons shall be provided.
AIR-6	**Payment of Impact Fees.** To the extent that the San Luis Obispo APCD determines, after considering all APMs and mitigation measures identified in this EIR and the First Solar EIR, as well as the air quality benefits in reducing air pollutants that will result from operation of these solar project, that project applicants are required to provide offsite mitigation through the offsets program, PG&E will pay its prorated share of the total fees imposed for the combined air pollution generated by construction of the California Valley Solar Ranch Project and PG&E's switching stations and reconductoring projects in direct proportion to the air pollutants generated by construction of PG&E's project components.
	Greenhouse Gases
GHG-1	**GHG emissions minimization**. PG&E is implementing the following voluntary company-wide actions to further reduce GHG emissions. • PG&E is an active member of the SF_6 Emission Reduction partnership for Electrical Power Systems, a voluntary program between the USEPA and electric power companies that focuses on reducing emissions of SF_6 from transmission and distribution operations. Since 1998, PG&E has reduced the SF_6 leak rate by 89 percent and absolute SF_6 emissions by 83 percent. • PG&E supports the Natural Gas STAR, a program promoting the reduction of methane from natural gas pipeline operations. Since 1998, PG&E has avoided the release of thousands of tons of methane. • In June 2007, PG&E launched the ClimateSmart program, a voluntary GHG emissions reduction program that allows its customers to balance out the GHG emissions produced by the energy they use, making their energy use "climate neutral". For ClimateSmart customers, PG&E calculates the amount needed to fund sufficient GHG emissions reduction projects in California to make their energy use "climate neutral". This is added to the customer's monthly energy bill and is tax deductable. • PG&E is offsetting all of the GHG emissions associated with energy used in PG&E's buildings by participating in its ClimateSmart program. In 2007, this amounted to over 50,000 tons of CO_2 reductions. • PG&E will implement the appropriate CARB AB-32 Early Action Measures as they become effective.

Table Ap.4A-6. PG&E Applicant Proposed Measures – Solar-Midway Reconductoring

GHG-2 (MM GHG-2.1)	**Avoid sulfur hexafluoride emissions.** PG&E shall ensure that project equipment, specifically the circuit breakers at switching stations, are incorporated into PG&E's system-wide SF_6 emissions reduction program.
	Biological Resources
There are 3 types of APMs for biological resources: • **BO-x**: The first items listed are general Biological Resources APMs for the Solar-Midway reconductoring project. • **AMM-x**: These are Avoidance and Mitigation Measures (AMM) from the Final PG&E San Joaquin Valley Operation & Maintenance Habitat Conservation Plan (HCP; December 2007), which would be implemented by PG&E when working in areas of natural vegetation and where practicable. • **APM BIO-x**: These are species-or habitat-specific Biological Resources APMs for the Solar-Midway reconductoring project. Some of the APMs reference specific AMM measures listed above.	
BO-1	**General avoidance of biological resources impacts**. • Litter and trash management. All food scraps, wrappers, food containers, cans, bottles, and other trash from the Project area will be deposited in closed trash containers. Trash containers will be removed from the Project area at the end of each working day. • Parking. Vehicles and equipment will be parked on pavement, existing roads, and previously disturbed or developed areas or work areas as identified in this document. Off-road parking shall only be permitted in previously identified and designated work areas. • Route and speed limitations. Vehicles will be confined to established roadways and pre-approved access roads, overland routes and access areas. Access routes and temporary work areas will be limited to the minimum necessary to achieve the Project goals. Routes and boundaries of work areas, including access roads, will be clearly mapped prior to initiating Project construction. Vehicular speeds will be kept to 15 mph on unpaved roads. • Maintenance and refueling. All equipment will be maintained such that there will be no leaks of automotive fluids such as fuels, solvents, or oils. All refueling and maintenance of vehicles and other construction equipment will be restricted to designated staging areas located at least 100 feet from any down gradient aquatic habitat unless otherwise isolated from habitat. Proper spill prevention and cleanup equipment shall be maintained in all refueling areas. • Minimization of fire hazard. During fire season in designated State Responsibility Areas, all stationary gasoline-powered equipment operated off paved or maintained gravel/dirt roads will have federal or state approved spark arrestors. All off-road vehicles will be equipped with a backpack pump filled with water and a shovel. All fuel trucks will carry a large fire extinguisher with a minimum rating of 40 B:C, and all equipment parking and storage areas will be cleared of all flammable materials. • Pets and firearms: No pets or firearms will be permitted at the Project site.
BO-2	**Avoidance of impacts to natural habitats**. • Minimization of grading and vegetation removal along access roads and pole work areas. Clearing and grading will be limited to previous access roads that have become overgrown with vegetation. Overland access routes and work areas around pole locations will not require any grading or vegetation removal other than minimal tree trimming as described in the Project description. • Re-vegetation. Since clearing and grading is limited to reestablishment of existing roads, no re-vegetation is needed for the Project. Temporarily disturbed vegetation is expected to recover without the need for reseeding.
BO-3	**Avoidance of and minimization of potential impacts to wetlands and water resources**. Stormwater Pollution Prevention Plan and erosion control measures. A Stormwater Pollution Prevention Plan (SWPPP) will be developed that describes sediment and hazardous materials control, fueling and equipment management practices, and other factors deemed necessary for the Project. Erosion control measures will be implemented where necessary to reduce erosion and sedimentation in wetlands, waters of the United States, and waters of the state, as well as aquatic habitat occupied by sensitive species. Erosion control measures will be monitored on a regularly scheduled basis, particularly during times of heavy rainfall. Corrective measures will be implemented in the event erosion control strategies are inadequate. Sediment/erosion control measures will be continued at the Project site until such time that soil stabilization is deemed adequate. Brush or other similar debris material will not be placed within any stream channel or on its banks. No Project work activity is planned within the limits of any stream channel.

Table Ap.4A-6. PG&E Applicant Proposed Measures – Solar-Midway Reconductoring

BO-4	An environmental monitor would conduct an environmental awareness program for all construction and on-site personnel prior to the beginning of construction activities. Training would include a discussion of avoidance and minimization measures being implemented to protect biological resources as well as the terms and conditions of the Biological Opinion and other permits. Training would include information on the federal and state Endangered Species Acts and the consequences of noncompliance with these acts. Under this program, workers would be informed about the presence, life history, and habitat requirements of all special-status species with a potential to be affected within the project area. Training would include information on state and federal laws protecting nesting birds, wetlands, and other water resources. An educational brochure would be produced for construction crews working on the project. The brochure would include color photos of sensitive species as well as a discussion of mitigation measures. The Worker Education Program may be conducted in concert with other environmental or safety awareness and education programs for the Project, provided that the program elements pertaining to cultural resources are provided by a qualified instructor meeting applicable professional qualifications standards.
BO-5	An environmental monitor would be onsite during all ground-disturbing construction activities in or near sensitive habitats previously identified by a qualified biologist. The monitor would ensure implementation of and compliance with all avoidance and mitigation measures. The monitor would have the authority to stop work or determine alternative work practices in consultation with agencies and construction personnel as appropriate if construction activities are likely to impact sensitive biological resources. The environmental monitor would document monitoring activities in daily logs to document construction activities and environmental compliance. The daily logs would be included in the project report submitted to the appropriate agencies following completion of construction. The environmental monitor would be responsible for reporting any capture and relocation, harm, entrapment, or death of a listed species to the USFWS and/or the CDFG and for reporting any permit violations in a timely manner and as indicated in their respective permits. Weekly monitoring reports would be submitted to CPUC, and to any resource agencies (upon request), throughout construction. A final project summary report would be submitted to the CPUC 90 days after the completion of construction activities.
BO-6	Sensitive resources identified during pre-construction surveys in the project vicinity would be mapped and clearly marked in the field. Such areas would be avoided during construction to the extent practicable and/or additional measures specific to sensitive species types as described herein and that may be required by the USACE, FWS, CDFG, and RWQCB permits, would be implemented to avoid or minimize impacts.
BO-7	A pre-construction survey would be conducted by a qualified botanist or biologist prior to commencement of construction in each area. All rare plant populations would be appropriately marked or flagged for exclusion, or as appropriate, the limits of construction will be marked between the population and the work area. Surveys and marking or flagging must be completed no more than 30 days prior to construction. In the event that any previously unidentified listed plants, or CNPS List 1-3 plants cannot be avoided, PG&E would consult with the USFWS and/or the CDFG (depending on whether the species is on the federal or state list of sensitive species) to determine appropriate measures to minimize effects to the species and its habitat during construction of the project, as well as during operation and maintenance. The CPUC would be informed of the results of any agency consultations.

Table Ap.4A-6. PG&E Applicant Proposed Measures – Solar-Midway Reconductoring

BO-8	Pre-construction surveys would be conducted by a qualified biologist for burrowing owls for all project work areas that provide suitable nesting or wintering habitat (annual grasslands and pastures). The work area surveys would take place within the ROW, covering the work area and surrounding areas visible from the ROW. The survey would include checking for the burrowing owl and owl signs (e.g., white wash at burrow entrances). If ground-disturbing activities in suitable habitat are delayed or suspended for more than 30 days after the pre-construction surveys, the site would be resurveyed. If no burrowing owls are detected, no further mitigation is necessary. If active burrows are found near a work area, work in the vicinity of the burrows would be limited as follows: • No disturbance would occur within approximately 160 feet (50 meters) of occupied burrows during the non-breeding season of September 1 through January 31, or within approximately 250 feet (75 meters) during the breeding season of February 1 through August 31 • The limits of the exclusion zone in the project work area will be clearly marked with signs, flagging and/or fencing If work within these limits is unavoidable while burrows are active, work would only take place within the presence of a qualified monitor who would monitor to determine if the owls show signs of disturbance or, upon prior approval from CDFG a passive relocation effort (displacing the owls from the work area) may be conducted as described below, and subject to the approval of the CDFG. Passive relocation of owls may occur during the non-breeding season (September 1 through January 31) with prior approval from CDFG. Passive relocation would include installing one-way doors on the entrances of burrows. The one-way doors would be left in place for 48 hours to ensure the owls have vacated the nest site. Owls would not be relocated during the breeding season.
BO-9	The open ends of light-duty steel poles would be inspected before moving or plugged during storage to prevent harm to burrowing owls or any other sensitive species inhabiting the pole openings.
BO-10	Pre-construction bird nesting surveys for pull sites or locations of pole replacement or clearing and grading activities would be conducted seasonally before work performed between February 1 and August 15. Pre-construction surveys would be conducted within the ROW and from the ROW of areas visible from the ROW. To the extent possible, working in the vicinity of active nests would be avoided; however, if avoidance is not practicable, a buffer zone, as determined by a qualified biologist, would be maintained around the active nest to prevent nest abandonment. In the event that work would take place within 50 feet (250 feet for raptors) of an active nest, a biological monitor would monitor the activity of the nesting birds during work to determine if construction activities are resulting in significant disturbance to the birds. If the qualified biologist determines that work is disrupting nesting, then work in that area would be halted until nesting is completed and the young have fledged. Monitoring guidelines would be provided in an Avian Protection Plan to be submitted to the USFWS and CDFG for review and approval prior to construction. Documentation of Plan approval would be submitted to the CPUC for recordkeeping. Installation of the replacement power lines would conform to PG&E's most current version of Bird and Wildlife Protection Standards, and would include the use of bird guards.
The following are Avoidance and Mitigation Measures (AMM) from the Final PG&E San Joaquin Valley Operation & Maintenance Habitat Conservation Plan (HCP; December 2007), which would be implemented by PG&E when working in areas of natural vegetation and where practicable. Measures would be considered practicable where physically possible and where they would not be in conflict with other regulatory obligations or safety considerations. These AMMs listed below would be considered Biological Resources APMs for the Solar-Midway reconductoring project, and are denoted by their code as stated in the HCP, for clarity.	
AMM-1	Employees and contractors performing O&M activities will receive ongoing environmental education. Training will include review of environmental laws and guidelines that must be followed by all personnel to reduce or avoid effects on covered species during O&M activities.
AMM-2	Vehicles and equipment will be parked on pavement, existing roads, and previously disturbed areas to the extent practicable.
AMM-3	The development of new access and ROW roads by PG&E will be minimized, and clearing vegetation and blading for temporary vehicle access will be avoided to the extent practicable.
AMM-4	Vehicles will not exceed a speed limit of 15 mph in the ROWs or on unpaved roads within sensitive land-cover types.
AMM-5	Trash dumping, firearms, open fires (such as barbecues) not required by the O&M activity, hunting, and pets (except for safety in remote locations) will be prohibited in O&M work activity sites.
AMM-6	No vehicles will be refueled within 100 feet of a wetland, stream, or other waterway unless a bermed and lined refueling area is constructed.

Table Ap.4A-6. PG&E Applicant Proposed Measures – Solar-Midway Reconductoring

AMM-7	During any reconstruction of existing overhead electric facilities in areas with a high risk of wildlife electrocution (e.g., nut/fruit orchards, riparian corridors, areas along canal or creek banks, PG&E's raptor concentration zone [RCZ]), PG&E will use insulated jumper wires and bird/animal guards for equipment insulator bushings or will construct lines to conform to the latest revision of PG&E's Bird and Wildlife Protection Standards.
AMM-8	During fire season in designated State Responsibility Areas (SRAs), all motorized equipment will have federal or state approved spark arrestors; a backpack pump filled with water and a shovel will be carried on all vehicles; and fire-resistant mats and/or windscreens will be used when welding. In addition, during fire "red flag" conditions as determined by California Department of Forestry (CDF), welding will be curtailed, each fuel truck will carry a large fire extinguisher with a minimum rating of 40 B:C, and all equipment parking and storage areas will be cleared of all flammable materials.
AMM-9	Erosion control measures will be implemented where necessary to reduce erosion and sedimentation in wetlands, waters of the United States, and waters of the state, and habitat occupied by covered animal and plant species when O&M activities are the source of potential erosion problems.
AMM-10	If an activity disturbs more than 0.25 acre in a grassland, and the landowner approves or it is within PG&E rights and standard practices, the area should be returned to pre-existing conditions and broadcast-seeded using a commercial seed mix. Seed mixtures/straw used for erosion control on projects of all sizes within grasslands will be certified weed-free. PG&E shall not broadcast seed (or apply in other manner) any commercial seed or seed-mix to disturbance sites within other natural land-cover types, within any vernal pool community, or within occupied habitat for any plant covered-species.
AMM-11	When routine O&M activities are conducted in an area of potential VELB habitat, a qualified individual will survey for the presence of elderberry plants within a minimum of 20 feet from the worksite. If elderberry plants have one or more stems measuring 1 inch or more in diameter at ground level are present, the qualified individual will flag those areas to avoid or minimize potential impacts on elderberry plants. If impacts (pruning/trimming, removal, ground disturbance or damage) are unavoidable or occur, then additional measures identified in the VELB conservation plan and compliance brochure will be implemented. The VELB compliance brochure must be carried in all vehicles performing O&M activities within the potential range of VELB.
AMM-12	If a covered plant species is present, a qualified biologist will stake and flag exclusion zones of 100 feet around plant occupied habitat (both the standing individuals and the seed bank individuals) of the covered species prior to O&M activities*. (Note: AMM 11 addresses elderberry plants and valley elderberry longhorn beetle.)
AMM-13	If a covered annual plant species is present, O&M activities will occur after plant senescence and prior to the first significant rain to the extent practicable.
AMM-14	If a covered plant species is present, the upper 4 inches of topsoil will be stockpiled separately during excavations. When this topsoil is replaced, compaction will be minimized to the extent consistent with utility standards. (This measure will be used as an AMM for narrow endemic plants only after approval by USFWS and DFG during the *Confer Process.*)
AMM-15	If vernal pools are present, a qualified biologist will stake and flag an exclusion zone prior to O&M activities. The exclusion zone will encompass 250 feet .* Work will be avoided after the first significant rain until June 1, or until pools remain dry for 72 hours.
AMM-16	If suitable habitat for giant garter snake or California red-legged frog is present and protocol-level surveys have not been conducted, a qualified biologist will stake and flag an exclusion zone of 250 feet around the habitat prior to O&M activities.* Work will be avoided within this zone from October 1 to May 1 for giant garter snake and from the first significant rain to May 1 for California red-legged frog.
AMM-17	If suitable habitat for covered amphibians and reptiles is present and protocol-level surveys have not been conducted, a qualified biologist will conduct preconstruction surveys prior to O&M activities involving excavation. If necessary, barrier fencing will be constructed around the worksite to prevent reentry by the covered amphibians and reptiles. A qualified biologist will stake and flag an exclusion zone of 50 feet around the potentially occupied habitat.* No monofilament plastic will be used for erosion control in the vicinity of listed amphibians and reptiles. Barrier fencing will be removed upon completion of work. Crews will also inspect trenches left open for more than 24 hours for trapped amphibians and reptiles. A qualified biologist will be contacted before trapped amphibians or reptiles (excluding blunt nosed leopard lizard and limestone salamander) are moved to nearby suitable habitat.
AMM-18	If western burrowing owls are present at the site, a qualified biologist will work with O&M staff to determine whether an exclusion zone of 160 feet during the non-nesting season and 250 feet during the nesting season can be established. If it cannot, an experienced burrowing owl biologist will develop a site-specific plan (i.e., a plan that considers the type and extent of the proposed activity, the duration and timing of the activity, the sensitivity and habituation of the owls, and the dissimilarity of the proposed activity with background activities) to minimize the potential to affect the reproductive success of the owls.

Table Ap.4A-6. PG&E Applicant Proposed Measures – Solar-Midway Reconductoring

AMM-19	If a Swainson's hawk nest or white-tailed kite nest is known to be within 0.25 mile of a planned worksite, a qualified biologist will evaluate the effects of the planned O&M activity. If the biologist determines that the activity would disrupt nesting, a buffer and limited operation period (LOP) during the nesting season (March 15–June 30) will be implemented. Evaluations will be performed in consultation with the local DFG representative.
AMM-20	PG&E staff shall avoid occupied or potentially occupied burrows identified by a qualified biologist within two core-areas for San Joaquin antelope squirrel and giant kangaroo rat identified by DFG. If occupied or potentially occupied burrows in the core areas cannot be avoided, a qualified PG&E biologist shall stake and flag a work-exclusion zone of at least 30 feet* and remain on-sight as a biological monitor, or the biologist shall stake and flag a work exclusion zone of 50 feet around active burrows prior to covered activities at the job site. If work must proceed in the exclusion zone, PG&E will pursue techniques to minimize direct mortality including using approved biologists to trap and hold the species in captivity, and excavating and closing burrows. The approved biologist will hold an ESA Section 10(a)(1)(A) permit for the species. The approved biologist will release the mammals as soon as possible when the work is complete. If active (occupied or potentially occupied) burrows for San Joaquin antelope squirrel or giant or Tipton kangaroo rat are present outside the two core areas identified by DFG, a qualified biologist will stake and flag an exclusion zone of 30 feet and remain on-site as a biological monitor, or the biologist shall stake and flag a work exclusion zone of 50 feet around the burrows prior to O&M activities on the job site.
AMM-21	If San Joaquin kit fox dens are present, their disturbance and destruction will be avoided where possible. However, if dens are located within the proposed work area and cannot be avoided during construction, qualified biologists will determine if the dens are occupied. If unoccupied, the qualified biologist will remove these dens by hand excavating them in accordance with USFWS procedures (U.S. Fish and Wildlife Service, 1999). Exclusion zones will be implemented following USFWS procedures (U.S. Fish and Wildlife Service, 1999) or the latest USFWS procedures. The radius of these zones will follow current standards or will be as follows: Potential Den—50 feet; Known Den—100 feet; Natal or Pupping Den—to be determined on a case-by-case basis in coordination with USFWS and DFG. Pipes will be capped and exit ramps will also be installed in these areas to avoid direct mortality.
AMM-22	All vegetation management activities will implement the nest protection program to avoid and minimize effects on Swainson's hawk, white-tailed kite, golden eagle, bald eagle, and other nesting birds. Additionally, trained pre-inspectors will use current data from DFG and CNDDB and professional judgment to determine whether active Swainson's hawk, golden eagle, or bald eagle nests are located near proposed work. If pre-inspectors identify an active nest near a proposed work area, they will prescribe measures to avoid nest abandonment and other adverse effects to these species, including working the line another time of year, maintaining a 500-foot setback, or if the line is in need of emergency pruning, contacting HCP Administrator.
AMM-23	If medium or large disturbance covered activities take place within 0.5 miles of an active breeding colony of tricolored blackbirds or bank swallows or a small disturbance covered activities take place within 350 feet of an active breeding colony of these species a qualified biologist will evaluate the site prior to work during the breeding season (April 1-July 31). If an active colony of either species could be disrupted by the covered activity, the biologist will stake and flag an exclusion zone of at least 350 feet around the colony prior to O&M activities at the site. This exclusion zone will be established in the field based on site conditions, the covered activity, and professional judgment by a qualified PG&E biologist and will be greater than the minimum distance. Work will not occur in this exclusion zone during April 1–July 31.*
AMM-24	If activities take place in blunt-nosed leopard lizard within the range of the species and outside the road shoulder, PG&E staff will identify if burrows are present and if work can avoid burrows. If work cannot avoid the burrows, a qualified biologist will evaluate the site for occupancy and stake and flag an exclusion zone of 50 feet around the burrows prior to O&M activities at the job site.*
AMM-25	If activities take place in designated occupied habitat[1] of Buena Vista Lake shrew, a qualified biologist will stake and flag an exclusion zone of 100 feet* around all suitable habitat, and PG&E staff will minimize the use of mechanical equipment and the area of ground disturbance.
AMM-26	If activities take place in designated occupied habitat[1] of the riparian brush rabbit, a qualified biologist will stake and flag an exclusion zone of 100 feet* around all suitable habitat, and PG&E staff will minimize the use of mechanical equipment and the area of ground disturbance. Work will be avoided during the reproductive period (January 1 to May 31).
AMM-27	If activities take place in designated occupied habitat[1] of the riparian woodrat, a qualified biologist will stake and flag an exclusion zone of the maximum practicable distance up to 100 feet around all suitable habitat, and PG&E staff will minimize the use of mechanical equipment and the area of ground disturbance.
AMM-28	If activities take place in designated occupied habitat[1] of the limestone salamander, a qualified biologist will stake and flag an exclusion zone of the maximum practicable distance up to 100 feet around all suitable habitat, and PG&E staff will minimize the use of mechanical equipment and minimize the area of ground disturbance.

Table Ap.4A-6. PG&E Applicant Proposed Measures – Solar-Midway Reconductoring

AMM-29	No herbicide will be applied within 100 feet of exclusion zones, except when applied to cut stumps or frilled stems or injected into stems.
AMM-30	Trees being felled in the vicinity of an exclusion zone will be directionally felled away from the zone, where possible. If this is not feasible, the tree will be removed in sections.
The following are species-specific Biological Resources APMs for the Solar-Midway reconductoring project. Some of the APMs reference specific AMM measures listed above.	
APM BIO-1	**Implement avoidance and minimization measures outlined in PG&E's O&M San Joaquin Valley Habitat Conservation Plan.** The blunt-nosed leopard lizard is a covered species in the HCP. The following avoidance and minimization measure from the HCP addresses blunt-nosed leopard lizards: "AMM-24: If activities take place in suitable blunt-nosed leopard lizard habitat within the range of the species and outside the road shoulder, PG&E staff will identify if burrows are present and if work can avoid the burrows. If work cannot avoid the burrows, a qualified biologist will evaluate the site for occupancy and stake and flag an exclusion zone of 50 feet around the burrows prior to O&M activities at the job site. " [this text is not included under AMM-24 in our table] "If an exclusion zone cannot extend the specified distance from the habitat, the biologist will stake and flag a restricted activity zone of the maximum practicable distance from the exclusion zone around the habitat. This exclusion zone distance is a guideline that may be modified by a qualified biologist, based on site-specific conditions (including habituation by the species to background disturbance levels). Measures are practicable where physically possible and not conflicting with other regulatory obligations or safety considerations; O&M activities will be prohibited or greatly restricted within restricted activity zones. However, vehicle operation on existing roads and foot travel will be permitted. A qualified biologist will monitor O&M activities near flagged exclusion and restricted activity zones. Within 60 days after O&M activities have been completed at a given worksite, all staking and flagging will be removed.
APM BIO-2	**Avoid and/or minimize potential impacts to blunt-nosed leopard lizards by establishing work areas in locations that will have the least negative impacts.** When construction vehicles must travel off existing access roads within suitable habitat, a qualified biologist will walk ahead of construction vehicles and identify a route for the vehicles to follow that will avoid burrows to the greatest extent practicable. If guard crossing poles need to be established within suitable blunt-nosed leopard lizard habitat, a biologist will work with construction crews to ensure that the poles are sited to avoid burrows. When removal of shrubs is necessary to allow vehicle access, it is recommended that the shrubs be removed by hand.
APM BIO-3	**Fence work areas, cover burrows with plywood mats, and conduct protocol surveys if burrows cannot be avoided.** If burrows occurring within the work area cannot be avoided, the work area will be fenced using material that blunt-nosed leopard lizards cannot climb. Protocol surveys will be conducted to determine if blunt-nosed leopard lizards occur within the fenced area. If blunt-nosed leopard lizards do occur, the burrows that occur along the vehicle access route will be covered with plywood mats during O&M activities and removed before the end of the work day. If necessary, contact a CDFG or USFWS representative so that the lizards may be passively relocated.
APM BIO-4	**Conduct work in suitable blunt-nosed leopard lizard habitat during the active season.** To lessen the potential of entrapping blunt-nosed leopard lizards in burrows, construction activities should occur during the active seasons for the blunt-nosed leopard lizards (generally April 15 through June 30 and August 1 through September 15).
APM BIO-5	**Conduct work in suitable habitat during periods when the species are most active.** When construction activities occur in habitat suitable for San Joaquin whipsnake and coast horned lizard, when practicable, the work should be conduct work in suitable habitat during warm weather, when these species are most likely to be active. Drive slowly on access roads and overland while in suitable habitat to allow these species to move out of the way of vehicles.
APM BIO-6	**Remove existing nests on towers, trim trees, and remove shrubs during the non-breeding season.** To lessen the potential for nesting birds, especially raptors, from nesting on the towers, PG&E crews should remove existing nests on towers during the non-breeding season (September 1 through February 28). PG&E should also trim any trees or remove any shrubs that could provide nesting habitat during the non-breeding season.

Table Ap.4A-6. PG&E Applicant Proposed Measures – Solar-Midway Reconductoring

APM BIO-7	**Conduct preconstruction surveys for active special-status and non-special-status raptors and migratory birds.** Construction activities are anticipated to occur mainly during the nesting season for migratory birds and raptors (generally March through August). PG&E will retain a qualified wildlife biologist to conduct preconstruction surveys for nesting birds for all construction activities that occur within or near suitable breeding habitat. The surveys will be conducted no more than 1 week prior to the start of construction activities and will cover all affected areas, including construction areas and staging areas where ground disturbance or vegetation clearing is required. If no active nests are detected, a letter report documenting survey methods and findings will be submitted to CDFG, and no further mitigation is required.
APM BIO-8	**Implement measures to avoid active nests.** If surveys indicate that migratory bird or raptor nests do occur in areas where construction activities will take place, a no-disturbance buffer will be established around the nest site to avoid disturbance or destruction of the nest site until after the breeding season or until a wildlife biologist determines that the young have fledged. Generally, the buffer zones are 50 feet for nesting passerine birds and 250 feet for nesting raptors other than Swainson's hawks. However, the extent of these buffers will be determined through coordination with CDFG and will depend on the level of noise or construction disturbance, line of sight between the nest and the disturbance, ambient levels of noise and other disturbances, and other topographical or artificial barriers. These factors will be analyzed to make an appropriate decision on buffer distances. Active nests occurring in or near the study area will be monitored during construction by the onsite monitor. If the onsite monitor determines that birds on the nest are stressed (e.g., a bird constantly leaving an active nest or a bird not returning to the nest regularly to feed chicks), construction will be halted and CDFG contacted to determine a further course of action.
APM BIO-9	**Conduct preconstruction surveys for active western burrowing owl burrows.** CDFG (1995) recommends that preconstruction surveys be conducted at all work areas (except paved areas) in project study areas and in a 250 foot-wide buffer zone around the work areas to locate active burrowing owl burrows. PG&E will retain a qualified biologist to conduct preconstruction surveys for active burrows no more than 30 days prior to the start of construction according to the CDFG guidelines. The surveys will include a nesting season survey and a wintering season survey, which is the season immediately preceding construction. If no burrowing owls are detected, a letter report documenting survey methods and findings will be submitted to CDFG, and no further mitigation is required.
APM BIO-10	**Implement avoidance and minimization measures outlined in PG&E's O&M San Joaquin Valley Habitat Conservation Plan if active burrows are observed during the preconstruction surveys in both Kern and San Luis Obispo Counties.** "AMM-18: If western burrowing owls are present at the site, a qualified biologist will work with O&M staff to determine whether an exclusion zone of 160 feet during the non-nesting season and 250 feet during the nesting season can be established. If it cannot, an experienced burrowing owl biologist will develop a site-specific plan (i.e. a plan that considers the type and extent of the proposed activity, the duration and timing of the activity, the sensitivity and habituation of the owls, and the dissimilarity of the proposed activity with background activities) to minimize the potential to affect the reproductive success of the owls." If the owls show signs of disturbance or, upon prior approval from CDFG, a passive relocation effort may be conducted as described below, and subject to the approval of CDFG. Passive relocation of western burrowing owls may occur during the non-breeding season (September 1 through January 31) with prior approval from CDFG. Passive relocation would include installing one-way doors on the entrances of burrows. The one-way doors would be left in place for 48 hours to ensure the owls have vacated the nest site. Owls would not be relocated during the breeding season.
APM BIO-11	**Implement preconstruction measure outlined in PG&E's O&M San Joaquin Valley Habitat Conservation Plan.** "AMM-22: PG&E will retain qualified biologists to determine whether active Swainson's hawk or white-tailed kite nests are located within 0.25 mile of the proposed work area. If the biologists identify an active nest within 0.25 mile of the proposed work area, they will prescribe measures to avoid nest abandonment and other adverse effects to these species, including working the line another time of year or maintaining an appropriate setback for those species. Evaluations will be performed in consultation with the local DFG representative"
APM BIO-12	**Implement avoidance and minimization measures outlined in PG&E's O&M San Joaquin Valley Habitat Conservation Plan if active Swainson's hawk or white-tailed kite nests are observed during the preconstruction surveys.** "AMM-19: If a Swainson's hawk or white-tailed kite nest is known to be within 0.25 mile of a planned worksite, a qualified biologist will evaluate the effects of the planned O&M activity. If the biologist determines that the activity would disrupt nesting, a buffer and limited operation period (LOP) during the nesting season (March 15-June 30) will be implemented. Evaluations will be performed in consultation with the local DFG representative."

Table Ap.4A-6. PG&E Applicant Proposed Measures – Solar-Midway Reconductoring

APM BIO-13	**Avoid and/or minimize potential impacts to San Joaquin antelope squirrel, giant kangaroo rat, Tipton kangaroo rat, short-nosed kangaroo rat, and Tulare grasshopper mouse by establishing work areas in locations that will have the least negative impacts.** When construction vehicles must travel off existing access roads within suitable habitat, a qualified biologist will walk ahead of construction vehicles and identify a route for the vehicles to follow that will avoid burrows to the greatest extent practicable. If guard crossing poles need to be established within suitable blunt-nosed leopard lizard habitat, a biologist will work with construction crews to ensure that the poles are sited to avoid burrows. When removal of shrubs is necessary to allow vehicle access, it is recommended that the shrubs be removed by hand.
APM BIO-14	**Implement avoidance and minimization measures outlined in PG&E's O&M San Joaquin Valley Habitat Conservation Plan when working in suitable San Joaquin antelope squirrel, giant kangaroo rat, Tipton kangaroo rat, short-nosed kangaroo rat, and Tulare grasshopper mouse habitat in Kern and San Luis Obispo Counties.** "AMM-20: PG&E staff shall avoid occupied or potentially occupied burrows identified by a qualified biologist within suitable habitat for San Joaquin antelope squirrel, giant kangaroo rat, Tipton kangaroo rat, short-nosed kangaroo rat, and Tulare grasshopper mouse. If occupied or potentially occupied burrows cannot be avoided, a qualified biologist shall stake and flag a work-exclusion zone of at least 30 feet and remain on-site as a biological monitor, or the biologist shall stake and flag a work exclusion zone of 50 feet around active burrows prior to covered activities at the job site. If work must proceed in the exclusion zone, PG&E will pursue techniques to minimize direct mortality; which may include having approved biologists trap and hold species in captivity, and excavating and closing burrows. The approved biologist will release the mammals as soon as possible when the work is complete." Another possible technique that may be implemented to minimize direct mortality will be to cover suitable burrows that occur along the vehicle access route with plywood mats during O&M activities. These boards will be removed before the end of the work day.
APM BIO-15	**Implement avoidance and minimization measures to reduce impacts to American badgers.** Avoid suitable burrows to the greatest extent possible. Drive slowly to allow badgers to move out of work area. If potential dens are present in the construction site and cannot be avoided, the following measures are required to avoid potential significant impacts to the American badger: • If the qualified biologist determines that potential dens are inactive, the biologist shall excavate these dens by hand with a shovel to prevent badgers from re-using them during construction. • If the qualified biologist determines that potential dens may be active, the entrances of the dens shall be blocked with soil, sticks, and debris for three to five days to discourage the use of these dens prior to project disturbance. The den entrances shall be blocked to an incrementally greater degree over the three to five day period. After the qualified biologist determines that badgers have stopped using active dens within the project boundary, the dens shall be hand-excavated with a shovel to prevent re-use during construction.
APM BIO-16	**Implement avoidance and minimization measures outlined in PG&E's O&M San Joaquin Valley Habitat Conservation Plan when construction activities occur in suitable San Joaquin kit fox habitat in Kern and San Luis Obispo Counties.** "AMM-21: If San Joaquin kit fox dens are present, their disturbance and destruction will be avoided where possible. However, if dens are located within the proposed work area and cannot be avoided during construction, a qualified biologist will determine if the dens are occupied. If unoccupied, the qualified biologist will remove dens by hand excavating them in accordance with USFWS procedures. Exclusion zones will be implemented following USFWS procedures. The radius of these zones will follow current standards or will be as follows: Potential Den- 50 feet; Known Den-100 feet; Natal or Pupping Den-to be determined on a case-by-case basis in coordination with the USFWS and DFG. Pipes will be capped and exit ramps will be installed in excavated trenches in these areas to avoid direct mortality."
APM BIO-17	**May or may not be required pending agency communications.** Biologists will consult with CDFG biologists to determine if calving areas for tule elk or pronghorn occur near the project. If calving grounds do occur near the project, construction activities should be rescheduled to occur after the calving season, generally May through July.

Table Ap.4A-6. PG&E Applicant Proposed Measures – Solar-Midway Reconductoring

APM BIO-18	**Implement avoidance measures outlined in PG&E's O&M San Joaquin Valley Habitat Conservation Plan when construction activities occur in occupied habitat for special status plants.** "AMM-11: When routine O&M activities are conducted in an area of potential valley elderberry longhorn beetle habitat, a qualified individual will survey for the presence of elderberry plants within a minimum of 20 feet from the worksite. If elderberry plants have one or more stems measuring 1 inch or more in diameter at ground level are present, the qualified individual will flag those areas to avoid or minimize potential impacts on elderberry plants. If impacts (pruning/trimming, removal, ground disturbance or damage) are unavoidable or occur, then additional measures identified in the VELB conservation plan and compliance brochure will be implemented. The VELB compliance brochure must be carried in all vehicles performing O&M activities within the potential range of VELB." "AMM 12 - If a covered plant species is present, a qualified biologist will stake and flag exclusion zones of 100 feet around plant occupied habitat (both the standing individuals and the seed bank individuals) of the covered species prior to O&M activities." "AMM 13 - If a covered annual plant species is present, O&M activities will occur after plant senescence and prior to the first significant rain to the extent practicable." "AMM 14 - If a covered plant species is present, the upper 4 inches of topsoil will be stockpiled separately during excavations. When this topsoil is replaced, compaction will be minimized to the extent consistent with utility standards. (This measure will be used as an AMM for narrow endemic plants only after approval by USFWS and DFG).
APM BIO-19	**Minimize impacts to special status plants to the extent possible.** In order to minimize impacts to known and unknown occurrences of special status plants which that cannot be fully avoided, PG&E will conduct surveys in all previously unsurveyed areas which potentially support special-status plants. PG&E will use existing access roads and disturbed areas as much as possible, and will establish work zones in the least densely occupied areas of the population(s). Grading with the applicable work zones will be prohibited and shrub removal, if required, will be conducted by hand and will be limited to the minimum amount of removal necessary to complete project activities.
APM BIO-20	**Implement management practices to control the introduction and spread of invasive plants.** Prior to construction, PG&E will identify the location of noxious weed species of concern within areas that will be disturbed as part of the project. Appropriate management practices will be designed by a botanist and implemented during construction to reduce the likelihood of spreading already established weeds into new areas or increasing their abundance, and of introducing new weed species to the project area. Actions to prevent noxious weed establishment will be described within the SWPPP prepared for the project, and will be consistent with PG&E's draft Invasive Plant Management Strategy. The project SWPPP will include BMPs such as using construction equipment that has been cleaned of soil and plant parts, including seeds, before entering the project area and using weed-free straw for erosion control. Disturbed areas will be revegetated with appropriate locally-based native seed mixes.
APM BIO-21	**Implement general protection measures for waters of the United States.** During construction, PG&E will implement the following measures to minimize or avoid impacts to waters of the United States: • Establish exclusion zones and minimize the amount of area disturbed to the minimum amount necessary to complete the work. Align work areas to avoid wetland areas and margins as much as feasible. • Delineate wetland areas within proximity to work areas, and restrict construction personnel and equipment from entering fenced protected areas. • Conduct all fueling of vehicles, equipment, and helicopters at least 100 feet from wetlands and other waterbodies (see general AMM 6 in this section for appropriate protection measures). • To the extent feasible, complete road construction adjacent or within waters of the United States during the dry season. If it is not feasible to complete road construction work during the dry season, PG&E will use appropriate erosion control measures for the site. • Install temporary bridges to span waters of the United States during wet season for equipment crossings.
(MM BR-1.1) No longer required	
MM BR-1.2 [Deleted]	

Table Ap.4A-6. PG&E Applicant Proposed Measures – Solar-Midway Reconductoring

APM BIO-22 (MM BR-1.3) **Compensation for permanent impacts to giant kangaroo rat, San Joaquin kit fox, and San Joaquin antelope squirrel and preparation of a Habitat Mitigation and Monitoring Plan.**

Compensation. To compensate for permanent impacts to giant kangaroo rat, San Joaquin kit fox, and San Joaquin antelope squirrel, the Applicant shall acquire parcels of land at a 3:1 ratio, containing suitable and occupied habitat for these species. The habitat must not already be public land and shall be located within the Carrizo Plain. The preserved habitat for permanent impacts to the species noted above shall be of equal or greater habitat quality to the impacted areas in terms of soil features, extent of disturbance, vegetative structure, and composition and shall contain verified extant populations, of a similar size to those impacted, of giant kangaroo rat and/or San Joaquin kit fox and/or San Joaquin antelope squirrel. Depending on availability, lands may have to be acquired in different locations, at the specified ratios, to satisfy mitigation for each of the above species. If one parcel of land meets the habitat and population requirements for all three species, separate acquisitions would not be required.

A conservation easement would need to be recorded on all property associated with the mitigation lands as to protect the existing plant resources in perpetuity. A conservation easement could be held by CDFG or an approved land management entity and shall be recorded immediately upon the dedication or acquisition of the land. Preserved or acquired mitigation lands shall be monitored and maintained per the requirements set forth the Habitat Mitigation and Monitoring Plan prepared for the project and discussed below.

The location of all lands proposed for mitigation land must be submitted to the CPUC for review and approval, prior to the issuance of a grading permit.

Habitat Mitigation and Monitoring Plan. To ensure the success of on-site preserved land and acquired mitigation lands required for compensation of permanent impacts to vegetative communities and listed or special-status plants and wildlife, the applicant shall retain a qualified biologist to prepare a Habitat Mitigation and Monitoring Plan (HMMP). The HMMP shall be submitted to the CPUC, prior to the issuance of a notice to proceed for construction. The HMMP shall include, at a minimum, the following information:

1. Summary of anticipated habitat impacts and the proposed mitigation.
2. Detailed description of the location and boundaries of undisturbed project areas proposed for preservation and off-site mitigation lands and a description of existing site-wide conditions.
3. Discussion of measures to be undertaken to enhance (e.g., through focused management) the on-site preserved habitat and off-site mitigation lands for listed and special-status species.
4. Dedication of adequate funds consistent with the PAR analysis required for CDFG and USFWS permit requirements.
5. Description of management and maintenance measures (e.g., managed grazing, fencing maintenance).
6. Discussion of habitat and species monitoring measures for on-site preservation areas and off-site mitigation lands, including specific, objectives, performance criteria, monitoring methods, data analysis, reporting requirements, monitoring schedule, etc.
7. Development of a monitoring strategy for the monitoring of indirect impacts to vegetation and wildlife from alteration to the solar and hydric regimes as a result of solar panels.
8. Development of a monitoring strategy, which shall serve to document the persistence of giant kangaroo rat, San Joaquin kit fox, and San Joaquin antelope squirrel populations within the project site. This monitoring shall be conducted for a minimum of 5 years after the completion of construction activities. The strategy, should include, at the minimum, the following:
   a) Documentation of pre-project population levels for the species noted above, based on results of focused pre-construction surveys and previously supplied applicant data.
   b) On-going monitoring of species populations upon completion of construction activities, while the project is in operation, for a minimum of three years.
   c) Monitoring of reference populations for each of these species in areas that contain undisturbed habitat, such as the Carrizo Plain National Monument.
   d) An analysis of the comparison of percent changes in population levels at the project and reference sites to be used in the determination of additional compensatory mitigation.
9. A contingency plan for mitigation elements that do not meet performance or final success criteria within 5 years; this plan shall include specific triggers for remediation if performance criteria are not being met and a description of the process by which remediation of problems within the mitigation site (e.g., presence of noxious weeds) shall occur.

Table Ap.4A-6. PG&E Applicant Proposed Measures – Solar-Midway Reconductoring

APM BIO-23 (MM BR-3.1)	**Focused pre-construction surveys for blunt-nosed leopard lizard and implementation of avoidance measures.** Prior to commencing any site disturbance, the Applicant shall implement pre-construction reconnaissance level surveys (minimum of 3 surveys) for blunt-nosed leopard lizard. Surveys shall be conducted by a qualified biologist(s) knowledgeable about the species prior to the initiation of ground disturbance in each of the proposed switching station locations. If present, active blunt-nosed leopard lizard burrows shall be flagged and PG&E shall cease all work activities within 50 feet of the sighting, or as otherwise directed by USFWS and CDFG. Protocol level surveys shall then be conducted within the switching stations in which the species was observed to determine their distribution on the site. Work may not resume until the protocol surveys have been completed. Upon completion of surveys a 1,000-foot buffer shall be placed around all active blunt-nosed leopard lizard habitat. The buffer may be adjusted pending the approval of the USFWS and CDFG. A minimum of 1,000 feet of linear exclusionary fencing shall be erected to prevent blunt-nose access work areas. Fencing shall consist of 36-inch tall silt fencing which will be partially buried to a depth of 6 inches. Each end of the fencing shall be monitored, during daily construction activities, to insure that no blunt-nosed leopard lizards enter active work areas. Where previously sighted, the biologist shall conduct clearance surveys each morning, prior to initiation of daily construction activities, to ensure that no lizards have entered the work area over night. The fencing and monitoring shall remain in place until work in that area is complete or additional protocol-level surveys yield negative results for blunt-nosed in the previously occupied areas. Should a blunt nosed leopard lizard enter the work area, all construction activities shall cease within 300-feet of the animal until it has left the area on its own. The buffer and work stoppage will remain in effect in these areas until such a time that Protocol surveys yield negative results for the species. The resumes of the proposed biologist(s) shall be provided to the CPUC, CDFG, and USFWS for concurrence prior to the commencement of surveys.
APM BIO-24 (MM BR-3.2)	**Compensation for impacts to occupied blunt-nosed leopard lizard**. The Applicant shall compensate for temporary impacts to occupied blunt-nosed leopard lizard habitat at a minimum 0.5:1 ratio. The mitigation areas must provide occupied habitat that is of equal or greater habitat quality compared to the impacted habitat, and must be located within the Carrizo Plain. A conservation easement would need to be recorded on all property associated with the mitigation lands as to protect the existing resources in perpetuity. A conservation easement could be held by CDFG or an approved land management entity and shall be recorded immediately upon the dedication or acquisition of the land. Preserved or acquired mitigation lands shall be monitored and maintained per the requirements set forth the Habitat Mitigation and Monitoring Plan prepared for the project. If lands acquired or protected for the compensation of permanent impacts to giant kangaroo rat, San Joaquin kit fox, San Joaquin antelope squirrel (discussed below), and/or vegetation communities (discussed above) contain similar amounts of occupied habitat similar in size to that of the impacted blunt-nosed leopard lizard habitat, of equal or greater habitat value, no further mitigation would be required. The location of all lands proposed for mitigation land must be submitted to the CPUC, CDFG and USFWS for review and approval, prior to the issuance of a grading permit.
APM BIO-25 (MM BR-4.1)	**Focused pre-construction surveys for San Joaquin whipsnakes and coast horned lizard and implementation of avoidance measures.** PG&E shall retain a qualified biologist approved by USFWS and CDFG to conduct pre-construction surveys immediately prior to (i.e., the morning of the commencement of) construction of the switching stations. If San Joaquin whipsnakes or coast horned lizards are found within the area of disturbance the biologist shall passively relocate the animals to a preapproved location outside the project area. The candidate locations for species relocation shall be identified prior to construction and based on the size and type of habitat present, the potential for negative interactions with resident species, and species range.

Table Ap.4A-6. PG&E Applicant Proposed Measures – Solar-Midway Reconductoring

	Cultural Resources
CR-1	**Pre-construction Worker Education Program.** PG&E will design and implement a Worker Education Program that will be provided to all Project personnel who may encounter and/or alter historical resources or unique archaeological properties, including construction supervisors and field personnel. No construction worker will be involved in field operations without having participated in the Worker Education Program. The Worker Education Program shall include, at a minimum: • A review of archaeology, history, prehistory and Native American cultures associated with historical resources in the Project vicinity. • A review of applicable local, state and federal ordinances, laws and regulations pertaining to historic preservation. • A discussion of site avoidance requirements and procedures to be followed in the event that unanticipated cultural resources are discovered during implementation of the Project. • A discussion of disciplinary and other actions that could be taken against persons violating historic preservation laws and PG&E policies. • A statement by the construction company or applicable employer agreeing to abide by the Worker Education Program, PG&E policies and other applicable laws and regulations. The Worker Education Program may be conducted in concert with other environmental or safety awareness and education programs for the Project, provided that the program elements pertaining to cultural resources are provided by a qualified instructor meeting applicable professional qualifications standards.
CR-2	**Unanticipated discoveries management**. In the unlikely event that previously unidentified cultural resources are uncovered during implementation of the Project, all work within 165 feet (50 meters) of the discovery will be halted and redirected to another location. PG&E's cultural resources specialist or his/her designated representative will inspect the discovery and determine whether further investigation is required. If the discovery can be avoided and no further impacts will occur, the resource will be documented on State of California Department of Parks and Recreation cultural resource records and no further effort will be required. If the resource cannot be avoided and may be subject to further impact, PG&E will evaluate the significance and CRHR eligibility of the resources, and implement data recovery excavation or other appropriate treatment measures if warranted.
CR-3 (MM CR-2.4)	**Follow State Health and Safety Code Section 7050.5 if human remains identified**. If human remains or possible human remains are encountered at any stage in the project, the Applicant shall be responsible for following the State Health and Safety Code Sections 7050.5 regarding handling, treatment, and disposition of those remains. Section 7050.5 states that the County Coroner must be notified immediately when any remains are found that might be human in origin. The Coroner will determine whether the remains are Native American and archaeological in nature. If the remains are not archaeological and Native American, the Coroner will take possession immediately. If the remains are archaeological and Native American, the Coroner will notify the California Native American Heritage Commission; the Commission will identify the Most Likely Descendant (MLD) for the remains. With the permission of the land owner or his/her authorized representative, the MLD may inspect the site of the discovery. The MLD shall complete the inspection within 48 hours of notification by the Commission. The MLD may recommend scientific removal and nondestructive analysis of human remains and items associated with Native American burials. The MLD will decide on the appropriate treatment and disposition of the remains, in consultation with the landowner or his/her representative.
Note:	**The following Cultural Resources APMs were inadvertently omitted from the Draft EIR. They are re-numbered from the PG&E Cultural Resources Inventory Report. The numbers from the CRIR are shown in parentheses below the APM number.**
CR-4 (CUI-1 in CRIR)	**Install Silt Fencing along Existing Access Roads and Prohibit Grading along the Fenced Road Segments**. Prior to construction, a PG&E cultural resources specialist or PG&E's authorized agent will install standard 2-ft-tall silt fencing along the edge of existing access roads that are located near where cultural resources are known to exist. The fencing will be installed parallel to the road, between the road and the resource. The length of the fencing shall equal the width of the resource area plus 100 feet, such that the fencing extends 50 feet in both directions beyond the width of the resource. PG&E will map the location of silt fencing on construction plans to ensure implementation of this APM. PG&E or its authorized agent will inspect the fencing on a weekly basis to ensure its integrity and that of the cultural resource. PG&E will prohibit grading along the fenced portions of the access roads.
CR-5 (CUI-5 in CRIR)	**Obtain a Clearance on the Foreign Transmission Line Crossing near Tower 159**. PG&E will obtain a clearance on the foreign transmission line that crosses the Morro Bay–Midway 230-kV Transmission Line. The line clearance will eliminate the need to build a crossing structure on site P-15-4014 [Prehistoric midden site with human remains].

Table Ap.4A-6. PG&E Applicant Proposed Measures – Solar-Midway Reconductoring

CR-6 (CUL-6 in CRIR)	**Protect Transmission Line Crossing with a Truck-Mounted Bucket.** PG&E will use a truck-mounted bucket on an electrically grounded vehicle to guard the foreign transmission line crossing. Use of a vehicle to protect the crossing will eliminate the need for excavation into P-15-4014[Prehistoric midden site with human remains],although the vehicle will still have the potential to crush and displace archaeological materials on the site surface. To minimize or prevent damage to surficial archaeological material, PG&E will retain a qualified archaeologist to mark a safe path (one that does not traverse visible archaeological materials) from the nearest road to the transmission line crossing. The archaeologist will identify the path by conducting an intensive archaeological survey between the road and crossing area. The archaeologist will then guide the vehicle to the work area. The archaeologist will also lead the vehicle out of the work area upon the completion of work at the crossing.
CR-7 (CUL-7 in CRIR)	**Build Low-Impact Crossing Structure on P-15-4014.** PG&E will build a low-impact, scaffold-style crossing structure on the surface of P-15-4014 [Prehistoric midden site with human remains]. This structure will substitute smaller 2 x 4 supports for the minimum of two 46-cm (18-inch)-diameter poles that are typically used to construct crossing structures. To minimize or prevent damage to surficial archaeological material, PG&E will retain a qualified archaeologist to mark a safe path (one that does not traverse visible archaeological materials) from the nearest road to the transmission line crossing. The archaeologist will identify the path by conducting an intensive archaeological survey between the road and crossing area. The archaeologist will then guide the vehicle to the work area. The archaeologist will also lead the vehicle out of the work area upon the completion of work at the crossing.
CR-8 (CUL-9 in CRIR)	**Avoidance Through Project Design**. [This APM is to address impact to a cultural resource near Tower 143 PG&E has decided not to replace or modify Tower 143. Therefore, this APM no longer is applicable.]
CR-9 (CUL-10 in CRIR)	**Evaluate P-15-1493's Significance and Prepare and Implement a Site-Specific Archaeological Treatment Plan.** If avoidance is not feasible, PG&E will evaluate P-15-1493 [Prehistoric site] for eligibility to the NRHP and CRHR. If P-15-1493 is found to be ineligible for the NRHP and CRHR, no further work is needed at the site. If P-15-1493 is eligible for the NRHP and CRHR, PG&E will prepare a work plan describing criteria for significance, including a research design, and conduct a test excavation at the site. PG&E shall extend to the USACE, SHPO, and any other consulting parties the opportunity to comment on the work plan prior to its implementation. Should P-15-1493 qualify for listing in the NRHP and CRHR, PG&E will prepare and implement a site-specific archaeological treatment plan at P-15-1493. The USACE, SHPO, and any other consulting parties will review the plan during Section 106 consultation. The plan will describe the proposed construction work and approximate volume of site damage expected, methods for the recovery of archaeological materials, laboratory methods, and reporting of results. PG&E will prepare and implement the plan prior to construction.
CR-10 (APM CUL-13 in CRIR)	**Survey Unexamined Areas for the Presence of Cultural Resources.** As PG&E identifies new project elements or gains access to previously unexamined areas, PG&E will retain qualified cultural resource specialists to survey the area(s) prior to construction. The survey results will be reported in a cultural resources inventory report that meets the standards promulgated in Archeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines (48 Federal Register 44716–44742) and the Office of Historic Preservation's (1990) Archaeological Resource Management Reports (ARMR): Recommended Contents and Format. PG&E will forward the report to the appropriate agencies during Section 106 consultation. Construction in the unexamined areas will not commence until the report is approved by the appropriate agencies.

Table Ap.4A-6. PG&E Applicant Proposed Measures – Solar-Midway Reconductoring

PAL-1 (MM PA-1.1)	**Paleontological Monitoring and Treatment Plan**. Prior to construction permit issuance, the Applicant shall retain a qualified paleontologist to prepare a Paleontological Monitoring and Treatment Plan (Plan), and submit the plan to the CPUC for review and approval. The plan shall be based on Society of Vertebrate Paleontology (SVP) guidelines and meet all regulatory requirements. The qualified paleontologist shall have a Master's Degree or Ph.D. in paleontology, shall have knowledge of the local paleontology, and shall be familiar with paleontological procedures and techniques. The Plan shall identify construction impact areas of high sensitivity for encountering potential paleontological resources and the shallowest depths at which those resources may be encountered. The Plan shall detail the criteria to be used to determine whether an encountered resource is significant, and if it should be avoided or recovered for its data potential. The Plan shall also detail methods of recovery, preparation and analysis of specimens, final curation of specimens at a federally-accredited repository, data analysis, and reporting. The Plan shall outline a coordination strategy to ensure that a qualified paleontological monitor will conduct full-time monitoring of all ground disturbance during grading activities in the 'deeper' sediments determined to have a moderate to high sensitivity. For sediments of low or undetermined sensitivity, the Plan shall determine what level of monitoring is necessary. Sediments with no sensitivity will not require paleontological monitoring. The Plan shall define specific conditions in which monitoring of earthwork activities could be reduced and/or depth criteria established to trigger monitoring. These factors shall be defined by the project paleontological resource specialist, following examination of sufficient, representative excavations.
PAL-2 (MM PA-1.2)	**Paleontology Construction Monitoring**. PG&E will implement construction monitoring during excavations more than 2 feet deep in areas of high sensitivity units, excluding auguring or hand-digging for pole or tower fitting holes, because fossils are not recoverable in auger holes and augering crushes rock material, obscuring the identification of fossils. This excavation shall be closely monitored by a qualified Principal Paleontologist or his/her designated assistant. Paleontologist monitors will have the authority to halt or redirect work temporarily in order to assess and/or recover paleontological remains, and to establish buffer zones around potentially significant specimens using flagging on lath until the find is assessed by the Principal Paleontologist. The qualified paleontologist shall have a minimum of a B.A. in Geology or Paleontology, and a minimum of one year of paleontological monitoring experience in local or similar sediments.
PAL-3 (MM PA-1.3)	**Paleontological data recovery**. If avoidance of significant paleontological resources is not feasible during construction/ground disturbing activities, treatment (including recovery, specimen preparation, data analysis, curation, and reporting) shall be carried out by the Applicant, in accordance to the approved Paleontological Monitoring and Treatment Plan per APM PAL-1 (Paleontological Monitoring and Treatment Plan).
PAL-4 (MM PA-1.4)	**Construction Personnel Training**. Prior to the initiation of construction or ground-disturbing activities, all construction personnel conducting rough grading shall be trained regarding the recognition of possible subsurface paleontological resources and protection of all paleontological resources during construction. The Applicant shall complete training for all applicable personnel. Training shall inform all applicable personnel of the procedures to be followed upon the discovery of paleontological materials. All personnel shall be instructed that unauthorized collection or disturbance of protected fossils on or offsite by the Applicant, its representatives, or employees shall not be allowed. Violators shall be subject to prosecution under the appropriate State and federal laws. Unauthorized resource collection or disturbance may constitute grounds for the issuance of a stop work order. The following issues shall be addressed in training or in preparation for construction: a. All construction contracts shall include clauses that require grading personnel to attend training so they are aware of the potential for inadvertently exposing subsurface paleontological resources, their responsibility to avoid and protect all such resources, and the penalties for collection, vandalism, or inadvertent destruction of paleontological resources. b. A qualified paleontologist shall provide a background briefing for supervisory personnel describing the potential for exposing paleontological resources, the location of any potential paleontological resources, and procedures and notifications required in the event of discoveries by project personnel or paleontological monitors. Supervisory personnel shall enforce restrictions on collection or disturbance of fossils. c. Upon discovery of paleontological resources by paleontologists or construction personnel, work in the immediate area of the find shall be diverted and the Applicant's paleontologist notified. Once the find has been inspected and a preliminary assessment made, the Applicant's paleontologist shall notify the CPUC and proceed with data recovery in accordance with the approved Treatment Plan. **d.** Prior to final inspection or occupancy, whichever occurs first, the paleontologist shall prepare a final report to be submitted to the CPUC that summarizes impacts to paleontological resources and impact minimization efforts and provides the results of all data recovery efforts.

Table Ap.4A-6. PG&E Applicant Proposed Measures – Solar-Midway Reconductoring

	Geology, Mineral Resources, and Soils
GM-1	**Soft or loose soils during construction minimization**. Where soft or loose soils are encountered during construction, appropriate measures will be implemented to avoid, accommodate, replace, or improve soft or loose soils encountered during construction. Such measures may include: • Locating construction facilities and operations away from areas of soft and loose soil. • Over-excavating soft or loose soils and replacing them with engineered backfill materials. • Increasing the density and strength of soft or loose soils through mechanical vibration and/or compaction. Treating soft or loose soils in place with binding or cementing agents. Construction activities in areas where soft or loose soils are encountered will be scheduled for the dry season to allow safe and reliable equipment access.
MM G-1.1 (Deleted)	
GM-2 (MM G-1.2)	**Protect against slope instability**. Based on the results of any geotechnical study performed as a part of the original Morro Bay–Midway 230 kV transmission line project, and in consultation with Kern County, appropriate support and protection measures shall be designed and implemented to maintain the stability of slopes adjacent to any re-graded access or spur roads, work areas, or replacement towers during and after the reconductoring work. Any tower site, work area, or road to be re-graded between MP 12 and MP 13 shall be evaluated with respect to potential landslides by means of air photo interpretation and geologic reconnaissance mapping. If towers would be replaced in an area of landslide potential, a California-registered Professional Geotechnical Engineer shall evaluate the potential for geotechnical hazards and unstable slopes on slopes with over 15 percent gradient. Design measures shall include, but are not limited to, retaining walls, visqueen, removal of unstable materials, and avoidance of highly unstable areas. Appropriate construction methods and procedures, in accordance with State and federal health and safety codes, shall be followed to protect the safety of workers and the public during drilling and excavation operations. PG&E shall submit final engineering plans and the geotechnical report, if applicable, to CPUC and Kern County for review at least 30 days prior to construction.
GM-3 (MM GE-2.1)	**Reduce effects of groundshaking.** Prior to issuance of construction permits, the design-level geotechnical investigations performed by the Applicant shall include site-specific seismic analyses in the vicinity of MP 8 and the Caliente Switching Station where new structures will be located to evaluate ground accelerations for design of project components. Based on these findings, project structure designs shall be modified/strengthened, as deemed appropriate by the project engineer, if the anticipated seismic forces are found to be greater than standard design load stresses on project structures. Study results and proposed design modifications shall be provided to the CPUC for review before final project design and prior to construction permit issuance.
GM-4 (MM GE-3.1)	**Avoid placement of project structures within active fault zones**. Prior to final project design, PG&E shall perform a fault evaluation study where new structures will be located near the Caliente Switching Station to confirm the location of mapped traces of active and potentially active faults at the Caliente Switching Station and transmission line alignment. The study would identify mapped fault locations in the area and determine locations for switching station and support structures that would avoid mapped fault traces. Compliance with this measure shall be documented to CPUC in a report submitted for review at least 60 days prior to the start of construction.
	Hazards and Hazardous Materials
HM-1/WQ-1	**Environmental Training and Monitoring Program (ETMP) development and implementation.** An environmental training program will be established to communicate to all field personnel any environmental concerns and appropriate work practices, including spill prevention and response measures and Best Management Practices (BMPs). The training program will emphasize site-specific physical conditions to improve hazard prevention (e.g., identification of flow paths to nearest waterbodies) and will include a review of all site-specific plans, including but not limited to the Project's SWPPP, Erosion Control and Sediment Transport Plan, Health and Safety Plan, and Hazardous Substances Control and Emergency Response Plan. A monitoring program will also be implemented to ensure that the plans are followed throughout the construction period. BMPs, as identified in the Project SWPPP and Erosion Control and Sediment Transport Plan, will also be implemented during the Project to minimize the risk of an accidental release and to provide the necessary information for emergency response.

Table Ap.4A-6. PG&E Applicant Proposed Measures – Solar-Midway Reconductoring

HM-2	PG&E would submit a **Hazardous Substance Control and Emergency Response Plan** to the CPUC for recordkeeping at least 30 days prior to project construction. The plan would identify methods and techniques to minimize the exposure of the public to potentially hazardous materials during all phases of project construction through operation. The plan would require implementing appropriate control methods and approved containment and spill-control practices (i.e., spill control plan) for construction and materials stored on-site. All hazardous materials and hazardous wastes would be handled, stored, and disposed of, in accordance with all applicable regulations, by personnel qualified to handle hazardous materials. With the exception of the poles, all hazardous materials would be collected in project-specific containers at the site, and transported to a PG&E service center designated as a PG&E consolidation site. Poles would be scheduled for transportation to the appropriate licensed Class 1 or a composite-lined portion of a solid waste landfill. The plan would include, but not be limited to, the following: • Proper disposal of potentially contaminated soils • Vehicles and equipment parking near sensitive resource areas during construction Emergency response and reporting procedures to address hazardous material spills.
HM-3	PG&E would prepare a site-specific **Health and Safety Plan (HSP)** to ensure that potential safety hazards would be kept at a minimum. The HSP would include elements that establish worker training and emergency response procedures relevant to project activities. The plan would be submitted to the CPUC at least 30 days prior to construction for CPUC recordkeeping.
HM-4	If it is necessary to store any chemicals on-site, they would be managed in accordance with all applicable regulations. Material Safety Data Sheets would be maintained and kept available on-site, as applicable.
HM-5	In the event that soils suspected of being contaminated (based on evidence from visual, olfactory, or other means) are removed during excavation activities along the power line corridor, the excavated soil would be tested and, if contaminated above hazardous levels, would be contained and disposed of at a licensed waste facility. The presence of known or suspected contaminated soil would require testing and investigation procedures to be supervised by a qualified person, as appropriate, to meet state and federal regulations.
HM-6	PG&E would prepare and submit a Fire Prevention and Response Plan to the CPUC and to local fire protection authorities for notification at least 30 days prior to construction. The plan would include fire protection and prevention methods for all components of the project during construction. The plan would include procedures to reduce the potential for igniting combustible materials by preventing electrical hazards, use of flammable materials, and smoking onsite during construction and maintenance procedures. Project personnel would be directed to park away from dry vegetation; to equip vehicles with fire extinguishers; not to smoke; and to carry water, shovels, and fire extinguishers in times of high fire hazard.
HM-7 (MM HZ-1.1)	**Use licensed herbicide applicator**. Prior to energization or final inspection (whichever occurs first), the contractor or personnel applying herbicides must have all the appropriate State and local herbicide applicator licenses and comply with all State and local regulations regarding herbicide use. Herbicides shall be mixed and applied in conformance with the product manufacturer's directions. The herbicide applicator shall be equipped with splash protection clothing and gear, chemical resistant gloves, chemical spill/splash wash supplies, and material safety data sheets for all hazardous materials to be used. To minimize harm to wildlife, vegetation, and waterbodies, herbicides shall not be applied directly to wildlife, products identified as non-toxic to birds and small mammals shall be used if nests or dens are observed, and herbicides shall not be applied within 50 feet of any surface waterbody when water is present. Herbicides shall not be applied if it is raining at the site, rain is imminent, or the target area has puddles or standing water. Herbicides shall not be applied when wind velocity exceeds 10 miles per hour. If spray is observed to be drifting to a non-target location, spraying shall be discontinued until conditions causing the drift have abated.
HM-8 (MM HZ-5.1)	**Cease work during Red Flag Warnings**. When a Red Flag Warning is issued by the National Weather Service for all or part of the project area, PG&E shall cease all activities in any affected areas that involve a high potential for starting fires as outlined in the Fire Prevention and Response Plan submitted to the CPUC. This provision shall be clearly stated in the fire safety plan. A designated Emergency Response Liaison shall ensure implementation of a system that allows for immediate receipt of Red Flag Warning information from the Los Angeles/Oxnard office of the National Weather Service.

Table Ap.4A-6. PG&E Applicant Proposed Measures – Solar-Midway Reconductoring

	Hydrology and Water Quality
WQ-1/HM-1	**Environmental Training and Monitoring Program (ETMP) development and implementation**. An environmental training program will be established to communicate to all field personnel any environmental concerns and appropriate work practices, including spill prevention and response measures and Best Management Practices (BMPs). The training program will emphasize site-specific physical conditions to improve hazard prevention (e.g., identification of flow paths to nearest waterbodies) and will include a review of all site-specific plans, including but not limited to the Project's SWPPP, Erosion Control and Sediment Transport Plan, Health and Safety Plan, and Hazardous Substances Control and Emergency Response Plan. A monitoring program will also be implemented to ensure that the plans are followed throughout the construction period. BMPs, as identified in the Project SWPPP and Erosion Control and Sediment Transport Plan, will also be implemented during the Project to minimize the risk of an accidental release and to provide the necessary information for emergency response.
WQ-2	Following project approval, PG&E would prepare and implement a **SWPPP** to minimize construction impacts on surface and groundwater quality. Implementation of the SWPPP would help stabilize graded areas and waterways and reduce erosion and sedimentation. The plan would designate BMPs that would be adhered to during construction activities. Erosion and sediment control measures, such as straw wattles, water bars, covers, silt fences, and sensitive area access restrictions (e.g., flagging) would be installed before the onset of winter rains or any anticipated storm events. Mulching, seeding, or other suitable stabilization measures would be used to protect exposed areas during construction activities, as necessary. During construction, measures would be in place to ensure that contaminants are not discharged from the construction sites.
WQ-3	PG&E would prepare an **Erosion Control and Sediment Transport Plan (ECSTP)** as an element of the SWPPP describing BMPs, to be used during construction. The plan would address construction in or near sensitive areas described in Section 3.5 Biological Resources. BMPs, where applicable would be designed based on specific criteria from recognized BMP design guidance manuals. Erosion-minimizing efforts may include measures such as: • Avoiding excessive disturbance of steep slopes • Defining ingress and egress within the project area • Implementing a dust control program during construction • Restricting access to sensitive areas • Using vehicle mats in wet areas • Revegetating disturbed areas where applicable following construction • Proper containment of stockpiled soils (including construction of berms in areas near water bodies, wetlands, or drainage channels) Erosion control measures identified in the ECSTP would be installed in an area before clearing begins during the wet season in that area and before the onset of winter rains or any anticipated storm events. Temporary measures such as silt fences or wattles, intended to minimize sediment transport from temporarily disturbed areas, would remain in place until disturbed areas have stabilized. The ECSTP would be submitted to the CPUC for review at least 30 days prior to the commencement of construction. The plan would be revised and updated as needed, and re-submitted to the CPUC if construction activities evolve to the point that the existing approved ECSTP does not adequately address the project.
WQ-4 (MM WR-1.1)	**Install pervious and/or high-roughness groundcover at switching stations or other permanent facilities.** In the design plans, groundcover for the new switching stations shall be comprised of a pervious and/or high-roughness material (e.g., gravel) to the maximum extent feasible, in order to ensure maximum percolation of rainfall after construction. Detention/retention basins shall be installed to reduce local increases in runoff, particularly on frequent runoff events (up to 10-year frequency). Downstream drainage discharge points shall be provided with erosion protection and designed such that flow hydraulics exiting the site mimics the natural condition as much as possible.
	Noise
NO-1	**Noise minimization with portable barriers**. Compressors and other small stationary equipment will be shielded with portable barriers in proximity to residential areas.
NO-2	**Noise minimization with "quiet" equipment.** "Quiet" equipment (i.e., equipment that incorporates noise-control elements into the design—compressors have "quiet" models) will be used during construction whenever possible.
NO-3	**Noise minimization through direction of exhaust**. Equipment exhaust stacks and vents will be directed away from buildings.

Table Ap.4A-6. PG&E Applicant Proposed Measures – Solar-Midway Reconductoring

NO-4	**Noise minimization through truck traffic routing**. Truck traffic will be routed away from noise-sensitive areas where feasible.
NO-5	**Noise disruption minimization through residential notification**. PG&E will coordinate with the County of San Luis Obispo to notify residents within both Kern and San Luis Obispo Counties that are located near the power lines of the timeframe for the construction activities.
MM NS-3.1 (Deleted)	
	Traffic and Transportation
TF-1	PG&E would develop a project-specific **Traffic Management Plan (TMP)**, which would be submitted to the CPUC for review at least 30 days prior to construction. The TMP would conform to the California Joint Utility Traffic Control Committee's *Work Area Protection and Traffic Control Manual*. The TMP would include the following: • Standard safety practices, including installation of appropriate barriers between work zones and transportation facilities, placement of appropriate signage, and use of traffic control devices. • Flaggers and/or signage would be used to guide vehicles through or around construction zones using proper construction techniques. • Provision that all equipment and materials would be stored in designated staging areas on or adjacent to the work sites in a manner that minimizes traffic obstructions and maximizes sign visibility. Vehicle speeds would be limited to safe levels as appropriate for all roads, including access roads and overland routes without existing, posted speed limits.
TF-2 (MM TR-1.1)	**Prepare and implement traffic control plan.** Prior to the start of construction, the Applicant shall submit a Traffic Control Plan (TCP) to the CPUC and Caltrans. The TCP shall: • define the locations of project access points and locations of any temporary lane closures; • identify and make provision for circumstances requiring the use of flag persons, warning signs, lights, barricades, cones, etc. to provide safe work areas in the vicinity of the project site and to warn, control, protect, and expedite vehicular and pedestrian traffic; • include signage placed along all proposed construction haul routes and alternate haul routes at appropriate intervals notifying drivers of the presence of construction traffic on those roadways; • identify alternative routes for construction-related truck and shuttle traffic in the event of a closure of Shell Creek Road; • include signage placed along the south and north shoulders of Highway 58 at appropriate intervals (as recommended in Part 7 of Traffic Control for School Areas of the California Manual on Uniform Traffic Control Devices) in the vicinity of the Carissa Plains Elementary School notifying drivers of the school entrance and school traffic. The TCP shall include a Truck and Bus Safety Plan that ensures that: • construction material and equipment deliveries requiring pilot cars are limited to traveling along Highway 41/46 and Highway 58 during off peak hours (i.e., between 9:00 AM and 4:00 PM); • designated worker pick-up and drop-off areas are located on-site and do not result in construction-related shuttle buses parking or queuing along Highway 58; • all vendors and suppliers creating construction worker transportation adhere to the prohibition of buses over 40 feet in length on Highway 58; • all construction truck and bus drivers are informed of and required to adhere to the designated traffic haul routes; • drivers of all delivery trucks and passenger buses shall follow the routes defined for the solar project. The measures included in the TCP shall be consistent with the guidelines outlined in the Standard Specifications for Public Works Construction, the U.S. Department of Transportation's Manual on Uniform Traffic Control Devices (MUTCD), and the Work Area Traffic Control Handbook (WATCH). Copies of the TCP shall be provided to the CPUC for approval at least 30 days prior to the start of construction.

Table Ap.4A-6. PG&E Applicant Proposed Measures – Solar-Midway Reconductoring

TF-3 (MM TR-3.1)	**Repair roadway damage.** The Applicant shall restore all public roads, easements, rights-of-way (ROWs), and infrastructure (such as signs, utility poles, and cattle guards) within the public road ROWs that have been damaged due to project-related construction activities or traffic in accordance with required Caltrans or local encroachment permits. Restoration shall be to original or near-original condition and undertaken in a timely manner, in consultation with San Luis Obispo County, Kern County, and Caltrans, as appropriate. Within 60 calendar days after completion of construction, the project owner shall meet with San Luis Obispo and Kern Counties and Caltrans (if applicable) to identify sections of public ROW to be repaired. At that time, the project owner shall establish a schedule to complete the repairs and to receive approval for the action(s). Following completion of any public ROW repairs, the project owner shall provide a letter signed by the San Luis Obispo County, Kern County, and Caltrans stating their satisfaction with the repairs. Prior to commencing construction, the Applicant shall consult with San Luis Obispo County, Kern County, and Caltrans and notify them of the proposed schedule for project construction. The Applicant shall review with these agencies the feasibility of postponing public right-of-way repair or improvement activities in areas affected by project construction until project construction is completed. The Applicant shall coordinate with the agencies regarding any concurrent road restoration or improvement activities that are planned or in progress and cannot be postponed. The Applicant shall coordinate with the CPUC, San Luis Obispo County, Kern County, and Caltrans on an ongoing basis to ensure other development projects contributing to traffic on Highway 41/46, Highway 58, Bitterwater Road, and Shell Creek Road during the same time frame as the proposed project would contribute to the repair of damage.
Public Services	
PS-1 (MM PS-2.1) (Deleted)	
PS-2 (MM PS-2.2)(Deleted)	

* If an exclusion zone cannot extend the specified distance from the habitat, the biologist will stake and flag a restricted activity zone of the maximum practicable distance from the exclusion zone around the habitat. This exclusion zone distance is a guideline that may be modified by a qualified biologist, based on site-specific conditions (including habituation by the species to background disturbance levels). Measures are practicable where physically possible and not conflicting with other regulatory obligations or safety considerations; O&M activities will be prohibited or greatly restricted within restricted activity zones. However, vehicle operation on existing roads and foot travel will be permitted. A qualified biologist will monitor O&M activities near flagged exclusion and restricted activity zones. Within 60 days after O&M activities have been completed at a given worksite, all staking and flagging will be removed.

[1] Designated occupied habitat is defined in the HCP as all land within 2 miles of a CNDDB occurrence polygon, and suitable habitat within 5 miles of a CNDDB occurrence polygon. The boundaries of each designated occupied habitat is defined in the HCP and mapped in HCP Appendix I.

3. Environmental Impact Analysis

Environmental impacts are evaluated based on PG&E's commitment to implement all of the APMs presented in Table AP.4A-6. Since all of these measures will be implemented, all impacts described in this section will be less than significant. No impact "class" designations are presented in this analysis because all impacts are fully mitigated. The APMs and AMMs in Table Ap.4A-6 are considered to be part of the switching station and reconductoring projects. As such, they would be implemented as part of the projects. The specific APMs and AMMs that would address a potentially significant impact are cited where appropriate. As PG&E will conducting the reconductoring and will own and operate the switching stations, it is assumed that all APMs and AMMs in Table Ap.4A-6 apply equally to the reconductoring effort and to construction and operation of the switching stations.

3.1 Introduction

This appendix describes the potential environmental impacts associated with the construction and operation of the proposed reconductoring of the PG&E Solar-Midway 230 kV transmission line. Based on CEQA requirements and the scoping issues raised in the CVSR and Topaz CEQA processes, this appendix presents impact analysis in the following issue areas:

3.2 Aesthetics
3.3 Agriculture
3.4 Air Quality
3.5 Climate Change
3.6 Biological Resources
3.7 Cultural and Paleontological Resources
3.8 Geology, Mineral Resources, and Soils
3.9 Hazards and Hazardous Materials
3.10 Land Use and Recreation
3.11 Noise
3.12 Population and Housing
3.13 Public Services, Utilities, and Service Systems
3.14 Transportation and Circulation
3.15 Water Resources

Environmental Assessment Methodology

The methodology used to determine potential impacts of the proposed project consists of three key components, summarized below. These factors are discussed for each issue area in Sections 3.2 through Section 3.15, which follow this introduction.

- **Environmental Setting.** The environmental setting describes existing conditions in the project site that may change as a result of the construction and operation of the proposed project. The environmental setting used for the impact analysis reflects the conditions at the time of the issuance of the Notice of Preparation for the California Valley Solar Ranch project (March 1, 2010).
- **Environmental Impacts and APMs.** This section evaluates the environmental impacts of the proposed project based on predetermined, specific significance criteria. In determining the significance of impacts, the assessment has found that existing regulations and other public agency requirements, as well as Applicant Proposed Measures, will reduce all impacts to less than significant levels.

Within each discipline's analysis, six switching station locations are evaluated for the CVSR Caliente Switching Station. Only one site is evaluated for the Topaz Solar Switching Station.

Applicant Proposed Measures. As defined in Section 2.5 above, PG&E has incorporated design features, measures, and procedures into the description of its proposed project to avoid or reduce impact from project construction and operation. These measures are referred to as Applicant Proposed Measures

(APMs) in this document and are considered in the analysis of impacts and in the determinations of impact significance.

3.2 Aesthetic Resources

Environmental Setting

The existing transmission corridor passes through the northern portion of the Carrizo Plan for approximately 7 miles, crosses the Temblor Range for approximately 10 miles, and traverses the San Joaquin Valley for approximately 17 miles. The dominant visual characteristic of the Carrizo Plain landscape in the vicinity of the existing transmission line is long, unobstructed views across the Plain to a mountainous backdrop. The visual character of the Temblor Range in the vicinity of the existing transmission line is that of remote, rolling hills dotted with patchy shrubland vegetation. The visual character of the San Joaquin Valley in the vicinity of the existing transmission line is an extensive, somewhat hazy valley with an intensive agricultural character.

There are two structures that are potentially occupied residences within 1,000 feet of the existing transmission line at MP 0.5 and MP 1.2 in the Carrizo Plain, and there are an additional 21 structures that are potentially occupied residences within 2,000 feet of the existing transmission line between MP 25 and MP 32.5 in the San Joaquin Valley. The existing transmission line is within the foreground viewshed of numerous residences and one school in the community of Buttonwillow between MP 32.5 and MP 34, at a distance of approximately 1,500 feet. The visual character in the community of Buttonwillow is predominantly industrial, due to the presence of the Midway Substation and the convergence of numerous transmission lines from the surrounding landscape. The existing transmission line is located within approximately 2,000 feet of Highway 58 for the easternmost five miles of the transmission line route.

Solar Switching Station

The Solar Switching Station (Topaz Project) would be located north of the existing PG&E transmission line corridor within the Topaz Project boundary, and approximately one mile north of Highway 58. The nearest residence to the switching station (APN 072-301-003) would be over 3,500 feet southwest of the proposed site. In addition, two occupied residences are between 4,500 and 5,250 feet northeast of the proposed Solar Switching Station (APNs 072-051-026 and 072-061-030, respectively). Switching station equipment would range in height from approximately 16 feet to 55 feet.

Caliente Switching Station Alternatives

Caliente Switching Station Alternatives 1, 2, 4, 5, and 6. These five Caliente Switching Station (CVSR project) alternatives would be located approximately 2 miles north of Highway 58 along the existing 115 kV transmission line. They would be screened from view from the highway by intervening topography. The nearest residence to the switching station would be more than 2 miles from the proposed site. Switching station equipment would range in height from approximately 20 feet to 55 feet; however, heights for all modifications would be determined based on vertical positions of existing structures.

Caliente Switching Station Alternative 3. Switching station Site 3 (specifically site M3, as modified in this Final EIR) is located approximately 2,500 feet from the eastern boundary of the Alquist-Priolo Fault Hazard Zone for the San Andreas Fault. It is the highest in elevation of the six alternatives, ranging in elevation from 2,785 feet to 2,835 feet, roughly 200 feet above the sites 1 and 2 and almost 400 feet above sites 4, 5, and 6.

Microwave Tower and Reflector. The microwave tower would be approximately 175 feet in height and would be located within the Caliente Switching Station footprint. The microwave tower would likely be a self-supporting lattice unpainted, galvanized steel structure. The microwave antennas are standard grey in color. The microwave reflector location would be dependent on which switching station alternative is built. The higher elevation of switching station alternative 3 requires the microwave reflector to be placed in a different position than switching station alternatives 1, 2, 4, 5, and 6. The locations of microwave reflector option A (for switching station alternatives 1, 2, 4, 5, and 6) and option B (for switching station alternative 3) can be seen in Figure Ap.4A-4c. The microwave reflectors can be painted any color to match the surrounding environment.

Environmental Impacts

Impact AE-1: Short-term visibility of construction activities, equipment, and night lighting

Construction would occur over approximately 20 months.

Switching Stations. The Caliente Switching Station would be constructed during Phase 1 of CVSR project construction, and would involve site clearing and grading followed by construction of the facility. The switching station would be completed during the first year of solar array installation and temporary facilities would initially be installed. This would allow the proposed CVSR to begin operation as soon as the first tracker systems are deployed and can generate solar power. The movement of equipment, materials, and workers to and from the site would be visible, but would be short term and transient. This would be a less than significant impact.

The Solar Switching Station site would be cleared and graded during the start of the construction for the Topaz project overall. The switching station would be completed during the first year of the project, allowing the proposed solar project to begin operation as soon as the first solar modules are deployed and can generate solar power. Unlike the Caliente Switching Station, the Solar Switching Station would be located in the interior of the Topaz project site, adjacent to the 230 kV transmission line and approximately 1 mile from Highway 58. Given its location a mile away in the interior of the project site and because there would be construction generally around the site for site preparation and installation of solar units, the short term visual impact during construction would be less than significant.

Reconductoring. Although the reconductoring project is a linear project that would occur across 35 miles, construction activities would be of short duration in any single location. This would minimize viewer exposure of the 23 or more sensitive receptors (residences) located in the Carrizo Plain and in the vicinity of the community of Buttonwillow. The 6 proposed fly yards and staging areas would each be used for approximately 3 months during tower modifications and 1.5 months for reconductoring activities. Construction activities would introduce heavy trucks, cranes, and helicopters into the foreground view of sensitive receptors in the vicinity of the community of Buttonwillow and in the Carrizo Plain. Night construction is not anticipated, but temporary portable lighting may be used as needed when construction begins or ends in dark conditions. APM AIR-5 would minimize visual impacts from dust during construction by watering down construction areas and enforcing reduced vehicle speeds. Impacts from construction activities would be temporary and limited in nature and would be considered less than significant.

Impact AE-2: Project would introduce structure contrast, industrial character, view blockage, skylining and glare

Switching Stations. The Caliente Switching Station and microwave tower and reflector would be located just south of the existing PG&E transmission corridor and approximately 2 miles north of Highway 58. Switching Station Alternatives 4 through 6 would not be visible from the highway as they are hidden from view by intervening topography. Switching Station Alternatives 1 through 3 would be visible along portions of eastbound Highway 58; however, because of the distance between the switching station alternatives and the highway, approximately 3 miles, the switching stations would not dominate the view of the observer and viewers would have only distance views of the switching station. There are no nearby sensitive viewing receptors.

The Solar Switching Station would be located within the project boundary and north of the existing PG&E transmission line corridor. The site is approximately one mile north of Highway 58. The switching station site would be visible from Highway 58, but the views would be distant. In both Option A and Option B configurations of the Topaz project, three single family residences are northeast and northwest of the proposed location of the switching station. In addition, the switching station would be visible from a few residences southwest of the project boundary. All of these residences would be about 0.5 miles or more from the switching station and would therefore have distant views of the switching station across the solar panel arrays.

Both proposed switching stations would be unstaffed, but they would be lighted after dark. Specific details regarding the proposed night lighting are unknown at this time; however, PG&E security lighting from similar projects includes sodium vapor lamps and exterior lighting that uses non-glare light bulbs. Because of the rural nature of the Carrizo Plain, nighttime lighting at the switching station sites has the potential to be visually intrusive in the landscape and a source of nighttime glare. If all lighting is properly shielded, directed downward, and of minimum brightness necessary for safety, no direct or excessively bright reflective light would be anticipated off-site. APM AE-1 (Prepare and implement an exterior lighting plan) would be implemented to ensure that light and glare are properly minimized so that this impact would be less than significant.

Microwave Tower and Reflector. The microwave tower would be the tallest element constructed for the switching station, and would range between 80 feet at the Caliente Switching Station Alternative 2, and 175 feet at the other switching station alternative locations. Although the microwave tower would be tall, views of it would be distant and it would not dominate the view of the observer.

The microwave reflector would be located approximately 1.8 miles north of the existing PG&E transimmission corridor. Although it would be located far from Highway 58, it would be approximately 30 feet tall, it would be the size of a billboard. Views of the microwave reflector would be striking in an otherwise natural setting, especially if it were to glint. To ensure the reflector blends with the existing background and does not draw the attention of passangers along Highway 58, incorporation of an APM would be necessary. APM AE-2 (Paint microwave reflector to reduce visibility) would be implemented to ensure that views of the reflector are minimized so that this impact would be less than significant.

Reconductoring. The average height of existing towers is 118 feet, and the average height of towers with proposed extensions would be 127 feet. Maximum tower height could be 150 feet. Tower modifications would increase the heights of the towers by an average of approximately 8 percent of the existing tower height. This would be a minimal long-term visual change even for sensitive receptors with an immediate foreground view of the transmission line. Receptors beyond approximately 2,000 feet from the existing transmission line would not be considered sensitive, as tower modifications would be

essentially unnoticeable to viewers at greater distances. Viewer sensitivity of receptors in the community of Buttonwillow would be low, as the existing visual character of Buttonwillow is dominated by transmission lines and the Midway Substation. The newly installed conductor would be a standard conductor (specular) and would reflect light and appear shiny to sensitive receptors in the vicinity of the line for the first 18 months after installation. Specular conductors typically grow dull and lose their reflective quality within 18 months of installation (PG&E, 2010). The increased tower heights and replacements of towers and conductor would not introduce a new source of structure contrast, industrial character, view blockage, or skylining. The new conductor would introduce a short-term source of specular reflection. Because long-term visual changes would be minimal, long-term aesthetic impacts of the new conductors would be considered less than significant.

3.3 Agriculture

Environmental Setting

The Solar Switching Station, the Caliente Switching Station alternatives, and microwave reflector would be located on land determined to be Important Farmland by the National Resource Conservation Service's (NRSC) Web Soil Survey (WSS). Additionally, the switching station locations fall on land with a zoning designation of Agriculture (AG). The proposed switching station sites and proposed microwave reflector would not be located on land currently under a Williamson Act contract.

Agricultural land under Williamson Act contract occurs along the existing transmission-line ROW from MP 1.5 to MP 3, MP 7.3 to MP 10, MP 16 to MP 17, MP 17.5 to MP 18, and MP 30.8 to MP 35. Active cotton production occurs along the existing ROW within California Department of Conservation designated Prime Farmlands between MP 30.8 and MP 35. Active grazing operations occur along the existing ROW from MP 1 through MP 30.8 and in the vicinity of the switching stations.

Environmental Impacts

Impact AG-1: Construction activities would temporarily interfere with Active Agricultural Operations

Switching Stations. Active agricultural operations would cease at the station locations during and after construction. For the Caliente Switching Station, areas not occupied by the station would be returned to agricultural use. To minimize disruption of grazing or other agricultural activity at the Caliente Switching Station site, APM AG-1 (Coordinate construction activities with agricultural landowners) would ensure that this impact to active agricultural operations would be less than significant, including grazing operations. With implementation of this measure, impacts would be less than significant. This would apply equally to all 6 alternative sites. For the Solar Switching Station, the surrounding land would be included in the Topaz solar project and would be used for solar panels. Therefore, Impact AG-1 is not applicable as there is no temporary interference. Impact AG-2 would apply.

Microwave Reflector. Active agricultural operations occur in the vicinity of the microwave reflector options. Construction of the proposed microwave reflector would disturb some land that would be actively grazed or in crops. As such, construction activities would temporarily disrupt active grazing or crop production operations. PG&E's existing ROW grants allow for compensation of crop damage if necessary. Work would be planned to allow flexibility in establish work near the beginning of construction in order to avoid crop damage. APM LU-1 ensures that PG&E work with farmers and ranchers to conduct work between harvest and planting periods whenever possible or provide compensation to landowners for crop losses. Because of the minor loss of active agriculture during the

construction of the microwave reflector, and with implementation of the APM, this impact would be less than significant.

Reconductoring. Active agricultural operations occur along most of the project ROW and in the vicinity of the switching stations. As listed in Table Ap.4A-2, the proposed upgrades would disturb some land that would be actively grazed or in crops. As such, construction activities would temporarily disrupt active grazing or crop production operations. PG&E's existing ROW grants allow for compensation of crop damage if necessary. Work would be planned to allow flexibility in establish work near the beginning of construction in order to avoid crop damage. APM LU-1 ensures that PG&E work with farmers and ranchers to conduct work between harvest and planting periods whenever possible or provide compensation to landowners for crop losses. In addition, APM AG-1 (Coordinate construction activities with agricultural landowners) would require coordination with landowners to ensure that this impact to active agricultural operations would be less than significant, including grazing operations. With implementation of this measure, impacts would be less than significant.

Impact AG-2: Permanent conversion of Important Farmland to non-agricultural use

Switching Stations. Each of the switching stations would permanently convert approximately 9 acres of farmland to a non-agricultural use. The Solar Switching Station would be located on land designated as Prime Farmland if irrigated, and the Caliente Switching Station would be located on land designated as Not Prime Farmland (NRCS, 2010). However, neither site is designated by the California Department of Conservation as prime farmland. The CPUC has determined that conversion of less than 10 acres of non-prime farmland is a less than significant impact. If the switching stations are located on state-designated prime farmland, then APM AG-2 (Mitigate the loss of state-designated prime farmland through permanent preservation of off-site farmlands) would reduce the impact to less than significant.

Reconductoring. The reconductoring work would be located within an existing PG&E ROW that passes through Prime Farmland for approximately 4.2 miles. Active crop production occurs along this stretch of the ROW, and two pull sites would likely be required to be located within the Prime Farmland of this transmission ROW. The pull sites would be approximately 300 feet by 300 feet (2.1 acres) and would be located within the ROW outside of the existing access road footprint.

A maximum of approximately 4.1 acres would be temporarily disturbed for this pull site and could be returned to agricultural production after a short construction interval. In addition, APM LU-1 ensures that PG&E work with farmers and ranchers to conduct work between harvest and planting periods whenever possible or provide compensation to landowners for crop losses. Implementation of this measure would ensure impacts to agriculture would be less than significant.

Impact AG-3: Permanent Conversion of Williamson Act contract lands to non-agricultural use

Switching Stations. The proposed switching station sites are not on land currently under a Williamson Act contract. Permanent conversion of Williamson Act contract lands would not occur.

Reconductoring. The reconductoring work would be located within an existing PG&E ROW that passes through land with active Williamson Act contracts for approximately 10.25 miles from MP 2.5 to MP 4.25, MP 8.3 to MP 11.3, MP 17 to MP 18, MP 18.5 to MP 19, MP 19.25 to MP 19.75 and MP 31.5 to MP 35. Active grazing operations and crop production occur through the ROW along these stretches of the transmission line, and several pull sites would likely be required to be located within the transmission ROW within Williamson Act parcels. Each pull site would be approximately 300 feet by 300 feet (2.1 acres), and would be located within the ROW outside of the existing access road footprint. It is estimated that approximately six pull sites (totaling 12.6 acres) would be required to be located within

active Williamson Act parcels. A maximum of approximately 12.6 acres would be temporarily disturbed and would be available to be returned to grazing or crop production after a short construction interval.

3.4 Air Quality

Environmental Setting

The United States Environmental Protection Agency (USEPA), the California Air Resources Board (CARB), and the local air districts classify an area as attainment, unclassified, or nonattainment depending on whether or not the monitored ambient air quality data show compliance, insufficient data available, or non-compliance with the ambient air quality standards, respectively. The National and California Ambient Air Quality Standards (NAAQS and CAAQS, respectively) are provided in Table Ap.4A-7.

Table Ap.4A-7. National and California Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards	National Standards
Ozone (O_3)	1-hour	0.09 ppm	—
	8-hour	0.070 ppm	0.075 ppm
Respirable particulate matter (PM10)	24-hour	50 µg/m^3	150 µg/m^3
	Annual mean	20 µg/m^3	—
Fine particulate matter (PM2.5)	24-hour	—	35 µg/m^3
	Annual mean	12 µg/m^3	15 µg/m^3
Carbon monoxide (CO)	1-hour	20 ppm	35 ppm
	8-hour	9.0 ppm	9.0 ppm
Nitrogen dioxide (NO_2)	1-hour	0.18 ppm	0.100 ppm
	Annual mean	0.030 ppm	0.053 ppm
Sulfur dioxide (SO_2)	1-hour	0.25 ppm	—
	24-hour	0.04 ppm	0.14 ppm
	Annual mean	—	0.03 ppm

Notes: ppm=parts per million; µg/m^3= micrograms per cubic meter;
"—" = no standard
Source: CARB, 2010a: http://www.arb.ca.gov/html/ds.htm.

Existing Air Quality. San Luis Obispo County is within the jurisdiction of the San Luis Obispo County Air Pollution Control District (APCD), which is part of the South Central Coast Air Basin. Western Kern County is within the San Joaquin Valley APCD, which is part of the San Joaquin Valley Air Basin and includes seven other counties in California's Central Valley: San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, and Tulare.

Air quality in San Luis Obispo and western Kern Counties is contingent on several factors including the type, amount, and dispersion rates of pollutants being emitted within the two air basins. Major factors affecting pollutant dispersion are wind speed and direction, atmospheric stability, temperature, the presence or absence of inversions, and the topographic and geographic features of the region.

San Luis Obispo County APCD is currently a non-attainment area for the State standards for atmospheric particulate matter, which is comprised of finely divided solids and liquids such as dust, soot, aerosols, fumes and mists. The San Joaquin Valley APCD is in a non-attainment area for both State and federal standards for particulate matter (PM). Particulate matter at high concentrations aggravates chronic respiratory illnesses such as bronchitis, emphysema, and asthma. Human activities that generate particulate matter include agricultural operations, industrial processes, fossil fuel combustion, construction and demolition operations, wood burning, and road dust entrained in the air. Natural sources include windblown dust, wildfire smoke, and sea spray salt.

San Luis Obispo County is a State-level non-attainment area for ozone. The San Joaquin Valley APCD is in a severe nonattainment area for both federal and State standards for ozone. Ozone is a secondary pollutant that is not produced directly by a source, but rather is formed by a reaction between nitrogen oxides (NOx) and reactive organic gases (ROGs) in the presence of sunlight. Ozone impacts public health at higher concentrations by aggravating asthma or causing respiratory irritation and other adverse effects on the lungs. It can also affect sensitive plant species by interfering with photosynthesis, and is there-

fore a threat to California agriculture and native vegetation. Primary emission sources of ROGs in San Luis Obispo County are motor vehicles (over 50 percent), organic solvents, the petroleum industry, and pesticides. Primary sources of NOx in San Luis Obispo County are motor vehicles (over 50 percent), public utility power generation, and fuel combustion by various industrial sources. Vehicle emissions contribute approximately 80 percent of the NOx and ROG emissions in the San Joaquin Valley APCD.

Table Ap.4A-8 summarizes the federal and State attainment status of criteria pollutants for the two APCDs based on the NAAQS and CAAQS, respectively.

Table Ap.4A-8. Attainment Status for the San Luis Obispo County and San Joaquin Valley Air Pollution Control Districts

	San Luis Obispo County APCD		San Joaquin Valley APCD	
Pollutant	**Federal**	**State**	**Federal**	**State**
Ozone – 1 Hr	Unclassified/Attainment	Non-attainment	Unclassified/Attainment	Non-attainment/Severe
Ozone – 8 Hr	Unclassified/Attainment	Non-attainment	Non-attainment/Serious	Non-attainment
PM10	Unclassified/Attainment	Non-attainment	Attainment	Non-attainment
PM2.5	Unclassified/Attainment	Attainment	Non-attainment	Non-attainment
CO	Unclassified	Attainment	Unclassified/Attainment	Unclassified/Attainment
NO_2	Unclassified	Attainment	Unclassified/Attainment	Attainment
SO_2	Unclassified	Attainment	Unclassified/Attainment	Attainment

Sensitive Receptors. Some land uses are considered more sensitive to air pollution than others due to the types of population groups or activities involved. Sensitive population groups include children, the elderly, the acutely ill and the chronically ill, especially those with cardio-respiratory diseases. There are two structures that are potentially occupied residences within 1,000 feet of the existing transmission line at MP 0.6 and MP 1.2 in the Carrizo Plain, and there are an additional 21 structures that are potentially occupied residences within 2,000 feet of the existing transmission line between MP 25 and MP 32.5 in the San Joaquin Valley. The existing transmission line is within 1,500 feet of numerous residences and one school in the community of Buttonwillow between MP 32.5 and MP 34. The closest residence to the Solar Switching Station (APN 072-301-003) would be located over 3,500 feet southwest of the proposed site. In addition, two occupied residences would be between 4,500 and 5,250 feet northeast of the Solar Switching Station (APNs 072-051-026 and 072-061-030, respectively). The nearest residence to the Caliente Switching Station alternatives would be more than 2 miles south of the proposed site.

Air Quality Regulatory Setting

Emissions from mobile and portable sources and temporary activities (like construction) are managed through a range of State and federal programs identified below.

- **U.S. EPA/CARB Off-Road Mobile Sources Emission Reduction Program.** The California Clean Air Act mandates that CARB achieve the maximum degree of emission reductions from all off-road mobile sources in order to attain the State ambient air quality standards. Off-road mobile sources include construction equipment. These standards and ongoing rulemaking jointly address emissions of nitrogen oxides (NOx) and toxic particulate matter from diesel combustion.
- **CARB Portable Equipment Registration Program.** This program allows owners or operators of portable engines and associated equipment commonly used for construction or farming to register

their units under a statewide portable program that allows them to operate their equipment throughout California without having to obtain individual permits from local air districts.

- **San Joaquin Valley APCD Rules 4101 and 4102 (Visible Emissions and Nuisances).** These rules apply to any source of air contaminants. They prohibit emissions of visible air contaminants to the atmosphere and any activity that creates a public nuisance.
- **San Joaquin Valley APCD Rule 4641 (Cutback, Slow Cure, and Emulsified Asphalt, Paving and Maintenance Operations).** This rule applies to the use of asphalt for paving, should it be necessary for covering the proposed underground facilities or for restoring roadways disturbed by project activities.
- **San Joaquin Valley APCD Regulation VIII (Fugitive PM10 Prohibitions).** These rules (Rules 8011 to 8081) are aimed at reducing fugitive PM10 emissions. Sources regulated under these rules include: construction, excavation, earthmoving activities, carryout and trackout, open areas, paved and unpaved roads, unpaved vehicle/equipment traffic areas, and agricultural sources. Regulation VIII was most recently revised in 2004. Violation of Regulation VIII would be subject to enforcement action by SJVAPCD. Regulation VIII requires implementation of various dust control measures (watering unpaved surfaces, minimizing vehicle speeds on unpaved surfaces, etc.) to ensure that visible dust emissions are substantially eliminated.
- **San Luis Obispo County APCD Rule 401 (Visible Emissions).** This rule prohibits any activity causing air contaminant emissions darker than Ringelmann Number 2 (or approximately 40 percent opacity) for more than an aggregate of three minutes in any consecutive 60-minute time period.
- **San Luis Obispo County APCD Rule 202 (Nuisance).** This rule prohibits any activity causing the discharge of air contaminants that cause or have a tendency to cause injury, detriment, nuisance, or annoyance to people and/or the public, or damage to any business or property.

Kern County Air Quality Thresholds. Projects subject to Kern County approvals may be compared to thresholds for operational emissions that are adopted by the Kern County Board of Supervisors for environmental documents prepared by the County under CEQA. While the thresholds are not relevant to the reconductoring project, they are provided here for informational purposes. Table Ap.4A-9 shows the Kern County thresholds as they may be used for determining whether cumulative effects of a project are "considerable" when located in the San Joaquin Valley Air Pollution Control District.

Table Ap.4A-9. Kern County Significance Thresholds

Reactive organic gases (ROG or VOC)	10 tons per year
NOx	10 tons per year
PM_{10}	15 tons per year

Source: Kern County, 2004.

Environmental Impacts

Significance Criteria

The following significance criteria for air quality were derived from the San Luis Obispo County APCD's *CEQA Air Quality Handbook* (2009a) and the San Joaquin Valley APCD Guide for Assessing and Mitigating Air Quality Impacts.

Significance Criteria for Construction-Related Emissions. Short-term construction emission thresholds for San Luis Obispo County, as stated in the APCD's *CEQA Air Quality Handbook* (2009a), involve two tiers shown in Table Ap.4A-10. If construction-related emissions of the reconductoring and switching stations exceed the Tier 2 threshold (6.3 ton/qtr for ROG + NOx), the APCD recommends implementing Standard Mitigation Measures, Best Available Control Technology (BACT) for construction equipment, a Construction Activity Management Plan (CAMP), and offsite mitigation. Implementing Standard Mitigation Measures, BACT, and a CAMP would be appropriate for construction exceeding the Tier 1 thresholds.

Table Ap.4A-10. Significance Thresholds for Construction Emissions

Pollutant of Concern	Threshold[1] Daily	Quarterly Tier 1	Quarterly Tier 2
Ozone Precursors (ROG + NOx, Combined)	137 lbs	2.5 tons	6.3 tons
Diesel Particulate Matter (DPM)	7 lbs	0.13 tons	0.32 tons
Fugitive Particulate Matter (PM_{10}), Dust[2]	—	2.5 tons	—

1 - Daily and quarterly emission thresholds are based on the California Health & Safety Code and the CARB Carl Moyer Guidelines;
2 - Any project with a grading area greater than 4.0 acres of worked area can exceed the 2.5 ton PM10 quarterly threshold; "—" = No Reported Threshold.
Source: SLO County APCD, 2009a.

The San Joaquin Valley APCD recommends taking a qualitative approach to determine whether a significant impact would occur for PM_{10} and emphasizes implementation of effective and comprehensive control measures for fugitive dust. The San Joaquin Valley APCD recognizes that construction phase emissions are generally short-term in duration, and because of the high variability of PM_{10} emissions during construction, has determined that compliance with Regulation VIII for all sites and implementation of other appropriate control measures in the San Joaquin Valley APCD Guide for Assessing and Mitigating Air Quality Impacts sufficiently reduces PM_{10} impacts during construction so that impacts would not be significant (SJVAPCD, 2002).

Table Ap.4A-11. Significance Thresholds for Operational Emissions

Pollutant of Concern	Threshold[1] Daily	Annual
Ozone Precursors ($ROG + NO_x$) [2]	25 lbs/day	25 tons/year
Diesel Particulate Matter (DPM) [2]	1.25 lbs/day	—
Fugitive Particulate Matter (PM_{10}), Dust	25 lbs/day	25 tons/year
CO	550 lbs/day	—

1 - Daily and annual emission thresholds are based on the California Health & Safety Code Division 26, Part 3, Chapter 10, Section 40918 and the CARB Carl Moyer Guidelines for DPM;
2 - URBEMIS – use winter operational emission data to compare to operational thresholds; "—" = No Reported Threshold.
Source: SLO County APCD, 2009a.

The San Joaquin Valley APCD recognizes that construction equipment and activities also emits carbon monoxide and ozone precursor emissions; however, it has determined that these emissions may cause a significant air quality impact only in the cases of very large or very intense construction projects (SJVAPCD, 2002). The guidelines indicate that projects permanently emitting more than 10 tons per year of ozone precursors (NOx or VOC) would have significant impacts to ozone.

Significance Criteria for Operational Emissions. The threshold criteria established by the San Luis Obispo County APCD to determine the significance and appropriate mitigation level for long-term operational emissions from a project are presented in Table Ap.4A-11. For Kern County, a project permanently emitting more than 10 tons per year of ozone precursors (NOx or VOC) could have a significant impact to ozone, and a project permanently emitting more than 15 tons per year of PM10 or PM2.5 could have a significant impact to particulate matter (Table Ap.4A-9).

In addition to exceeding the thresholds established for construction and operational emissions, a project may also have significant adverse impacts on air quality if it individually or cumulatively would result in:

- emissions of toxic or hazardous air pollutants in close proximity (i.e., 1,000 feet) to sensitive receptors;
- exceedance of a State or federal ambient air quality standard for any criteria pollutant (as determined by modeling); or
- inconsistency with the emissions reduction projections contained in an air quality management plan.

Impact AQ-1: Construction would generate dust and exhaust emissions of criteria pollutants and toxic air contaminants

Switching Stations and Reconductoring. Construction of the switching stations and undertaking the reconductoring would have similar types of air quality impacts.

Exhaust from construction equipment results in short-term emissions of ROG, NOx, CO, SOx, PM_{10}, and $PM_{2.5}$. These emissions would occur in conjunction with diesel PM emissions (a toxic air contaminant). Forecasted levels of emissions ROG and NOx in the San Luis Obispo APCD would be approximately 0.42 tons per year and 2.20 tons per year, respectively (PG&E, 2010). These emissions would impact nonattainment ozone areas, but the levels would be less than the quantitative thresholds of significance established by the San Luis Obispo County APCD and the qualitative thresholds of the San Joaquin Valley APCD guidelines. Total emissions of CO, SOx, and diesel PM would be minimal as in both San Luis Obispo County and Kern County as indicated in Table Ap.4A-12A.

Fugitive PM emissions during construction would occur from soil disturbance and travel on paved and unpaved roads. The reconductoring and switching station construction is expected to exceed both quarterly Tier 1 and Tier 2 construction emissions thresholds for PM10 (fugitive dust). APM AIR-1 (for San Luis Obispo County) requires implementation of the San Luis Obispo APCD's Standard Mitigation Measures, as appropriate and necessary, for construction equipment; however, the PG&E APM is not specific as to when the APM would be necessary. APM AIR-1 (for Kern County) requires PG&E implement Best Management Practices (BMPs) to reduce construction tailpipe emissions. Without a specific activity management plan, the impact from construction equipment emissions could exceed the thresholds established by the San Luis Obispo County APCD. APM AIR-3 (Reduce construction vehicle emissions) would ensure that the APCD recommendations for controlling emissions from equipment would be implemented for both San Luis Obispo and Kern Counties. Because the project would also require up to 9 acres of grading for each of the two switching stations, APMs AIR-4 (Develop construction activity management plan (CAMP) and AIR-5 (Reduce fugitive dust) would be required to ensure reduction of fugitive dust from construction of the switching stations, as recommended by the San Luis Obispo County APCD. APM AIR-6 (Payment of impact fees) would ensure impacts to air quality during construction would be reduced to a less-than-significant level. With implementation of APMs AIR-3, 4, 5 and 6, air quality impacts during construction would be less than significant.

Table Ap.4A-12A. Total Construction Emissions in San Luis Obispo and Kern Counties

Emission Sources and Thresholds	ROG (ton/project)	NOx (ton/project)	Diesel Particulate Matter (ton/project)	PM10, Fugitive Dust (ton/project)	PM 2.5 (ton/project)	CO (ton/project)	SOx (ton/project)
Total Construction Emissions San Luis Obispo County (2011)	0.97	6.77	0.22	1.36	0.46	6.9	0.0
Total Construction Emissions Kern County (2011)	0.4	1.68	0.02	3.24	0.68	2.59	0.0
Total Construction Emissions San Luis Obispo County (2012)	0.46	4.84	0.17	0.78	0.29	3.76	0.0
Total Construction Emissions Kern County (2012)	1.07	4.4	0.06	0.02	0	4.42	0.0
Total Construction Emissions (2011)	**1.36**	**8.45**	**0.24**	**4.67**	**1.2**	**9.49**	**0.1**
Total Construction Emissions (2012)	**1.53**	**9.24**	**0.23**	**0.80**	**0.29**	**8.17**	**0.1**

Table Ap.4A-12B provides detailed information regarding quarterly construction emissions compared to the San Luis Obispo APCD Thresholds.

Table Ap.4A-12B. Total Quarterly Construction Emissions Versus San Luis Obispo APCD Thresholds

Emission Sources and Thresholds	ROG (ton/project)	NOx (ton/project)	Diesel Particulate Matter (ton/project)	PM10, Fugitive Dust (ton/project)	PM 2.5 (ton/project)	CO (ton/project)	SOx (ton/project)
Reconductoring Project Construction Emissions	0.33	1.22	0.0	0.0		0.0	0.0
First Solar Switching Station Project Construction Emissions	0.9	.99		0.0	0.0	0.79	0.0
Caliente Switching Station Project Construction Emissions	0.0	0.0	0.8	0.68	0.0	1.57	0.0
Maximum Quarterly Construction Emissions*	**0.42**	**2.20**	**0.8**	**0.68**	**0.2**	**2.36**	**0.0**
San Luis Obispo APCD Tier 1 Quarterly Threshold	2.5	*Combined with ROG*	0.13	2.5	0.2	None	None
APCD Tier 2 Quarterly Threshold	6.3	*Combined with ROG*	0.32	*Equal to Tier 1 Threshold*		---	---
Exceed Threshold?	***Yes***	***Yes***	***No***	***No***		***---***	***---***

*Reconductoring project is estimated to take approximately 20 months to complete. PG&E states that construction of transmission facilities would be scheduled to occur after the PG&E switching stations have been completed to allow each transmission circuit to be placed back in service immediately after it is interconnected to the new switching station. It is estimated that the switching stations would require up to 8 months of construction each; however, the PG&E air quality estimates for the project show only the First Solar Switching Station and the reconductoring upgrades overlapping during 2011. The construction of the Caliente Switching Station is estimated to occur during 2012, and is not expected to overlap with the other phases of construction. As such, the maximum quarterly construction emissions are not always for the same quarter.

Unmitigated construction emissions could exceed the designated San Luis Obispo APCD thresholds for criteria pollutants. APM AIR-3 through 5 are identified to reduce the production of ROGs, NOx, diesel PM, and PM10 from construction activities and to comply with San Luis Obispo APCD *CEQA Air Quality Handbook* (2009a). These measures would reduce construction emissions in a manner consistent with San Joaquin Valley guidelines. The resulting emissions after mitigation would not exceed the thresholds of significance for ROGs, NOx, or diesel PM, and impacts of fugitive dust (PM10) would be mitigated to a less than significant level through the extensive measures included in APM AIR-5. Implementing these measures would ensure that the construction activities would be consistent with local air quality rules and regulations and regional air quality management plans and impacts would be less than significant.

Impact AQ-2: Operation, maintenance, and inspections would generate dust and exhaust emissions of criteria pollutants and toxic air contaminants

Switching Stations and Reconductoring. During operation, no stationary sources of criteria pollutants or toxic air contaminants would be associated with the reconductoring project. The switching stations would be unstaffed, therefore there would be no emissions associated with regular commuting. Low levels of emissions from mobile sources would occur as a result of using vehicles for periodic visits for electrical switching and routine maintenance. Routine maintenance and inspection would occur along the reconductored transmission line, similar to current practice. The air quality impact caused by emissions from project vehicular traffic for operations and maintenance would be less than significant.

3.5 Climate Change and Greenhouse Gas

Environmental Setting

Human activity contributes to emissions of six primary greenhouse gases (GHGs): CO_2, CH_4, N_2O, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride (SF_6). In response to Executive Order S-3-05 (June 2005), which declared California's particular vulnerability to climate change, the California Global Warming Solutions Act of 2006, Assembly Bill 32 (AB32), was signed into effect on September 27, 2006. In passing the bill, the California Legislature found that:

> *"Global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California. The potential adverse impacts of global warming include the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other human health-related problems" (California Health & Safety Code, Sec. 38500, Division 25.5, Part 1).*

Emissions of CO_2 occur largely from combustion of fossil fuels. The major categories of fossil fuel combustion CO_2 sources can be broken into sectors for residential, commercial, industrial, transportation, and electricity generation. The transportation sector includes all motor gasoline and diesel fuel combustion, and the GHG emissions of this sector are not split into activities or uses (i.e., there is no separate estimate for the level of GHG emissions caused by gasoline or diesel fuel combustion related to statewide construction activities). Other GHG emissions tracked by State inventories occur in much smaller quantities. However, the global warming potential of CH_4 is about 21 times that of CO_2. The use of SF_6 in power transformers and circuit breakers along transmission lines also poses a concern because of its extremely high global warming potential (one pound of SF_6 is the equivalent warming potential of

approximately 23,900 pounds of CO_2) and the possible occurrence of a slow leak from the equipment. When quantifying GHG emissions, the different global warming potentials of GHG pollutants are usually taken into account by normalizing their rates to an equivalent CO_2 emission rate (CO2e).

California is currently responsible for approximately 500 million metric tonnes of CO_2 equivalent (500 MMTCO2e) each year or between 1 and 2 percent of about 49,000 MMTCO2e emitted globally (IPCC, 2007). Electricity generation for use in California is responsible for about 80 to 90 MMTCO2e annually (depending on yearly variations) or between 20 and 25 percent of the total statewide GHG emissions. Statewide GHG emissions in 1990 were 427 MMTCO2e (CARB, 2007).

How global climate change may impact California's public health, infrastructure and natural resources is described in the 2009 Biennial Report of the California Climate Action Team (CAT, 2009). The Climate Action Team findings include: "extreme events from heat waves, floods, droughts, wildfires and bad air quality are likely to become more frequent in the future and pose serious challenges to Californians. These impacts pose growing demands on individuals, businesses and governments at the local, state, and federal levels to minimize vulnerabilities, prepare ahead of time, respond effectively, and recover and rebuild with a changing climate and environment in mind" (CAT, 2009).

For Central California, the number of days conducive to ozone formation in the San Joaquin Valley may rise by 75 to 85 percent by the end of the century, and sea-level rise may place additional pressure on the levee systems and increase the intensity of saltwater intrusion into coastal groundwater resources, leading to increased flooding and decreased freshwater availability (CAT, 2006; CAT, 2009).

The reconductoring project would require use of construction equipment that would emit GHGs. The project would occur in an area that does not include major anthropogenic GHG emission sources due to a low population density, limited agricultural activity, lack of major transportation facilities, and lack of large stationary sources of emissions. Native soils and vegetation currently provide a natural carbon sink.

Environmental Impacts

Significance Criteria

The following significance criteria for climate change and greenhouse gas emissions were derived from the current State CEQA Guidelines. The reconductoring project would be found to have a significant impact related to GHG emissions if the project would:

- Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment; or
- Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

Impact GHG-1: Construction would generate exhaust emissions of greenhouse gases

Switching Stations and Reconductoring. Construction of the switching stations and undertaking the reconductoring would have similar impacts.

Offsite manufacture of the project components, including new transmission towers, cage extensions, switching station components, and conductors, that would be delivered to and installed at the project site involves consumption of fossil fuels, metals, minerals, and water. Major resource requirements for energy input during production and manufacturing include: coal, oil, and natural gas; and for raw

materials making up the components and their installation: iron, and other metals and minerals. Coal would be consumed primarily to produce steel. Smaller quantities of oil and natural gas would be used in manufacturing and transporting the project components. The GHG emission rates and quantities of the raw materials and resources that would be consumed outside the project area, through manufacturing and long-distance transportation of the project components, have not been quantified, but they would be associated one time with project construction.

Construction would involve onsite activities and region-wide mobilization of numerous equipment (including helicopters) and personnel. These activities would cause short-term, unavoidable increases in GHG emissions. The construction GHG emissions would occur over approximately 20 months. APM AIR-2 (Minimize greenhouse gas emissions during construction) would minimize carbon emissions of construction activities by encouraging carpooling and encouraging recycling construction waste. PG&E stated that construction of the switching stations and reconductoring would result in approximately 1,185.89 metric tonnes of CO_2-equivalent (MTCO2e) for 2011 and approximately 1,241.99 MTCO2e for 2012 (PG&E, 2010). The construction-phase GHG emissions would be substantially less than the CARB Mandatory Reporting applicability level of 2,500 metric tonnes per year. As a result, the short-term emission of greenhouse gases during construction would be less than significant.

Impact GHG-2: Operation, maintenance, and inspections would generate exhaust emissions of greenhouse gases

Operation, maintenance, and inspections would cause GHG emissions, primarily CO_2 emissions, from use of the carbon-based fuels (gasoline and diesel) used by motor vehicles during inspections.

Switching Stations and Reconductoring. Reconductoring the line would not cause an increase in the baseline rate of maintenance and inspections; however, reconductoring would extend the life of the transmission line, which would result in maintenance and inspections for a longer duration than under baseline conditions. The construction of the two new switching stations would slightly increase maintenance requirements, but the switching stations would be located adjacent to the existing transmission corridor. Increased CO_2 emissions from maintenance and inspections would be minimal.

Another GHG emission source for the transmission reconductoring project and switching stations would be SF_6 from electrical equipment leakage. Sources of SF_6 would be small in quantity and emission rate, and would easily be controlled or minimized because the gas can be reused and recycled. Routine and safe operation requires that SF_6 be contained within electric power equipment.

PG&E would implement its routine measures to reduce potential SF_6 emissions from the switching station equipment and the switching station would be incorporated into PG&E's system-wide SF_6 emissions reduction program. These measures would include: SF_6 handling procedures; using a single, full-service SF_6 vendor to track SF_6 usage and recycling and to coordinate leak detection procedures; and keeping logs of "topping off" events (CPUC, 2009). APM GHG-2 (Avoid sulfur hexafluoride emissions) would ensure that the potential for SF_6 leaks is minimized by requiring PG&E to incorporate the switching stations into their system-wide program. In addition, implementation of APM GHG-1 (GHG emissions minimization) ensures that PG&E will adhere to its voluntary company-wide GHG emission reduction actions to further reduce and offset GHG emissions.

Land use conversion related to the reconductoring work would be minimal and temporary. Vegetated areas that provide a natural carbon sink would be restored at the end of the construction period. The nature of the reconductoring project, including mitigation for SF_6 control, ensures that GHG emissions related to long-term operation of the line would be minimal relative to baseline conditions.

The level of emissions for long-term operation of the reconductored line is expected to be substantially less than the level of 2,500 metric tonnes per year triggering CARB Mandatory Reporting. As a result, with implementation of APM GHG-1 and 2, GHG emissions caused by operation, maintenance, and inspection would be less than significant.

Impact GHG-3: The project would conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases

Switching Stations and Reconductoring. The reconductoring project, including switching stations construction, would ensure the delivery of renewable energy to the regional grid to achieve compliance with the Renewable Portfolio Standard program and Renewable Electricity Standard (RES) requirements. As such, the reconductoring project would contribute to the successful implementation of AB32, the AB32 Scoping Plan, and Executive Order S-14-08. The reconductoring project would not conflict with any other applicable plan, policy, or regulation adopted for the purpose of reducing GHG emissions. The project would not conflict with any applicable plan, policy or regulation for GHG reduction or managing global climate change, and no impact would occur.

3.6 Biological Resources

Biological resources in the project region were determined by a review of existing information and field surveys. The key sources of data and information accessed during the review are listed below:

- A search of the CNDDB for special-status plant and wildlife occurrences within a 10-mile radius of the project area (California Natural Diversity Database 2010).
- Revised biological resources assessment report for the CVSR Project (URS and H.T. Harvey 2009).
- Biological report for the Topaz Solar Farm (Althouse and Meade 2009).
- Biological Resources Report for the Carrizo to Midway Reconductoring Project (ICF International 2010).

Initial assessment-level botanical and wildlife surveys were conducted within the project area on February 22 and 23, 2010 and March 10 and 11, 2010. Another general assessment of only wildlife occurred on March 18, 2010. Additional comprehensive floristic surveys are ongoing as of the preparation of this report, occurring during appropriate periods of the flowering and fruiting season throughout the entire project area. All botanical surveys within the project area are being performed using the *Protocols for Surveying and Evaluating Impacts to Special-Status Native Plant Populations and Natural Communities* (California Department of Fish and Game, 2009). The general habitat assessment surveys were conducted by two wildlife biologists walking and driving the proposed project work areas, recording general habitat conditions, and noting habitat features associated with special-status species that could occur in the project area.

Environmental Setting

The portion of the Solar–Midway transmission line located in Kern County (MP 9 to MP 34) is covered under PG&E's San Joaquin Valley Operations and Maintenance Multi-species Habitat Conservation Plan (HCP; PG&E, 2007). The purpose of a HCP program is to streamline permitting through the federal and State wildlife resource agencies while ensuring protection for special-status species. Congress amended section 10 of the Endangered Species Act (ESA) in 1982 to authorize "incidental take" through the development and implementation of HCPs. The HCP integrates an applicant's proposed project or activity with the needs of the species. It describes, among other things, the anticipated effect of a

proposed take on the affected species and how that take will be minimized and mitigated. Such information must be submitted with any incidental take permit application.

Both State and federally listed species are covered, as are certain unlisted, but sensitive species that may become listed in the future. Implementation of the San Joaquin Valley Operations and Maintenance Multi-species HCP enables PG&E to continue to conduct current and future O&M activities in the San Joaquin Valley while minimizing, avoiding, and compensating for direct, indirect, and cumulative adverse effects on threatened and endangered species that could result from such utility activities. Reconductoring activities fall within the HCP's definition of Operation and Maintenance work. The HCP is unique because, unlike standard development-oriented HCPs that address permanent land conversion and loss of habitat, it primarily addresses small-scale temporary effects that are dispersed over a large geographic area. The HCP includes general Avoidance and Minimization Measures (AMMs) that are implemented for all O&M projects, species specific AMMs (which are implemented on a case by case basis), and compensation measures. The general and species-specific AMMs are listed in Table Ap.4A-6 in Section 2.5.

In some cases, the HCP AMMs focus on avoidance of the impact. Complete avoidance may not always possible for this particular project, in which case additional APMs) are applied. APMs for the proposed project are listed in Table Ap.4A-6.

PG&E's HCP also includes compensation for species effects through a variety of mechanisms. These mechanisms may be combined in various configurations, including purchase of compensation lands, purchase of mitigation credits from existing mitigation banks, placement of conservation easements on PG&E lands, and purchase of conservation easements, with an emphasis on the first three mechanisms. Compensation lands demonstrate habitat characteristics similar to those disturbed by O&M activities. Depending on the species and habitat requiring compensation, compensation may involve occupied or suitable habitat (e.g., direct effects on a specific plant population would require compensation to include occupied habitat, whereas the temporary disturbance of San Joaquin kit fox habitat would require compensation to include suitable San Joaquin kit fox habitat). The use of proposed compensation land would be subject to USFWS and DFG approval and would be protected and maintained in perpetuity. A discussion of species specific compensation efforts that PG&E has implemented, or would be implementing in the future, is provided in this section.

The HCP covers 23 wildlife and 42 plant species, 9 and 6 of which, respectively, have the potential to occur in the vicinity of the Solar-Midway reconductoring and switching station work. Biological survey work, including mapping of wetlands and jurisdictional waters, wildlife habitat assessments, and rare plants surveys, for the transmission ROW from MP 0 to MP 9 in San Luis Obispo County has resulted in preliminary determinations of impacts to biological resources.

Vegetation Communities and Habitats

Four vegetation communities occur in the project region: annual grassland, oak woodland, saltbush scrub, and California Juniper Woodland.

Annual Grassland

Vegetation from MP 0 to MP 9 and MP 17 to MP 30 consists primarily of non-native annual grassland species. This vegetation community type often occurs as an understory component within other vegetation communities, such as saltbush scrub. Annual grassland species within the project area include ripgut brome, barley, filaree species, fiddleneck species, pepper-grass, Sierra tidytips, pygmy weed, and goldfield species. Additionally, common native plant species such as blue dicks (*Dichelo-*

stemma capitata), lupine species (*Lupinus* spp.), California mustard (*Guillenia lasiophylla*), common monolopia (*Monolopia lanceolata*), popcorn flower (*Plagiobothrys* sp.), and bracted alkali goldenbush (*Isocoma acradenia* var. *bracteosa*) are found in the project area. Round-leaved filaree (*California macrophylla*), a CNPS List 1B.1 species (rare, threatened, or endangered in California and elsewhere), is known to occur in at least one portion of the project area.

Oak Woodland

Oak woodland occurs within a limited portion of the project area in the Temblor Range. Blue oak woodland is the dominant vegetation type from MP 9 to MP 17 (USFWS & CDFG, 2006). The project area within the Temblor Range is dominated by Tucker's oak (*Quercus john-tuckeri*). Tucker's oak is an evergreen shrub that reaches an average height of 6 meters. Stands typically occur on steep slopes and ridges, with the canopy within stands ranging from open and sparse to continuous and dense. Composition and density within stands are influenced by fire frequency and intensity.

California Juniper Woodland

California juniper (Juniperus californica) woodland occurs in a limited portion of the study area within the Temblor Range. California juniper is an evergreen shrub that reaches an average height of 4 meters. Canopy within stands is open to intermittent, often consisting of a few scattered individuals. Natural stand replacement is via seed; California juniper does not sprout after moderate to intense fire events.

Saltbush Scrub

Saltbush scrub stands occur throughout the project area, but are primarily concentrated and best represented within the lower, eastern portion of the project area, east of the Temblor Range. Saltbush scrub within the project area is dominated by allscale (Atriplex polycarpa), an intricately branched woody perennial shrub that reaches an average height of 1 to 2 meters. Shrub canopy within stands varies from open and sparse to continuous and dense. Allscale exhibits a high tolerance for drought and some tolerance for saline conditions. Natural stand replacement occurs primarily as result of flooding events in lowland areas. Natural stand replacement in upland areas is typically via fire events. Kern mallow (Eremalche kernensis), a species listed by the federal government as endangered and a CNPS List 1B.1 species (rare, threatened, or endangered in California and elsewhere), is known to occur in saltbush scrub habitat within portions of the project area east of the Temblor Range.

Special-Status Wildlife

Based on a review of the CNDDB and environmental documents prepared for other projects in the region, 41 special-status wildlife species were identified as having the potential to occur in the region. Protocol wildlife surveys have not been conducted for the reconductoring project, although incidental occurrences or sign were recorded. The rational for not evaluating certain species is given below.

- The project area, and 250 feet surrounding the project area, lack suitable aquatic habitat for longhorn fairy shrimp, vernal pool fairy shrimp, western spadefoot, and western pond turtle.
- The project area lacks suitable habitat for Kern primrose sphinx moth.
- The project area is outside of the geographic range of the California tiger salamander, western patch nosed snake.
- The project area lacks suitable nesting habitat for tricolored blackbird, yellowed-head blackbird, bald eagle, peregrine falcon, northern harrier, lesser sandhill crane, greater sandhill crane, and purple

martin. Oregon vesper sparrows do not nest within project area and would only occur during the non-nesting season.

- The project area lacks suitable roosting habitat for pallid bat, Townsend's big-eared bat, western mastiff bat, and western red bat.

Those species with potential or are known to occur in the project area are discussed below.

Blunt-Nosed Leopard Lizard

The blunt-nosed leopard lizard (*Gambelia sila*) is listed as endangered under ESA and CESA, and it is a fully protected species under California Fish and Game Code (FGC) 5050. Blunt-nosed leopard lizards are endemic to the San Joaquin Valley and the Carrizo Plain (U.S. Fish and Wildlife Service, 1998).

Blunt-nosed leopard lizards are found in sparsely vegetated plains, alkali flats, grasslands, low foothills, canyon floors, and large washes. They inhabit areas with sandy soils and scattered vegetation and are usually absent from thickly vegetated habitats. On the floor of the San Joaquin Valley, they are usually found in nonnative grassland, valley sink scrub habitats, valley needlegrass grassland, alkali playa, and valley saltbush scrub. Blunt-nosed leopard lizards use small rodent burrows for shelter, predator avoidance, and behavioral thermoregulation. These burrows may be either abandoned ground squirrel tunnels or occupied or abandoned kangaroo rat tunnels. Each lizard may use several burrows, avoiding those with predators or other leopard lizards. Blunt-nosed leopard lizards are large, opportunistic predatory lizards, feeding primarily on insects, including grasshoppers, crickets, and moths. They also feed on other small lizards, even of their own species (U.S. Fish and Wildlife Service, 1998).

Several CNDDB (2010) records for blunt-nosed leopard lizards occur within 10 miles of the proposed project area. Suitable habitat for the species occurs in several of the proposed work areas located in annual grassland and saltbush scrub habitats.

San Joaquin Kit Fox

The San Joaquin kit fox (*Vulpes macrotis mutica*) is listed as threatened under ESA and as endangered under CESA. The current known range of San Joaquin kit fox extends from the southwest corner of San Joaquin County south into Kern and San Luis Obispo Counties (U.S. Fish and Wildlife Service, 1998).

San Joaquin kit foxes appear to have adapted to living in marginal areas of the agricultural Central Valley, such as grazed, non-irrigated grasslands; peripheral lands adjacent to tilled and fallow fields; irrigated row crops, orchards, and vineyards; and petroleum fields and urban areas (U.S. Fish and Wildlife Service, 1998). San Joaquin kit foxes usually prefer areas with loose-textured soils suitable for den excavation, but they are found on virtually every soil type. Dens are usually scarce in areas with shallow soils because of the proximity to bedrock, impenetrable hardpan layers, and high water tables. Where soils make digging difficult, kit foxes frequently use and modify burrows built by other animals, particularly those of California ground squirrels and American badgers. Structures such as culverts, abandoned pipelines, and well casings may also be used as den sites (U.S. Fish and Wildlife Service, 1998).

Several CNDDB (2010) recordings of San Joaquin kit fox occur within 10 miles of the proposed project area, and a San Joaquin kit fox scat was observed at the proposed site for the Caliente Switching Station, near Tension/Pull Sites 073 and 097. Suitable habitat for the species occurs in several of the proposed work areas that occur in annual grassland and saltbush scrub habitats.

Giant Kangaroo Rat

The giant kangaroo rat (*Dipodomys ingens*) is a listed as endangered under ESA and CESA. The current distribution of giant kangaroo rats includes the Panoche Region in western Fresno County and eastern San Benito County; the Kettleman Hills in western Kings County; the Lokern, Elk Hills, and other uplands around McKittrick, Taft, and Maricopa in western Kern County; the Carrizo Plain Natural Area in eastern San Luis Obispo County; and Cuyama Valley in Santa Barbara and San Luis Obispo Counties (U.S. Fish and Wildlife Service, 1998).

Giant kangaroo rats occur in annual grassland habitats in areas with slopes generally less that 10° and friable, sandy-loam soils. Giant kangaroo rats develop burrow systems with one to five entrances. Two types of burrows are dug: a burrow with a vertical shaft, circular opening, and no dirt apron, and a wide burrow with a horizontal entrance and a well-worn path leading from the mouth (U.S. Fish and Wildlife Service, 1998).

Several CNDDB (2010) recordings of giant kangaroo rats occur within 10 miles of the proposed project area. Suitable habitat for the species occurs in several of the proposed work areas that occur in annual grassland and saltbush scrub habitats.

Coast Horned Lizard and San Joaquin Whipsnake

The California horned lizard (*Phrynosoma coronatum*) and San Joaquin whipsnake (*Masticophis flagellum ruddocki*) are a California species of special concern. California horned lizard is endemic to California, occurring in localized areas along the South Coast Ranges and isolated sections of natural habitat remaining on the San Joaquin Valley floor (Jennings and Hayes, 1994). San Joaquin whipsnakes occur along the Coast Ranges from Alameda and San Joaquin Counties south to Kern County.

Grassland and saltbush scrub habitats in the project area provide suitable habitat for coast horned lizards and San Joaquin whipsnake; however, there are no CNDDB recording of either animal within 10 miles of the project area (California Natural Diversity Database, 2010). Neither the coast horned lizard nor the San Joaquin whipsnake was observed during the 2010 field surveys.

California Condor

The California condor (*Gymnogyps californianus*) is listed as endangered under ESA and CESA and is a fully protected species under FGC 3511. In California, California condors historically occurred along a wishbone-shaped area encompassing 10 counties in the southern and central parts of the state—San Benito, Monterey, San Luis Obispo, Santa Barbara, Kern, Ventura, Tulare, Fresno, Kings, and Los Angeles Counties (U.S. Fish and Wildlife Service, 1996). The wild population was extirpated by mid-1987 (with the trapping of the last individuals for captive breeding). Since 1992, releases of captives have occurred in parts of California, including Big Sur in the Ventana Wilderness Sanctuary, the Sespe Condor Sanctuary, and the Los Padres National Forest in Santa Barbara, Ventura, and Kern Counties (California Department of Fish and Game, 2009). Condors feed exclusively on the carcasses of medium-sized to large mammals. Domestic cattle, sheep, and horses, along with mule deer and California ground squirrel, are the predominant food sources for California condors today (U.S. Fish and Wildlife Service, 1996).

Golden Eagle

Golden eagles (*Aquila chrysaetos*) are a California species of special concern and fully protected under FGC 3511, the Migratory Bird Treaty Act (MBTA), and the Bald Eagle and Golden Eagle Protection Act.

Golden eagles typically inhabit open grassland areas in foothills surrounding the Central Valley. Golden eagle nests are commonly built on cliff ledges and in large trees in open areas. They typically forage in open grasslands, where they prey on California ground squirrels and black-tailed jackrabbits (Kochert et al., 2002).

No golden eagles were reported by the CNDDB (2010) within 10 miles of the project area. One golden eagle was observed soaring above Tension/Pull Site 013 during the 2010 field surveys. Large trees and towers occurring in or near the project area provide suitable nesting habitat for this species, and grasslands and agricultural areas provide suitable foraging habitat.

White-Tailed Kite

The white-tailed kite is a fully protected species under FGC 3511, and its nests are protected under the MBTA. Since the 1980s, many white-tailed kite populations have been declining, apparently because of loss of habitat and increased disturbance of nests (Dunk, 1995).

The breeding season generally extends from early February through early August. White-tailed kites usually nest in large native trees, although nonnative trees also are occasionally used. Nest trees are generally at the edge of wooded habitat next to open fields. Large trees in areas that have been developed may also be used, although the trees need to be close to open fields for foraging (Dunk, 1995).

No white-tailed kites were reported by the CNDDB (2010) within 10 miles of the project area, and no white-tailed kites were observed in or in the vicinity of the project area during 2010 field surveys. Large trees in the vicinity of the project area provide suitable nesting habitat, and the grassland and agricultural field in the project area provide suitable foraging habitat.

Swainson's Hawk

Swainson's hawks (*Buteo swainsoni*) are listed as threatened under CESA, and their nests are protected under the MBTA. Swainson's hawks inhabit grasslands, sage-steppe plains, and agricultural regions of western North America during the breeding season, and winter in grassland and agricultural regions from central Mexico to southern South America (England et al., 1997). In California, the nesting distribution includes the Sacramento and San Joaquin Valleys, the Great Basin sage-steppe communities and associated agricultural valleys in extreme northeastern California, and limited areas of the Mojave Desert region (California Department of Fish and Game, 2005). Swainson's hawks usually nest in large native trees such as valley oak (*Quercus lobata*), Fremont cottonwood, and willows (*Salix* spp.), although, nonnative trees such as eucalyptus (*Eucalyptus* spp.) are occasionally used. The breeding season is typically March to August (England et al., 1997).

No Swainson's hawks were reported by the CNDDB (2010) within 10 miles of the project area, and no Swainson's hawks were observed in or in the vicinity of the project area during 2010 field surveys. Large trees in or near the vicinity of the project area provide suitable nesting habitat, and the grassland and agricultural field in the project area provide suitable foraging habitat.

Western Burrowing Owl

The western burrowing owl (*Athene cunicularia hypugea*) is a California species of special concern, and its nests are protected under the MBTA. Western burrowing owls were formerly a common permanent resident throughout much of California, but population declines were noticeable by the 1940s and have continued to the present, especially along the central and southern coasts. The draining of wetlands in

the Central Valley and conversion of desert scrub to agriculture in the Imperial Valley likely contributed to the increase in numbers and distribution throughout the valleys (Shuford and Gardali, 2008)).

Western burrowing owls prefer open, dry, short grassland habitats with few trees. They typically occupy burrows abandoned by ground squirrels or other burrowing mammals. Burrowing owls can persist on habitats that have been highly modified by human activity and will burrow in abandoned pipes, culverts, and debris piles (Shuford and Gardali, 2008). The breeding season usually extends from late February through August. This species is more diurnal than most owls and can often be observed during the day standing outside the entrance to its burrow (California Department of Fish and Game, 1995).

CNDDB (2010) records indicated several burrowing owl records within 10 miles of the project area. One burrowing owl was observed at the eastern end of the Caliente Switching Station survey area. Suitable western burrowing owl nesting and foraging habitat occurs in the grassland, saltbush scrub, and disturbed habitats of the project area where ground squirrel burrows and other artificial burrows are present.

Long-eared Owl

The long-eared owl (*Asio otus*) is a California species of special concern, and its nests are protected under the MBTA. They prefer grasslands and open forests and nest in trees and shrubs (Marks et al., 1994). Long-eared owls exclusively hunt for prey in open habitats. Like most owls, long-eared owls hunt at night and prey on a variety of small rodents (Marks et al., 1994).

There are no CNDDB (2010) records for long-eared owls within 10 miles of the project area and none were observed during 2010 surveys. California Department of Fish and Game biologist David Hacker has reported observing long-eared owls in the Temblor Range (Krenn pers. comm.) Long-eared owls could nest in the denser trees and shrubs located in the Temblor Range and forage in grassland habitat in the Temblor Range.

Loggerhead Shrike

The loggerhead shrike (*Lanius ludovicianus*) is a California species of special concern, and its nests are protected under the MBTA. In California, loggerhead shrike occurs in open habitats with scattered shrubs, trees, posts, fences, utility lines, and other perches. Habitats include valley foothill forests, pinyon-juniper, desert riparian, and Joshua tree (Duke, 2010a). Loggerhead shrike is adaptable to urban environments as long as preferred habitat characteristics and abundant prey supplies are present (Yosef, 1996).

The loggerhead shrike is a predatory songbird and feeds on a wide variety of prey, including insects, small mammals and birds, reptiles, amphibians, and occasionally carrion (Yosef, 1996). Nesting habitat includes densely foliaged shrubs and trees near open habitats (Duke, 2010a).

There are no CNDDB (2010) records for loggerhead shrikes within 10 miles of the project area. Several loggerhead shrikes were observed within the project area during the 2010 surveys. Loggerhead shrikes could nest in trees and shrubs located throughout the project area and forage in suitable habitat throughout the project area.

Le Conte's Thrasher

The Le Conte's thrasher (*Toxostoma lecontei*) is a California species of special concern, and its nests are protected under the MBTA. Le Conte's thrashers are an uncommon resident of the desert southwest and northwestern Mexico. In California, the species is a permanent resident in the San Joaquin Valley,

Mojave Desert, and Colorado Desert (Sheppard, 1996).Typical habitat consists of sparsely vegetated desert with a high proportion of saltbush or shadscale and/or cylindrical cholla cactus species (Sheppard, 1996).

CNDDB (2010) records indicated several Le Conte's thrasher records within 10 miles of the project area, although, no Le Conte's thrashers were observed during the 2010 field surveys. Suitable nesting and foraging habitat occur in the saltbush scrub habitats within the project area.

Grasshopper Sparrow

The grasshopper sparrow (*Ammodramus savannarum*) is a California species of special concern, and its nests are protected under the MBTA. In California, grasshopper sparrows are summer residents and breed in the foothills and lowlands west of the Sierra Nevada from Mendocino and Trinity Counties south to San Diego County. Grasshopper sparrow occurs in dry grasslands, especially those with a variety of grasses and forbs. The species prefers moderately open grasslands with patchy bare ground (Vickery, 1996).

Grasshopper sparrow feeds exclusively on the ground, and exposed bare ground is critical for foraging. A large portion of its diet is grasshoppers (Vickery, 1996). Nests are built of grasses and forbs in a slight depression in the ground and are often concealed with overhanging grasses (Duke, 2010b).

No grasshopper sparrows were reported by the CNDDB (2010) within 10 miles of the project area, and no grasshopper sparrows were observed during the 2010 field surveys. The annual grasslands in the study area provide suitable nesting habitat.

San Joaquin Antelope Squirrel

The San Joaquin antelope squirrel (*Ammospermophilus nelsoni*) is listed as threatened under CESA. San Joaquin antelope squirrels inhabit dry grasslands with sandy loam soils, widely spaced alkali scrub vegetation, and dry washes. Today, only the Carrizo and Elkhorn Plains and western Kern County around Elk Hills support significant populations of San Joaquin antelope squirrels. Smaller populations also inhabit marginal habitat in the foothills at the western edge of the San Joaquin Valley (U.S. Fish and Wildlife Service, 1998). The species breeds only once a year, coinciding with the presence of green vegetation (U.S. Fish and Wildlife Service, 1998).

Several CNDDB (2010) records for San Joaquin antelope squirrels occur within 10 miles of the proposed project area. Suitable habitat for the species occurs in several of the proposed work areas that occur in annual grassland and saltbush scrub habitats. One San Joaquin antelope squirrel was observed at Tension/Pull Site 097.

Tipton Kangaroo Rat

The Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*) is listed as endangered under ESA and CESA. Currently, Tipton kangaroo rats are limited to scattered, isolated clusters in Pixley, Tulare County, and Kern County (U.S. Fish and Wildlife Service, 1998).

Tipton kangaroo rat occupies arid-land communities. Alluvial fans and floodplain soils ranging from fine sands to clay-sized particles with high salinity are characteristics of suitable habitat. The species occurs in higher densities in areas with sparse-to-moderate shrub cover. Burrow systems are most often located in open areas and are commonly found in slightly elevated mounds, road berms, canal embankments, railroad beds, and bases of shrubs and fences where windblown soils accumulate above the level of surrounding terrain (U.S. Fish and Wildlife Service, 1998).

Several CNDDB (2010) records for Tipton kangaroo rats occur within 10 miles of the proposed project area. Suitable habitat for the species occurs in the proposed work area in the annual grassland habitat that occurs between the southern end of the Midway Substation and SR-58.

Valley Elderberry Longhorn Beetle

The valley elderberry longhorn beetle (VELB) (*Desmocerus californicus dimorphus*) is listed as threatened under the ESA. Its range extends throughout the Central Valley and associated foothills, from the 3,000-foot contour in the Sierra Nevada foothills, across the valley floor, to the Central Valley watershed in the foothills of the Coast Ranges (U.S. Fish and Wildlife Service 2006). VELB's life cycle is entirely dependent on its host plants—blue elderberry and red elderberry (*Sambucus racemosa*). VELB eggs and larva spend up to two years living in the stem of the plant. Adults emerge after pupating in the spring (March to June) when the host plants are flowering. VELB adults live from a few days to a few weeks, mating and feeding on elderberry nectar, flowers, and leaves (Collinge et al. 2001).

Elderberry shrubs (*Sambucus racemosa*) suitable for VELB were found to be present along the access road to Tension/Pull site 65 during biological surveys in June 2010 (ICF, 2010).

Short-Nosed Kangaroo Rat

The short-nosed kangaroo rat (*Dipodomys nitratoides brevinasus*) is a California species of special concern. The short-nosed kangaroo rat is one of three subspecies of the San Joaquin kangaroo rat. Historically, short-nosed kangaroo rats occur along the western, southern, and extreme southeastern sides of the San Joaquin Valley above the valley floor. The species' current range approximates its historic range, but the number of localities has diminished as a result of loss and fragmentation of habitat due to agricultural and urban conversion (Bolster, 1998a).

Short-nosed kangaroo rats occur in grassland and saltbush scrub habitats with friable soils on flat or gently rolling terrain. In the Soda Lake area of the Carrizo Plain, short-nosed kangaroo rats occur in alkali soils. Burrows most often occur in slightly elevated areas, including road berms, canal embankments, railroad beds, and at the base of shrubs and fences, where the likelihood of seasonal flooding is less (Bolster, 1998a).

Several CNDDB (2010) records for short-nosed kangaroo rats occur within 10 miles of the proposed project area. Suitable habitat for the species occurs in several of the proposed work areas that occur in annual grassland and saltbush scrub habitats.

Tulare Grasshopper Mouse

The Tulare grasshopper mouse (*Onchomys torridus tularensis*) is a California species of special concern. The Tulare grasshopper mouse's range includes western Kern County, the Carrizo Plain, Cuyama Valley, and the Panoche region in Fresno and San Benito Counties (U.S. Fish and Wildlife Service, 1998). Grasshopper mice feed almost exclusively on arthropods, especially grasshoppers, crickets, and scorpions. Predators include raptors, snakes, and predatory mammals. This species is considered beneficial to farmers because it eats potentially harmful insects (Bolster, 1998b).

Several CNDDB (2010) records for Tulare grasshopper mouse occur within 10 miles of the proposed project area. Suitable habitat for the species occurs in several of the proposed work areas that occur in annual grassland and saltbush scrub habitats.

American Badger

The American badger (*Taxidea taxus*) is a California species of special concern. Badgers are found throughout most of California, except for the extreme northwest area of the state. Badgers are most abundant in open, drier habitats with friable soils. Associated habitats include annual grasslands. Open blue oak and valley oak savannah may also be used (White and Ahlborn, 2010a).

Badgers are highly specialized for digging. Their dens function as sites for diurnal inactivity, foraging, and food storage. Badgers are mainly nocturnal, although all age classes, especially the young, can be active during daylight hours. Badgers do not hibernate, but rather react to colder weather by reducing their aboveground activity (White and Ahlborn, 2010a).

Several CNDDB (2010) records for American badger occur within 10 miles of the proposed project area, and one badger was observed in a burrow at the Tension/Pull Site 013. Suitable habitat for the species occurs in several of the proposed work areas that occur in annual grassland and saltbush scrub habitats.

Tule Elk

Tule elk (*Cervus elaphus nannodes*) have no special-status designation, but are an uncommon game species that are managed by the CDFG. Tule elk are endemic to California and were once common in the Central Valley. By the end of the 19th century, tule elk had been nearly hunted to extinction, with just a small herd of less than 30 individuals occurring near Bakersfield (URS and H.T. Harvey, 2009). Tule elk prefer open, semiarid habitats that are dominated by grasses and shrubs on flat to gently-sloping topography. Calving occurs in May and June in areas that provide dense cover near water sources (White and Ahlborn, 2010b).

One herd of approximately 30 individuals was observed near Tension/Pull Site 013 and a herd of five individuals was observed on hill side above Tension/Pull Site 072. Suitable habitat for tule elk occurs throughout the Temblor Range and California Valley.

Pronghorn

Pronghorn (*Antilicapra americana*) have no special-status designation, but are an uncommon game species that are managed by the CDFG. Pronghorn are a common resident on the Modoc Plateau in northeastern California and CDFG has relocated pronghorn to portions of Kern, San Luis Obispo, and San Benito Counties (Harris and Duke, 2010). Pronghorn inhabit sagebrush, bitterbrush, grassland, pinyon-juniper, and alkali desert scrub habitats (Harris and Duke, 2010). Pronghorn calve in areas where vegetation is generally greater than 2 feet in height (Stafford pers. Comm., 2009) Pronghorn generally give birth to twins in the spring (Harris and Duke, 2010).

No pronghorn were observed during 2010 surveys. Pronghorn are known to occur in California Valley and may occur in the vicinity of the western portion of the project.

Other Protected Species

Migratory Birds and Raptors

Several active red-tailed hawk nests were observed in either 230 kV or adjoining towers. Additionally, several unoccupied nests were observed on towers and in nearby trees. An active horned lark nest was observed in the proposed work area for the Caliente Switching Station. Although these species and other bird species that could nest in or near the project area are not considered special-status wildlife species, their occupied nests and eggs are protected by FGC 3503 and/or 3503.5 and the MBTA.

Special-Status Plants

Based on a review of the CNDDB (2010) and environmental documents prepared for other projects in the region, 23 special-status plant species were identified as having the potential to occur in the region. The species known to occur in the study area or with a high potential to occur in the study area are discussed below.

Kern Mallow. Kern mallow is an annual herbaceous plant known to occur within portions of Kern, San Luis Obispo, and Tulare Counties. It is listed by the federal government as endangered and is a CNPS List 1B.1 species (rare, threatened, or endangered in California and elsewhere). The reported blooming period is April through June. It is known to occur in saltbush scrub habitat within portions of the project area east of the Temblor Range. Specific locations where Kern mallow is known to occur within the project area include MP 73/321, MP 73/322, and MP 69/303.

Round-Leaved Filaree. Round-leaved filaree is an annual, or sometimes biennial, herbaceous plant known from scattered occurrences in the Central Valley, southern North Coast Ranges, San Francisco Bay Area, South Coast Ranges, Channel Islands, Transverse Ranges, and Peninsular Ranges. The reported blooming period is March through May. Round-leaved filaree is a CNPS List 1B.1 species (rare, threatened, or endangered in California and elsewhere). It is known to occur in at least one portion of the project area: MP 60/266. One individual plant was observed during initial assessment-level botanical surveys in February 2010; however, other individuals or populations are expected to be found in the project area.

Hoover's Eriastrum. Hoover's eriastrum (*Eriastrum hooveri*) is an annual herbaceous plant known to occur from the western side of the San Joaquin Valley from San Benito County to Kern and Los Angeles Counties. The reported blooming period is March through July. Hoover's eriastrum is a CNPS List 4.2 species (a plant of limited distribution). It was listed by the federal government as threatened on July 19, 1990, and subsequently delisted on October 7, 2003. Portions of the project area provide suitable habitat for Hoover's eriastrum. In addition, there is a known location listed in the CNDDB less than 3 miles from the project area. As a result, Hoover's eriastrum has a high potential to occur within the project area.

Temblor Buckwheat. Temblor buckwheat (*Eriogonum temblorense*) is an annual herbaceous plant known to occur in Fresno, Kern, Monterey, and San Luis Obispo Counties. The reported blooming period is May through September. Temblor buckwheat is a CNPS List 1B.2 species (rare, threatened, or endangered in California and elsewhere). Portions of the project area may provide suitable habitat for this species. In addition, there is a known location listed in the CNDDB approximately 3 miles from the project area. As a result, the species has a high potential to occur within the project area.

Pale-Yellow Layia. Pale-yellow layia (*Layia heterotricha*) is an annual herbaceous plant known from the interior foothills of the South Coast Ranges, Transverse Ranges, and Tehachapi Mountains in Fresno, Kings, Kern, Monterey, Santa Barbara, San Luis Obispo, Ventura, and (possibly) San Benito Counties. The reported blooming period is March through June. Pale-yellow layia is a CNPS List 1B.1 species (rare, threatened, or endangered in California and elsewhere). Portions of the project area may provide suitable habitat for this species. In addition, there is a known location listed in the CNDDB less than 1 mile from the project area. As a result, pale-yellow layia has a high potential to occur within the project area.

Showy Golden Madia. Showy golden madia (*Madia radiata*) is an annual herbaceous plant known from scattered populations in the interior foothills of the South Coast Ranges, including Contra Costa, Fresno, Kings, Kern, Monterey, Santa Barbara, San Benito, Santa Clara, San Joaquin, San Luis Obispo, and

Stanislaus Counties. The reported blooming period is March through May. Showy golden madia is a CNPS List 1B.1 species (rare, threatened, or endangered in California and elsewhere). Portions of the project area may provide suitable habitat for this species. In addition, there is a known location listed in the CNDDB approximately 0.5 miles from the project area. As a result, showy golden madia has a high potential to occur within the project area.

Golden Violet. Golden violet (*Viola aurea*) is a perennial herbaceous plant known from the east side of the Sierra Nevada and the Mojave Desert, from Lassen to San Diego Counties. The reported blooming period is April through June. Golden violet is a CNPS List 2.2 species (rare, threatened, or endangered in California; common elsewhere). Portions of the project area may provide suitable habitat for this species. In addition, there is a known location listed in the CNDDB approximately 0.5 miles from the project area. As a result, golden violet has a high potential to occur within the project area.

Wetlands and Other Waters of the United States

Field surveys to map potential waters of the United States were conducted in March and April 2010. Although no wetlands appear to be present, several ephemeral and intermittent streams are present in the study area. A wetland delineation conducted according to USACE protocol is underway as of the preparation of this report. A wetland delineation report will provide a summary of the location, type, and extent of waters of the United States in the study area.

Areas of Critical Environmental Concern

The transmission line passes through the BLM-managed Lokern Area of Critical Environmental Concern (ACEC) from MP 21.5 to MP 30. The Lokern ACEC contains 3,110 acres of federal land. This large, undeveloped area provides habitat for the State-listed San Joaquin antelope squirrel and the State- and federally-listed San Joaquin kit fox, blunt-nosed leopard lizard, giant kangaroo rat, and Tipton kangaroo rat. The Lokern area also contains virtually all populations of the federally-listed Kern mallow. A second federally-listed plant, Hoover's woolly-star and numerous sensitive animal species (short-nosed kangaroo rat, San Joaquin pocket mouse, long-billed curlew, mountain plover and ferruginous hawk) also occur in the area. The area is characterized by open grasslands, patches of saltbush scrub, and a dense growth of alkali sink scrub (BLM, 1997). The Lokern area has been identified by the FWS and the CDFG as an important location for the conservation and recovery of endangered species.

Environmental Impacts

All impacts from the upgrade activities are expected to be temporary with the exception of the construction of the Solar and Caliente Switching Stations, which would require permanent footprints of up to 9 acres each and around Tower #072. Temporary impacts include driving vehicles off road, hand-removal of vegetation, and use of helicopters. The discussion below analyzes both temporary and permanent impacts.

Impact BR-1: Construction activities would result in temporary and permanent losses of native vegetation

The switching station and transmission line areas are dominated by California annual grassland and a suite of other native and non-native plant communities. Direct impacts to native vegetation communities would occur as a result of the removal of vegetation during construction activities, including ground-disturbing activities to support construction of the switching stations and microwave tower and reflector. Additionally, permanent impacts (i.e., permanent loss of habitat) would occur at

the Caliente Switching Station, the Solar Switching Station, and around Tower #072. Surveys for sensitive biological resources at the Solar Switching Station have not yet been completed as publication of this document. Implementation of the switching stations and reconductoring elements of the project would result in up to 18 acres of permanent and approximately 56.8 acres of temporary impacts to vegetative communities and landforms. Additionally, approximately 27.2 acres of disturbance would occur due to widening and upgrading existing access roads. Indirect impacts to native vegetation communities could include alterations in existing topography and hydrology regimes, sedimentation and erosion, soil compaction, the accumulation of fugitive dust, disruptions to native seed banks from ground disturbance, and the colonization of non-native, invasive plant species. These actions may result in reduced habitat quality for native plants. In addition, the removal of vegetation cover and the disruption of soil crusts create possibilities for erosion, dust, and weed invasion that can affect habitat in adjacent areas.

Typically, the loss of non-sensitive plant communities including California annual grassland, agriculture, and disturbed/developed vegetation communities and land covers would not be considered a significant impact. These communities are not sensitive, are locally and regionally abundant, and are typically dominated by exotics. However, on the Carrizo Plain the loss of native and non-native plant communities, including annual grassland, has the potential to result in the loss of habitat occupied by a variety of special-status species. Because of the importance of these plant communities, construction activities that result in the loss of these communities would be considered significant absent mitigation. To minimize impacts to vegetation communities, the Applicant would implement APMs that would require an environmental awareness program for all construction and on-site personnel and require the general avoidance of biological resources impacts. Specific Avoidance and Mitigation Measures from the Final PG&E San Joaquin Valley Operation & Maintenance Habitat Conservation Plan would also be implemented. These same APMs and AMMs will be implemented during the construction of the switching stations.

PG&E has purchased 83.9 acres of habitat at the Semitropic Preserve, which enabled the expansion of the Preserve, and 10.6 acres of habitat occupied by giant kangaroo rat, which has become a Center for Lands Management Preserve, as compensatory mitigation to off-set temporary O&M impacts under its HCP. No compensatory mitigation has been purchased for the permanent loss of up to 18 acres due to the construction and operation of the Caliente and Solar Switching Stations, a significant impact. As such, APM BIO-22 (Compensation for permanent impacts to giant kangaroo rat, San Joaquin kit fox and San Joaquin antelope squirrel and preparation of a Habitat Mitigation and Monitoring Plan) would be required. With implementation of this measure, the impacts from project construction would be less than significant.

Impact BR-2: The project would result in the loss of foraging habitat for wildlife

The Carrizo plain eco-region consists of over 195,297 acres of natural habitat (SC Wildlands, 2009). This region supports a broad diversity of both common and sensitive wildlife that utilize the existing habitat in the project area for foraging and other life history requirements including breeding, movement, and refugia. Some of these species are permanent residents such as the San Joaquin kit fox, giant kangaroo rat, American badger, burrowing owl, and golden eagle. Other species, including mountain plover and ferruginous hawk, are winter residents that forage on the project site. Direct impacts to foraging habitat would occur from construction and operation of the reconductoring and the permanent conversion of open space as a result of the placement of the two switching stations.

Indirect impacts to foraging habitat could include alterations to existing topographical and hydrological conditions, increased erosion and sediment transport, and the establishment of noxious weed colonies.

Operational impacts include increased human presence and the spread of noxious weeds due to use of new or improved access roads.

Although the reconductoring and switch stations occur within an area supporting large open space, not all of these areas support the same types of habitat and may have different land use practices (i.e., grazing agriculture, etc.). Therefore, while the overall loss of foraging habitat compared to available habitat in the region is low, project-related impacts to foraging habitat for wildlife are considered significant absent mitigation. To minimize impacts to foraging habitat, the Applicant would implement APMs that would require an environmental awareness program for all construction and on-site personnel, and APMs that would include general avoiding of biological resources impacts. Avoidance and Mitigation Measures (AMM) from the Final PG&E San Joaquin Valley Operation & Maintenance Habitat Conservation Plan would also be implemented. As the APMs would be required for the entire project, including the switching stations, implementation of the same APMs and AMMs for the construction of the switching stations would ensure the impacts of the switching stations would be less than significant.

Additionally, PG&E has purchased 83.9 acres of habitat at the Semitropic Preserve, which enabled the expansion of the Preserve, and 10.6 acres of habitat occupied by giant kangaroo rat, which has become a Center for Lands Management Preserve, as compensatory mitigation to off-set temporary O&M impacts under its HCP. However, no compensatory mitigation has been purchased for the permanent loss of up to 18 acres of foraging habitat due to the construction and operation of the two switching stations, a significant impact absent mitigation. As such, APM BIO-22 (Compensation for permanent impacts to giant kangaroo rat, San Joaquin kit fox and San Joaquin antelope squirrel and preparation of a Habitat Mitigation and Monitoring Plan) would be required. With implementation of this measure, the impacts from project construction would be less than significant.

Impact BR-3: Project would result in disturbance to or loss of blunt-nosed leopard lizards and temporary disturbance of their habitat

Several of the proposed tension/pull sites, landing zones, and areas for crossing guards would be located within suitable habitat for blunt-nosed leopard lizards (BNLL). These areas would be temporarily disturbed by construction noise and habitat disturbance, although there would be no net loss of suitable habitat. Although these activities would only temporarily affect suitable habitat, these activities could disturb or result in injury or mortality by running over lizards or collapsing occupied burrows. This impact is potentially significant because it could result in the injury or loss of a federally- and State listed species and a fully protected species. In addition to implementation of general biological APMs (BO-1 to BO-10) and AMMs (AMM-1 to AMM-30) from the Final PG&E San Joaquin Valley Operation & Maintenance Habitat Conservation Plan listed in Table Ap.4A-6, the following species-specific APMs would also minimize impacts to the species:

- APM BIO-1/AMM-24: Implement avoidance and minimization measures outlined in PG&E's O&M San Joaquin Valley Habitat Conservation Plan.
- APM BIO-2: Avoid and/or minimize potential impacts to blunt-nosed leopard lizards by establishing work areas in locations that will have the least negative impacts.
- APM BIO-3: Fence work areas, cover burrows with plywood mats, and conduct protocol surveys if burrows cannot be avoided.
- APM BIO-4: Conduct work in suitable blunt-nosed leopard lizard habitat during the active season.

The work areas for tension/pull site and landing zone, which were originally proposed at Tower 127, would have been located in an area that would potentially impact BNLL because: (1) lizards are known to occur on the site based on previous observations, (2) large number of burrows occurring within the proposed work areas provide likely habitat, and (3) high density of the vegetation would make it difficult to avoid impacting suitable blunt-nosed leopard lizard burrows. As a result, PG&E moved the tension/pull site and landing zone to between Tower 118 and Tower 119. Although this area also provides suitable habitat for BNLL, there are significantly fewer burrows and the vegetation is much less dense.

Potential habitat for the BNLL occurs near the switching stations and BNLL have been documented south of the region, within the Carrizo Plain National Monument. Direct impacts to BNLL are not authorized by the CDFG and are not expected to occur during construction of the switching stations; however, if the BNLL is present and undetected, direct impacts could include being hit by vehicles on access roads, mechanical crushing during site preparation and grading, fugitive dust, disturbance from noise or vibrations from heavy equipment, and general disturbance due to increased human activity. Because this species is commonly associated with small mammal burrows, which provide potential refugia, direct impacts could also include unintentional entombment if burrows are collapsed.

In addition to implementation of APMs BIO-1, BIO-2, BIO-3, and BIO-4, PG&E stated that it has purchased 83.9 acres of habitat occupied by BNLL at the Semitropic Preserve, which enabled the expansion of the Preserve, as compensatory mitigation to off-set temporary O&M impacts under its HCP. Since the activities of the proposed upgrades would be covered under the HCP and the same APMs would apply to the work within San Luis Obispo County, impacts would be less than significant and no additional compensatory mitigation would be required for the reconductoring of the transmission line.

The habitat purchased by PG&E did not take into account the direct loss of up to 18 acres of BNLL habitat due to the construction of two switching stations. As stated above, impacts to BNLL are not expected to occur from the construction of the switching stations; however, if present even in very low densities, impacts on this species would be considered significant without mitigation. To reduce effects of the construction of the switching stations on the species, APM BIO-23 (Focused Pre-construction surveys for blunt-nosed leopard lizard and implementation of avoidance measures) and BIO-24 (Compensation for impacts to occupied blunt-nosed leopard lizard) would be required. Implementation of these APMs would ensure potential impacts to BNLL would be less than significant.

Impact BR-4: Project would result in loss of San Joaquin whipsnakes and coast horned lizards

Several of the proposed tension/pull sites, landing zones, and areas for crossing guards would be located within suitable habitat for whipsnakes and coast horned lizards. Although construction would only temporarily affect suitable habitat, whipsnakes or horned lizards could experience injury or mortality from vehicle traffic by being run over. The number of whipsnake or horned lizards impacted by construction related activity would be relatively small and impacts to their habitat would be temporary; impacts would be less than significant.

The proposed switching stations would be located within potentially suitable habitat for whipsnakes and coast horned lizards as they have been documented in the region. The switching stations would potentially result in the permanent loss of up to 18 acres of suitable habitat for these species. Direct impacts include being hit by vehicles on access roads; mechanical crushing during grading or from vehicle travel, entombment; fugitive dust; and general disturbance due to increased human activity. Indirect impacts to these species include compaction of soils and the introduction of exotic plant species. Operational impacts include risk of mortality by vehicles and disturbance from routine

maintenance. As with other small species, the introduction of perch sites increases potential predation risks from aerial predators. Temporary and permanent habitat loss and the loss of individual animals would be considered significant absent mitigation.

In addition to implementation of general biological APMs (BO-1 to BO-10) and AMMs (AMM-1 to AMM-30) from the Final PG&E San Joaquin Valley Operation & Maintenance Habitat Conservation Plan listed in Table Ap.4A-6, APM BIO-5 (Conduct work in suitable habitat during periods when the species are most active) would also minimize potential impacts to San Joaquin whipsnakes and coast horned lizards by requiring work to be conducted during warm weather when the species is most active and requiring workers to drive slowly on access roads and overland while in suitable habitat to allow these species to move out of the way of vehicles. To further reduce the effects of the switching station stations on San Joaquin whipsnakes and coast horned lizard the Applicant would implement APM BIO-25 (Focused pre-construction surveys for San Joaquin whipsnakes and coast horned lizard and implementation of avoidance measures). The implementation of these APMs would ensure impacts of the proposed project would be less than significant.

Impact BR-4a: Project would result in disturbance to or loss of valley elderberry longhorn beetle

Habitat for the valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) was observed along an access road to pull/tension site 65. Construction and O&M-related activity could result in the disturbance, injury, or death of valley elderberry longhorn beetle (VELB), if the ten elderberry shrubs present along the access road support VELB. There are currently no VELB CNDDB records within 10 miles of the project area (California Natural Diversity Database 2010). If VELB were determined to be present in these 10 bushes, implementation of APM BIO-18 and AMM-11 listed in Table Ap.4A-6 would reduce potential impacts to VELB to less than significant. APM BIO-18 and AMM-11 require surveys for elderberry plants within a minimum of 20 feet from the worksite take place prior to O&M activities. If impacts (pruning/trimming, removal, ground disturbance or damage) are unavoidable or occur, then additional measures identified in the VELB conservation plan and compliance brochure will be implemented. The APM and AMM would be required for construction activities as well.

The Valley Elderberry Longhorn Beetle Environmental Compliance brochure states:

"If ground disturbance is planned within 20 feet of an elderberry shrub or if the shrub must be pruned or otherwise disturbed, then the impact must be documented and submitted on a VELB Habitat Impact Report form. In some cases, an elderberry shrub must be removed in order to complete the work necessary. Trimming is preferred to removal; however, authorization for shrub removal can be requested from the PG&E VELB Program Manager on a limited, case-by-case basis. The request must be approved before removal takes place."

PG&E general biology APMs, HCP APMs, and AMMS would be implemented during reconductoring. With implementation of the aforementioned APMs, impacts would be less than significant.

Impact BR-5: Project would result in disturbance to or loss of active non-special-status and special-status bird nests

Several active red-tailed hawk nests were observed within towers where construction activities would occur or adjacent to these construction areas and an active horned lark nest was observed within the proposed Caliente Switching Station (PG&E, 2010). Additionally, numerous non-active nests were observed throughout the proposed corridor. Construction activities associated with the proposed upgrades, especially the use of helicopters, would have the potential to disturb an active nest. Disturbance of an active nest would potentially cause nest abandonment, resulting in the loss of

reproductive potential or death of young in the nest. All active bird nests are protected by the Migratory Bird Treaty Act of 1918 (MBTA) and Fish and Game Code 3503. In addition to implementation of general biological APMs (BO-1 to BO-10) and AMMs (AMM-1 to AMM-30) listed in Table Ap.4A-6, the following APMs would also specifically minimize impacts to the bird nests:

- APM BIO-6: Remove existing nests on towers, trim trees, and remove shrubs during the non-breeding season.
- APM BIO-7: Conduct preconstruction surveys for active special-status and non-special-status raptors and migratory birds.
- APM BIO-8: Implement measures to avoid active nests.

The APMs would include removal of nests during the non-breeding season, conducting preconstruction surveys for nesting birds for all construction activities that occur within or near suitable breeding habitat, and/or establishing a no-disturbance buffer around nest sites to avoid disturbance or destruction of the nest site until after the breeding season or until a wildlife biologist determines that the young have fledged. The no-disturbance buffer distances would be established in consultation with CDFG. With implementation of APMs, AMMs and protection of active bird nests by the MBTA and Fish and Game Code 3503, impacts would be less than significant and no additional mitigation would be required for the reconductoring of the transmission line.

Impact BR-6: Project would result in disturbance to or loss of active western burrowing owl burrows

An active western burrowing owl nest was observed in the work area for the Caliente Switching Station and potential nesting habitat occurs at all of the proposed work areas that contain California ground squirrel burrows or other artificial burrows (PG&E, 2010). Construction activities associated with the proposed upgrades would potentially result in significant impacts on active western burrowing owl burrows. If burrowing owls are using burrows within 250 feet of the work areas, construction activities would potentially result in removal of an occupied breeding or wintering burrow site and loss of adults, young, or eggs. This impact would be considered potentially significant because construction could result in a reduction in the local population of burrowing owls. In addition to implementation of general biological APMs (BO-1 to BO-10) and AMMs (AMM-1 to AMM-30) from the Final PG&E San Joaquin Valley Operation & Maintenance Habitat Conservation Plan listed in Table Ap.4A-6, the following APMs would also specifically minimize impacts to the western burrowing owl burrows:

- APM BIO-9: Conduct preconstruction surveys for active western burrowing owl burrows.
- APM BIO-10/AMM-18: Implement avoidance and minimization measures outlined in PG&E's O&M San Joaquin Valley Habitat Conservation Plan if active burrows are observed during the preconstruction surveys in both Kern and San Luis Obispo Counties.

Under APM BIO-9, PG&E would retain a qualified biologist to conduct preconstruction surveys for active burrows no more than 30 days prior to the start of construction according to the CDFG guidelines. If western burrowing owls are present at the site, according to APM BIO-10/AMM-18, a qualified biologist would work with O&M staff to determine whether an exclusion zone of 160 feet during the non-nesting season and 250 feet during the nesting season could be established or otherwise a site-specific plan would be developed. If the owls show signs of disturbance or upon prior approval from CDFG, PG&E may conduct a passive relocation effort. Most activities of the proposed upgrades would be covered under the HCP and no other mitigation would be required for the reconductoring of the transmission line. However, because impacts to western burrowing owl would potentially occur at the switching stations

as well, implementation of the HCP APMs and AMMs would ensure that impacts to western burrowing owl during the construction of the Solar and Caliente Switching Stations would be less than significant.

Impact BR-7: Project would result in disturbance or loss of active Swainson's hawk or white-tailed kite nests

There is potential for Swainson's hawks and white-tailed kites to nest in trees within 0.25 miles of the work areas located on the San Joaquin Valley floor (PG&E, 2010). Swainson's hawk is less likely to be found nesting near the Solar and Caliente Switching Stations because Swainson's' hawk although once a resident of the Carrizo Plain now is more commonly observed as a foraging migrant. However, white tailed kite is known from the Carrizo Plain and could forage and potentially nest in or adjacent to the switching stations. Construction activities, especially the use of helicopters near an active nest, would potentially result in direct impacts on nesting Swainson's hawks or white-tailed kites. These activities would have the potential to cause nesting Swainson's hawks or white-tailed kites to prematurely abandon an active nest, resulting in the death of chicks or failure of eggs. Premature abandonment of an active nest that results in the death of chicks or failure of eggs would be considered a significant impact because it could result in death of a species listed as threatened under California Endangered Species Act or a fully protected species. In addition to implementation of general biological APMs (BO-1 to BO-10) and AMMs (AMM-1 to AMM-30) from the Final PG&E San Joaquin Valley O&M HCP listed in Table Ap.4A-6, the following APMs would specifically minimize impacts to active Swainson's hawk or white-tailed kite nests:

- APM BIO-11/AMM-22: Implement preconstruction measure outlined in PG&E's O&M San Joaquin Valley Habitat Conservation Plan
- APM BIO-12/AMM-19: Implement avoidance and minimization measures outlined in PG&E's O&M San Joaquin Valley Habitat Conservation Plan if active Swainson's hawk or white-tailed kite nests are observed during the preconstruction surveys

Under APM BIO-11/AMM-22, PG&E would retain a qualified biologist to determine whether active Swainson's hawk or white-tailed kite nests are located within 0.25 miles of the proposed work area and prescribe measures to avoid nest abandonment and other adverse effects to these species as appropriate and in consultation with CDFG. If a Swainson's hawk or white-tailed kite nest is known to be within 0.25 miles of a planned worksite, a qualified biologist would evaluate the effects of the planned O&M activity and a buffer and limited operation period (LOP) during the nesting season would be implemented as necessary. Most activities of the proposed upgrades would be covered under the HCP and no additional mitigation would be required for the reconductoring of the transmission line. However, because impacts to Swainson's hawk or white-tailed kite nests could occur at the switching stations, implementation of HCP APMs and AMMs during the construction of the Solar and Caliente Switching Stations would ensure that this impact would be less than significant. These same APMs would apply to the work within San Luis Obispo County, and with implementation of the aforementioned APMs, impacts would be less than significant.

Impact BR-8: Project would result in disturbance to or loss of San Joaquin antelope squirrels, giant kangaroo rats, Tipton kangaroo rats, or Tulare grasshopper mice and temporary disturbance of their habitat

Several of the proposed tension/pull sites, landing zones, and areas for crossing guards would be located within suitable habitat for San Joaquin antelope ground squirrels, giant kangaroo rats, Tipton kangaroo rats, and Tulare grasshopper mice (PG&E, 2010). These areas would be temporarily disturbed by construction noise and habitat disturbance, although there would be no net loss of suitable habitat due

to the reconductoring. Although these activities would only temporarily affect suitable habitat, these activities would potentially disturb or result in injury or mortality by running over these species or collapsing occupied burrows. This impact would be potentially significant because it could result in the injury or loss of a federally- and State-listed species, and a species of special concern.

The proposed switching stations would be located within potentially suitable habitat for San Joaquin antelope squirrels, giant kangaroo rats, Tipton kangaroo rats, and Tulare grasshopper mice, as they have been documented in large numbers at the CVSR Project site and were present in the Topaz Solar Project site (Althouse and Meade, 2010). The switching stations would potentially result in the permanent loss of up to 18 acres of habitat for these species. Direct impacts to the species associated with construction of the switching stations would include mortality from trampling or crushing and disturbance to above ground seed storage or granaries. Project construction would also disrupt paths and trails, and compact loose soils used by giant kangaroo rats for sand bathing. Indirect impacts to the species listed above include compaction of soils, the introduction of exotic plant species, alterations to the existing hydrological conditions, alterations in the existing solar regime from shading, and alteration to species composition. Operational impacts include risk of mortality by vehicles and disturbance from routine maintenance. As with other small species the introduction of perch sites increases potential predation risks from aerial predators. Temporary and permanent habitat loss and the loss of individual animals would be considered significant absent mitigation.

In addition to implementation of general biological APMs (BO-1 to BO-10) and AMMs (AMM-1 to AMM-30) from the Final PG&E San Joaquin Valley O&M HCP listed in Table Ap.4A-6, the following species-specific APMs would also minimize impacts to San Joaquin antelope squirrels, giant kangaroo rats, Tipton kangaroo rats, or Tulare grasshopper mice:

- APM BIO-13: Avoid and/or minimize potential impacts to San Joaquin antelope squirrel, giant kangaroo rat, Tipton kangaroo rat, short-nosed kangaroo rat, and Tulare grasshopper mouse by establishing work areas in locations that will have the least negative impacts.
- APM BIO-14/AMM-20: Implement avoidance and minimization measures outlined in PG&E's O&M San Joaquin Valley Habitat Conservation Plan when working in suitable San Joaquin antelope squirrel, giant kangaroo rat, Tipton kangaroo rat, short-nosed kangaroo rat, and Tulare grasshopper mouse habitat in Kern and San Luis Obispo Counties.

Impacts to these species would occur at the switching stations as well and the HCP APMs and AMMs would be implemented during the construction of the Solar and Caliente Switching Stations to ensure that impacts would be less than significant.

In addition to implementation of APMs BIO-13 and BIO-14, PG&E stated that it has purchased 83.9 acres of habitat occupied by San Joaquin antelope squirrels and Tipton kangaroo rat at the Semitropic Preserve. This purchase enabled the expansion of the Preserve as compensatory mitigation to offset temporary O&M impacts to suitable habitat for San Joaquin antelope squirrel and Tipton kangaroo rat. Additionally, PG&E has purchased 10.6 acres of habitat occupied by giant kangaroo rat, which has become a Center for Lands Management Preserve, as compensatory mitigation to offset temporary O&M impacts to suitable habitat for giant kangaroo rat. Since the activities of the proposed upgrades in Kern County are covered under the HCP, no additional compensatory mitigation is proposed for impacts occurring in Kern County. Since the activities of the proposed upgrades would be covered under San Joaquin Valley O&M HCP and the same APMs would apply to the work within San Luis Obispo County, impacts would be less than significant and no additional mitigation would be required for the reconductoring.

No compensatory mitigation has been purchased for the permanent loss of up to 18 acres of foraging habitat due to the construction and operation of the two switching stations. As such, APM BIO-22 (Compensation for permanent impacts to giant kangaroo rat, San Joaquin kit fox, and San Joaquin antelope squirrel and preparation of a Habitat Mitigation and Monitoring Plan) would be required. With implementation of this measure, the impacts from project construction would be less than significant.

Impact BR-9: Project would result in loss of American badgers

An American badger was observed in a burrow at tension/pull site #013 and most of the proposed work areas would be located within suitable habitat (PG&E, 2010). Although most construction activities would only temporarily affect suitable habitat, these activities would potentially result in injury or mortality by running over American badgers or collapsing occupied burrows. This impact would not be significant because the number of American badgers that could be affected is relatively small and impacts to their habitat would be temporary for the reconductoring of the transmission line. The construction of the Solar and Caliente Switching Stations, however, would remove up to 18 acres of potential badger habitat permanently.

To minimize the impacts to American badgers, APM BIO-15 (Implement avoidance and minimization measures to reduce impacts to American badgers) would be implemented in addition to general biological APMs (BO-1 to BO-10) and AMMs (AMM-1 to AMM-30). APM BIO-15 requires avoidance of suitable burrows to the greatest extent possible, limits vehicle speeds, and presents measures, such as excavation of burrows and blockage, to avoid significant impacts to the American badger if dens are present. With implementation of APMs, impacts to the American badger would be less than significant for the reconductoring of the transmission line. With implementation of the PG&E general biology APMs, HCP APMs, and AMMs impacts would be less than significant.

Impact BR-10: Project would result in disturbance to or loss of San Joaquin kit foxes and temporary disturbance of their habitat

A burrow with recent San Joaquin kit fox scat was observed at the work area for the Caliente Switching Station and recent San Joaquin kit fox scat was observe near the work area for the tension/pull site at Structure #072 (PG&E, 2010). Most of the proposed work areas would occur within suitable habitat and suitable burrows were observed at several of the proposed work areas. Though most construction activities would temporarily affect suitable habitat, these activities would potentially result in injury or mortality by running over San Joaquin kit fox or collapsing occupied burrows. This impact would be potentially significant because it could result in the injury or loss of a federally and State-listed species. In addition to implementation of general biological APMs (BO-1 to BO-10) and AMMs (AMM-1 to AMM-30) from the Final PG&E San Joaquin Valley O&M HCP listed in Table Ap.4A-6, APM BIO-16/AMM-21 (Implement avoidance and minimization measures outlined in PG&E's O&M San Joaquin Valley Habitat Conservation Plan when construction activities occur in suitable San Joaquin kit fox habitat in Kern and San Luis Obispo Counties) would ensure impacts to the San Joaquin kit fox would be less than significant.

In addition to the APM BIO-16/AMM-21, PG&E stated that it has purchased 83.9 acres of suitable San Joaquin kit fox habitat at the Semitropic Preserve, which enabled the expansion of the Preserve, as compensatory mitigation to off-set temporary O&M impacts under San Joaquin Valley O&M HCP. No compensatory mitigation has been purchased for the permanent loss of up to 18 acres of foraging habitat due to the construction and operation of the two switching stations, a significant impact. As such, APM BIO-22 (Compensation for permanent impacts to giant kangaroo rat, San Joaquin kit fox, and San Joaquin antelope squirrel and preparation of a Habitat Mitigation and Monitoring Plan) would be required.

With implementation of this measure, the impacts from project construction would be less than significant.

Impact BR-11: Project would result in disturbance to tule elk or pronghorn antelope calving grounds

Tule elk (*Cervus elaphus nannodes*) and pronghorn antelope (*Antilocapra americana*) are two ungulates that are known to occur in the Carrizo Plain. Tule elk are also known to occur throughout the Temblor Range. Both tule elk and pronghorn antelope are game species that are managed by CDFG. Construction activities that occur near calving grounds during the calving season would cause potentially significant impacts to these species, particularly due to helicopter construction noise. Noise or human presence could frighten the mother elk or pronghorn and separate them from their calves, which would result in increased risk of mortality to the young. APM BIO-17 would require PG&E to consult with CDFG to determine if calving areas occur near the project. If calving grounds do occur near the project, then construction activities would be rescheduled to occur outside of the calving season. With implementation of APM BIO-17, general biological APMs (BO-1 to BO-10), and AMMs (AMM-1 to AMM-30) listed in Table Ap.4A-6, potential impacts to tule elk or pronghorn antelope calving grounds would be less than significant.

Impact BR-12: The project could result in the loss of candidate or special-status plant species

Surveys for special-status plants are not complete as of publication of this EIR; however, one species, Kern mallow, is known to occur at or near several of the work areas and others may occur (PG&E, 2010). Habitat for early-blooming special-status plants is also present in several of the additional work areas. Additionally, special-status plants may be present at the proposed Solar and Caliente Switching Stations due to the large presence of special-status plant species at the nearby CVSR project site. Surveys for special-status plants in the additional work areas have not been completed during the appropriate season to determine presence or absence of the plants. The survey on June 3, 2010 was conducted outside the identification period for numerous species identified as potentially occurring in the region. While the overall potential for most species appears to be low based on the results of the surveys conducted to date for the project, the presence or absence of other species can not be confirmed at this time.

Direct impacts to special-status plant species include the direct removal of plants during the course of construction. Clearing and grading associated with the switching stations or the grading of access roads could also result in the alteration of soil conditions, including the loss of native seed banks and changes to the topography and drainage of a site such that the capability of the habitat to support special-status species is impaired. Indirect impacts include the creation of conditions favorable to invasion of weedy exotic species. These exotic species could prevent the establishment of desirable vegetation and could adversely affect wildlife.

This impact would be potentially significant because it could result in the disturbance or loss of a federally-listed species and possibly other special-status plant species. In addition to implementation of general biological APMs (BO-1 to BO-10) and AMMs (AMM-1 to AMM-30) from the Final PG&E San Joaquin Valley O&M HCP listed in Table Ap.4A-6, the following species-specific APMs would also minimize impacts to special-status plants:

- APM BIO-18/AMM-12/AMM-13/AMM-14: Implement avoidance measures outlined in PG&E's O&M San Joaquin Valley Habitat Conservation Plan when construction activities occur in occupied habitat for special status plants.
- APM BIO-19: Minimize impacts to special status plants to the extent possible.

In order to minimize impacts to known occurrences of special status plants that cannot be fully avoided under APM BIO-19, PG&E would use existing access roads and disturbed areas as much as possible, and would establish work zones in the least densely occupied areas of the population(s). Grading within the applicable work zones would be prohibited and shrub removal, if required, would be conducted by hand and would be limited to the minimum amount of removal necessary to complete project activities.

The activities of the proposed PG&E upgrades are covered under the San Joaquin Valley O&M HCP, which includes compensatory mitigation for covered species, and no additional compensatory mitigation is proposed for Kern mallow and the other species covered under the HCP. With implementation of the general biological APMs (BO-1 to BO-10), and AMMs (AMM-1 to AMM-30) listed in Table Ap.4A-6, APM BIO-22 (Compensation for permanent impacts to giant kangaroo rat, San Joaquin kit fox, and San Joaquin antelope squirrel and preparation of a Habitat Mitigation and Monitoring Plan) the impacts from switching station construction would be less than significant.

Impact BR-13: The project could result in the establishment and spread of noxious weeds and invasive and non-native plants

While the project area supports a dense flora of non-native species, the proposed upgrades and construction of the switching stations have the potential to increase the spread of noxious or invasive weeds. New introductions occur when seeds are inadvertently introduced to a site through mulch, hay bales, or wattles used for erosion control, or when seeds are transported or dispersed to the site on equipment and vehicles. Ground-disturbing activities are some of the principal vectors for the introduction or spread of invasive species. Construction of staging areas, access roads, and other ground-disturbing activities may introduce noxious weeds into previously uninfested areas. Noxious weeds are known to negatively affect the abundance of native species and result in modifications to habitats, which ultimately may cause an area to become unsuitable for common and special-status species.

APM BIO-20 (Implement management practices to control the introduction and spread of invasive plants) would require that PG&E identify the location of noxious weed species of concern within areas that would be disturbed as part of the project and design appropriate management practices and BMPs to reduce the likelihood of spreading already established weeds into new areas, or increasing their abundance, and the likelihood of introducing new weed species to the project area. Actions to prevent noxious weed establishment would be described within the SWPPP prepared for the project and would be consistent with PG&E's draft Invasive Plant Management Strategy. With implementation of APM BIO-20, general biological APMs (BO-1 to BO-10), and AMMs (AMM-1 to AMM-30) listed in Table Ap.4A-6, potential impacts from noxious weeds and non-native plants would be less than significant.

Impact BR-14: Project would result in impacts to Waters of the United States

Potential waters of the United States, consisting of seasonal and intermittent streams, such as Salt Creek and Temblor Creek, are located in the project area and may be impacted as part of the proposed upgrades. Although the overall area of impact would be small, several project components and activities would require some disturbance of waters of the United States.

Implementation of the APM BIO-21 (Implement general protection measures for waters of the United States) would include measures to minimize or avoid impacts to waters of the United States, such as establishment of exclusion zones, minimizing the amount of area disturbed, delineation of wetland areas within proximity to work areas, restricting the location of fueling areas, completing road construction adjacent or within waters of the United States during the dry season, and installing

temporary bridges to span waters of the United States during wet season. With implementation of APM BIO-21, general biological APMs (BO-1 to BO-10), and AMMs (AMM-1 to AMM-30) listed in Table Ap.4A-6, potential impacts to waters of the United States would be less than significant.

Impact BR-15: Project would result in increased risk of electrocution or bird collision due to the raising of towers

During the reconductoring project on the Solar-Midway 230 kV transmission line, PG&E proposes to raise approximately half of the towers approximately 20 feet. The towers that would be raised would remain in the same location, and the alignment of the transmission line would not change. The new conductor would be the same thickness as the existing conductor, but it would operate at a higher operating temperature, which would cause the new conductor to sag lower than the existing conductor. One of the concerns with modifying existing transmission lines is the increased risk of electrocutions or bird collisions as a result of the modifications. This section discusses the potential increased risk to California condors, other raptors, passerine birds, and waterfowl as a result of modifying the towers.

PG&E, in consultation with avian biologists, has developed an Avian Protection Plan (APP) to reduce the risks to migratory and threatened and endangered bird species from its electrical lines. Key components of the APP, which PG&E has committed to implementing, include:

- Training of PG&E employees on federal and state bird protection laws, bird-safe construction practices, appropriate corrective actions, and migratory bird nest protocols.
- Procedures for reporting discovery of bird electrocutions and collisions and implementation of corrective actions.
- Avian-safe construction design standards.
- Procedures to identify and proactively retrofit utility poles to reduce avian electrocutions and collisions.
- Procedures describing the management of migratory bird nests to minimize disturbance to birds.
- The development of a work verification process that ensures that facilities are designed and constructed to protect birds.
- Identification of partnering potential with avian conservation programs to improve habitat for key bird species within the service territory.
- Promotion of protection of bird species and their habitat in cooperation with federal and state resource agencies, non-profit organizations, and other agencies.

Electrocution

Electrocution of birds is usually attributed to distribution electrical lines. Electrocutions do not usually occur on transmission lines, because the line spacing is far enough apart that even large birds cannot complete the circuit for electrocution at full wing span. Current design guidelines require conductor spacing that all but eliminates electrocutions due to wing contact with two phases. Therefore the risk of electrocution as a result of the project would be less than significant and no mitigation is required.

Collision

The significance of bird collisions increases when they affect bird population's ability to sustain or increase numbers, especially when the populations are threatened or endangered species. Birds can exist near power lines in many situations without significant risk of collisions. The problem with power

line collisions occur in specific, local situations where certain factors exist, including where a power line or other aerial structure transects a daily flight path used by a concentration of birds and where migrants are traveling at reduced altitudes and encounter tall structures in their path. Collision rates generally increase in low light conditions, during inclement weather, such as rain or snow, during strong winds, and during panic flushes when birds are startled by a disturbance or are fleeing from danger. Collisions are more probable near wetlands, valleys that are bisected by power lines, and within narrow passes where power lines run perpendicular to flight paths (APLIC, 1994).

California Condor. The Solar-Midway 230 kV transmission line, which was constructed in the early 1960s, runs from the California Valley, east across the Temblor Range, and into the western edge of the San Joaquin Valley. The transmission line crosses through the historic range of the California condor, a species listed as endangered under the federal Endangered Species Act and under the California Endangered Species Act. After continuous population decline, the last of the wild California condors were removed from the wild in the late 1980s and brought into captivity. A captive breeding program was initiated in hope of re-releasing condors into the wild. The captive breeding program has been a success and captive-raised condors have been released in the southern and central portions of the California, as well as Arizona and Baja California, Mexico. The nearest release location of condors to the Solar-Midway 230 kV Reconductoring project area is the Bitter Creek National Wildlife Refuge, approximately 40 miles south of the western end of the transmission line. The nearest critical habitat for California condors is the East Unit of the Hi Mountain-Beartrap Condor Area, approximately 20 miles southwest of the western end of the transmission line.

The Carrizo Plain was part of the historic range of the California condor. Captive-released condors were observed in the Carrizo Plain after they began to be released back into the wild. However, there are no recent condor records from the Carrizo Plain (PG&E, 2010). The Temblor Range does provide conditions for movement by condors, and domestic cattle, tule elk, and pronghorn occurring in the area provide suitable carrion.

There have been known condor deaths as a result of collisions with power lines between 1993 and 2007, predominately in Big Sur and the Los Padres National Forest and Angeles National Forest. There have not been any reports of injury or death of California condors resulting from collisions with the Carrizo-Midway 230 kV transmission line or any other nearby transmission lines.

Raising some of the towers approximately 20 feet during the reconductoring project would not significantly increase the rate of collision with condors. The project would not occur within any designated critical habitat for California condor or in areas that condors frequently use. Additionally, the Solar-Midway 230 kV transmission line is an existing transmission line that was constructed in the early 1960's and has been a part of the landscape for almost 50 years. Therefore, impacts to the California condor associated with operation of the transmission upgrades would be less than significant and no mitigation is recommended.

Other Raptors. The Solar-Midway 230 kV transmission line crosses within a Raptor Concentration Zone (RCZ) that is located in the southern end of PG&E's service territory. PG&E, in consultation with avian biologists, developed a map of RCZs throughout its service territory to identify those areas with greater potential risks to raptors. RCZs represent those geographical areas where raptors are generally found in abundance and that provide abundant forage and nesting structures.

Raptor species that are known to occur or potentially could occur within the area of the Solar-Midway 230 kV transmission line include the following: golden eagles (*Aquila chrysaetos*), red-tailed hawk (*Buteo jamaicensis*), Swainson's hawks (*Buteo swainsoni*), osprey (*Pandion haliaetus*), ferruginous hawk (*Buteo*

regalis), prairie falcon (*Falco mexicanus*), and American kestrel (*Falco sparverius*). While they may fly at the height of electrical wires while foraging, raptors collide with electrical lines infrequently because they are highly maneuverable and the generally do not fly in large flocks (APLIC, 1994).

Raising some of the towers approximately 20 feet during the reconductoring project would not significantly increase the rate of collision with raptors. Though the transmission line is located in areas that are frequented by many species of raptors, the Solar-Midway 230 kV transmission line is an existing transmission line that was constructed in the early 1960's and has been a part of the landscape for almost 50 years. The alignment of the transmission line would not be altered during the reconductoring project and the location of towers would not be changed as a result of the project. Therefore, raptor impacts associated with operation of the transmission upgrades would be less than significant and no mitigation is recommended.

Impact BR-16: Construction activities would result in disturbance to wildlife and may result in wildlife mortality

The reconductoring site and switching stations support a suite of common and sensitive wildlife species. Direct impacts to wildlife associated with construction of the project could include mortality from trampling or crushing; increased noise levels due to heavy equipment use; light impacts from construction during low-light periods; increased vehicular and human presence along existing access roads; displacement due to habitat modifications, including vegetation removal, alterations of existing soil conditions; fugitive dust; and increased erosion and sediment transport.

Direct mortality of small mammals, reptiles, and other less mobile species would likely occur during construction of the reconductoring and switching stations. Construction could also result in the loss of eggs and nestlings of bird species with small, well-hidden nest. This would occur primarily during habitat clearing, earth removal, grading at the switching stations, digging, and equipment movement. More mobile species such as birds and larger mammals would likely disperse into nearby habitat areas during construction. Increased lighting during low-light periods, particularly near dawn and dusk, could cause some species to leave the area and could disrupt foraging, breeding, or other activities. Other species, including many insects, are drawn to lights. Species, such as bats, that prey on insects may be attracted to lighted construction areas, resulting in the increased potential for disturbance and mortality.

Noise from clearing, grading, and construction activities, including helicopter use, could affect wildlife in adjacent habitats by interfering with breeding or foraging activities and movement patterns, causing animals to temporarily avoid areas adjacent to the construction zone. Nocturnal wildlife would be affected less by construction than diurnal species since construction would occur primarily during daylight hours. Construction may also occur during dusk and dawn when many species are highly active. More mobile species such as birds and larger mammals would likely disperse into adjacent habitat areas during the land clearing and grading phases of switching station and road construction. However, smaller animals would be less able to disperse. Construction activities would also likely affect how animals use the area as a movement corridor. Post construction the switching stations would limit wildlife movement due to the permanent fencing. Noise could also result in temporary threshold shifts in hearing sensitivity. Threshold shifts could last for an extended period of time, and loss of hearing could result in increased mortality for species that rely on their sense of hearing to detect predators or warning calls. Noise and vibrations could also cause animals to leave their burrows, where they would be better protected from predation or project-related injury or mortality.

Construction of new access roads would be limited, although existing access roads would be maintained and widened as required for construction activities. Where roads are planned or widened the construc-

tion would alter the physical characteristics of the soil underneath the road. For example, road construction increases compaction up to 200 times relative to undisturbed sites (Riley, 1984). Organisms that are not killed directly by the construction of the road could be displaced by the altered soil conditions (Haskell, 2000). Construction traffic along access roads, particularly in areas used by nesting birds could adversely affect wildlife by disrupting breeding, foraging, and movement. These disturbances could result in nest, roost, or territory abandonment and subsequent reproductive failure if these disturbances were to occur during the breeding season.

Indirect effects on wildlife as a result of the switching stations and reconductoring include the introduction of non-native, invasive plant species, alterations to existing hydrological conditions, and noise.

Operational impacts to wildlife would include mortality from vehicle strikes, disturbance from vegetation management activities, potential disruption of nest sites, noise from switching station operations and lighting, human disturbance, and the spread of noxious weeds from maintenance personnel.

Construction-related impacts on common wildlife are typically not considered significant under CEQA. To reduce the effects of the construction on common wildlife, the Applicant would implement general biological APMs (BO-1 to BO-10) and AMMs (AMM-1 to AMM-30). With implementation of APMs, impacts to the wildlife would be less than significant.

Impact BR-17: Corona noise could result in disturbance to wildlife

Corona is a phenomenon associated with all energized transmission lines. Under certain conditions, the localized electric field near an energized conductor can be sufficiently concentrated to produce a tiny electric discharge that can ionize air close to the conductors (Electric Power Research Institute (EPRI), 1982). This partial discharge of electrical energy is called corona discharge, or corona. Several factors, including conductor voltage, shape, and diameter, and surface irregularities such as scratches, nicks, dust, or water drops can affect a conductor's electrical surface gradient and its corona performance. Corona is the physical manifestation of energy loss, and can transform discharge energy into very small amounts of sound, radio noise, heat, and chemical reactions of the air components.

Because power loss is uneconomical and noise is undesirable, corona on transmission lines has been studied by engineers since the early part of this century. Many excellent references exist on the subject of transmission line corona (e.g., EPRI, 1982). Consequently, corona is well understood by engineers and steps to minimize it are one of the major factors in transmission line design for extra high voltage transmission lines (345 to 765 kilovolts (kV)). Corona is usually not a design issue for power lines rated at 230 kV and lower. The conductor size selected for the project's transmission line is of sufficient diameter to lower the localized electrical stress on the air at the conductor surface and would further reduce already low conductor surface gradients so that little or no corona activity would exist under most operating conditions.

Because corona and induced current effects associated with the project are less than significant, mitigation measures are not required.

Impact BR-18: The project would result in transmission line strikes by special-status bat species

Focused bat surveys were not conducted; however, two pallid bats (*Antrozous pallidus*), California Species of Special Concern, were observed flying over the CVSR project site during spotlight surveys in June 2009. Roosting areas for bats are not expected to be present at the switching stations; however, a variety of bats are expected to use the switching stations and reconductoring region for foraging habitat. Additionally, Townsend's big-eared bat, a California Species of Special Concern, while not

observed are known to occur in the area and have been documented at the Carrizo Plain National Monument.

Although many studies have quantified bird strikes with transmission lines, analogous information on bats is very limited (Manville, 2005). Collisions with distribution and transmission lines will likely occur to some degree; however, collision risk is not thought to pose a significant risk to bats in the project area. The most likely collision risk for bats is associated with vehicle or equipment as bats forage near roads or work areas.

Given that most bat species use echolocation to discriminate objects as small as 0.4 to 0.004 inches in size (Vaughan and Vaughan, 1986), and the size of guard lines and transmission lines are typically equal to or greater than 0.5 inches in diameter, the frequency of transmission line strikes is expected to be extremely low. The number of fatal strikes is expected to be insufficient to substantially reduce the population of this species.

Project impacts resulting in collision with the distribution or transmission line by special-status bat species are expected to be adverse, but less than significant.

Impact BR-19: The project would result in loss of sensitive bats

A variety of bat species are known from the Carrizo Plain natural area. Some of these include Townsend's big-eared bat and pallid bats. These species are California Species of Special Concern. The decline of bat populations is often due to roost site disturbance, loss of foraging habitat, and loss of roost sites. While many bat species are associated with the large open expanse of water at Soda Lake, other species utilize large areas for foraging. For example, the pallid bat is capable of flying more than 18 miles, although most foraging occurs within about two miles of the diurnal roost (Hermanson and O'Shea, 1983). Although no roosting sites are located at the switching station sites, the adjacent foothills, old granaries, abandoned structures, including the old grain silos and ranch house in the CVSR site, all provide suitable roost spots for bats (Althouse and Meade, 2009). While not all of these structures would be expected to provide the conditions appropriate for maternity colonies or hibernaculum, they may nonetheless support bat use.

Activities that have been documented to impact bats include livestock grazing, vegetation treatments, and water reclamation that could lead to loss of a water source or riparian habitat. Due to their sensitivity to human disturbance, roost protection is vitally important for bats. Roost protection measures may include seasonal use restrictions or physical closures as necessary.

Bats that forage near the ground, such as the pallid bat, will be subject to crushing or disturbance by vehicles driving at dusk, dawn, or during the night. The construction and use of access roads could also disturb bats. Construction-related activities, which would generate noise, traffic, dust, and diesel fumes, could result in the direct loss of roosting habitat and subsequent mortality to adult bats or pups if any bats were present along the reconductoring transmission line or in the switching stations area. Indirect effects could include increased traffic, dust, and human presence in the project area leading to bats abandoning their roosts or maternal colonies.

The construction and operation of the project would not result in a barrier for, or restrict the range of, special-status bat species. However, direct impacts to these species would be considered significant absent mitigation. To reduce effects of the reconductoring and switching station on bats, the Applicant would implement general biological APMs (BO-1 to BO-10) and AMMs (AMM-1 to AMM-30). With implementation of APMs, impacts to the bats would be less than significant.

3.7 Cultural and Paleontological Resources

Environmental Setting

Cultural Resources

The study area for the reconductoring project lies within two geographic regions, the Central Coast and the Central Valley, each with a distinct regional prehistory. The following discussion presents an abbreviated review of the sequences developed for the culturally- and materially-diverse coastal and San Joaquin Valley regions.

Central Coast Region

The following review of archaeological research in San Luis Obispo and Kern Counties is organized according to a series of temporal periods. This level of organization emphasizes changes in adaptation over time. The chronological sequence is derived from the work of Jones et al. (1994), Jones and Klar (2007), and King (1990), and is commonly used throughout the central coast region.

Millingstone Period (10.000-5500 cal BP). With the exception of a few isolated finds, there is little evidence of Paleo-Indian occupation in the San Luis Obispo region (Mills et al., 2005). Although radiocarbon dates predating 9,000 cal BP have been reported at a number of sites (including those at Pismo Beach, Edna Valley, Morro Bay, and Nipomo Mesa), most associated artifacts are typical of Millingstone Period assemblages, probably indicating that this adaptation extends back to ca. 10,000 cal BP.

Millingstone Period assemblages are characterized by a relative abundance of handstones and millingstones, as well as Thick Rectangular (L-series) *Olivella* beads (Glassow, 1996), and a lack of hunting gear (i.e., projectile points). Recovered tools and fauna indicate that seed and shellfish collection and processing were important early Holocene economic pursuits, with large terrestrial game and marine mammals contributing rather minimally to the diet (Hildebrandt et al., 2009).

Early Period (5500-2600 cal BP). Introduction of mortar-pestle technology and an increase in the occurrence of side-notched projectile points mark the Early Period on the central California coast. This adaptive shift in the Santa Barbara area has been attributed to population replacement; the intrusion of new people into the area from such regions as western Alaska, eastern California, or the Channel Islands; and technological shifts by local peoples (County, 2010). Evidence for Early Period occupation in the San Luis Obispo region includes acorn use and resource storage (County, 2010), apparently allowing for the establishment of sedentary villages in a variety of estuary settings along the coast. With populations becoming more circumscribed, the importance of inter-group trade became enhanced, as reflected in the importation of obsidian into the local area.

Middle Period (2600-1000 cal BP). Diagnostic artifacts marking the Middle Period consist of contracting-stemmed and possibly concave base projectile points and various *Olivella* bead types, as well as *Haliotis* disk ornaments, perforated disks, ring with incised edges, and Plain and Flat-ended rings (Jones, 1995). Bone tools and ornaments are relatively abundant and include needles, pins, awls, strigils, whistles, spatulas, gorge hooks, and antler tines. In addition, mortars and pestles occur more frequently than handstones and millingstones. It has been posited that few adaptive changes occurred during the Middle Period in the San Luis Obispo area. Instead, many of the subsistence-settlement trends set in motion during the Early Period continued forward into the Middle Period, including an increased use of

mortars and pestles (and presumably acorns), a more intensified harvest of small schooling fish and sea otters, and a decreased dependence on shellfish (County, 2010).

Middle/Late Transition (1000-700 cal BP). The Middle/Late Transition is represented along the central California coast by contracting-stemmed and double side-notched projectile points, curved shell fish-hooks, and a variety of *Olivella* shell bead types. Archaeological sites dating to this interval are quite rare. Unlike the Santa Barbara Channel were settlement was high, evidence of archaeological materials along the San Luis Obispo coast actually declines during the Middle/Late Transition (County, 2010). The decline may reflect a more dispersed settlement patterns as exchange networks for Casa Diablo obsidian appear to have collapsed. According to Jones (1995) and Jones et al. (1999), many of these changes were probably related to the medieval warm, dry period (County, 2010) which created severe environmental degradation in the central coast region, reducing human population densities and undermining the entire socioeconomic system

Late Period (700 cal BP to Historic-Period). Late Period artifact forms continuing from the previous phase include hopper mortars, handstones, millingstones, circular shell fishhooks, and *Olivella* bead types. New forms include arrow points (Desert Side-notched and Canaliño [Cottonwood]), chipped stone drills, and E1 and E2 *Olivella* beads, clamshell disk beads, *Haliotis* disk beads, and small serpentine disk beads. Many researchers have thought that Late Period economies maintained a terrestrial orientation, focusing on the storage and consumption of acorns, as well as a variety of other interior plant and animal foods, particularly black-tailed deer (see Jones, 1995). Within the last decade, however, excavations along the Big Sur coast (County, 2010) have shown the presence of small seasonal encampments on the shore, focusing on small schooling fish and a generally more intensive use of marine environments (County, 2010).

Central Valley Region – The prehistory of the lower San Joaquin Valley has been summarized by a variety of researchers (e.g., Hartzell, 1992; Jackson et al., 1998; Milliken and Mikesell, 1997; Siefkin, n.d.). Although each sequence is slightly different, the following series of intervals provides a good framework for the region and contrasts significantly from that of the coast, showing much greater affinities with the western Great Basin and Sierra Nevada regions.

Paleo-Indian Period (12,000-10,000 BP). Fluted projectile points are well-represented in the southern San Joaquin Valley, particularly on Dudley Ridge along the southwest shore of Tulare Lake (County, 2010). Although the mineralized bones of several now-extinct animal species (e.g., bison, mammoth) have been found in the same area, direct associations between the bones and prehistoric artifacts have never been established through formal excavation. In fact, many of the fluted points have been found in surface contexts also producing late Holocene materials, making it difficult to isolate the full range of artifacts dating to this ancient period.

Western Pluvial Lakes Tradition (10,000-7000 BP). The western Pluvial Lake Tradition is recognized throughout the Great Basin, but only in certain parts of California, including the San Joaquin Valley (County, 2010). Typical sites of this tradition are found along the ancient shorelines of now dry pluvial lakes, and include large, contracting-stemmed points (e.g., Lake Mohave series), square-stemmed points of the Silver Lake series, flake tools, drills, hammerstones, and crescents; milling gear is not considered a major component of the assemblage. Similar to Paleo-Indian assemblages, most materials corresponding to this early interval have been recovered from surface contexts. One important exception is KER-116, a large buried component located at the edge of Buena Vista Lake and radiocarbon-dated to between 8600 and 7200 BP (County, 2010). The small assemblage included crescent fragments, scrapers, a projectile fragment, and a faunal collection indicative of a diversified subsistence economy based on both lacustrine and terrestrial resources.

Middle Holocene (7000-4000 BP). Archaeological indicators of the middle Holocene are well-known along the shores of Tulare Lake, largely represented by hundreds of Pinto-series points in the hands of private collectors. Similar to the earlier temporal intervals, however, no well-dated components have yet been discovered. At Buena Vista Lake, Pinto-series materials are quite rare, as are securely dated components corresponding to this interval. One possible exception is Fredrickson and Grossman's (1977) discovery of a component at KER-116 stratigraphically dated to between 7000 and 2000 BP. The assemblage, which included handstones, millingstones, and extended burials, was thought to have affinities to Millingstone Period materials on the coast and was assigned to the Buena Vista Complex. Later analysis of projectile points and obsidian hydration data, however, led Hartzell (1992) to conclude that the component actually dated between 4000 and 2000 BP, creating a 7000-4000 BP hiatus in the record that she attributed to the Middle Holocene desiccation of Buena Vista Lake.

Early Period (4000-2500 BP). As noted above, Hartzell (1992) assigns materials from KER-116, as well as those from a variety of sites excavated by Wedel (1941), to this interval. These include Pinto- and Elko-series projectile points, extended burials, handstones, millingstones, and flake scrapers. She also notes an increase in the diversity of faunal remains (particularly those from wetland environments) and attributes these developments to late Holocene improvements in the condition of Buena Vista Lake**.**

Middle Period (2500-1200 BP). Archaeological evidence expands significantly throughout the southern San Joaquin region during the Middle Period. At Buena Vista Lake, data from a variety of sites document the presence of mortars and pestles, steatite and baked-clay net weights, stone-lined hearths, flexed burials, and circular-to-oval house structures similar to those documented ethnographically among the Yokuts. Exotic materials like obsidian and marine shell beads increase in frequency, as does the use of lacustrine resources, the latter probably supported by the cool-wet climatic conditions that characterized the interval (County, 2010). As in many other parts of California, these data indicate that a higher degree of sedentism emerged during the Middle Period in the southern San Joaquin Valley.

Late Period (Post-1200 BP). After 1000 BP, Hartzell (1992) argues that there was a decline in the occupational intensity at Buena Vista Lake, largely corresponding to the Medieval Drought—so called because it occurred ca. 1100-600 BP, corresponding to the Medieval Period in Europe. Evidence for large-scale habitation sites (i.e., house structures, robust artifact assemblages, cemetery areas) disappears, replaced by small sites representing short-term, sporadic occupations. Even after the return of more favorable climatic conditions after 600 BP, archaeological data indicate that a more "forager-like" adaptation took hold, where relatively mobile groups occupied a variety of terrestrial and lacustrine environments on a short-term, seasonal basis.

Ethnography

The proposed project is located in the territories of the Southern Valley Yokuts, the Interior Chumash, and the Salinan. Approximately 25 miles of the project are located within the Southern Valley Yokuts territory in Kern County. The 10-mile segment of the project in San Luis Obispo County is located within the territory of the Interior Chumash and the Salinan on the northwestern portion of the Carrizo Plain and the eastern foothills of Temblor Range.

The Carrizo Plain is well known for the spectacular polychrome pictographs at sites about 10 miles south of the western portion of the reconductoring project. These complex and elaborate paintings feature abstract designs executed principally in red, black, white, and yellow, and represent the zenith of the Chumash rock painting style (Lichtenstein et al., 2010).

Southern Valley Yokuts

The proposed project is located in the territory of the Chuxoxi and Tulamni Yokuts groups, two divisions of the ethnolinguistic group that ethnographers designate as Southern Valley Yokuts or Tulare Lake Yokuts. Southern Valley Yokuts territory encompassed the upper (southern) end of the San Joaquin Valley, from the lower Kings River to the Tehachapi Mountains. Included in this area were Tulare, Buena Vista, and Kern lakes and their connecting sloughs and the lower portions of the Kings, Kaweah, Tule, and Kern Rivers. The Tulare Lake and Buena Vista Lake basins offered a rich and varied array of resources to the several Yokuts tribes occupying its environs. These tribes, referred to collectively as the Lake People, include the Apichi, Nutunutu, Tache, Halaumne, Chunut, Wowol, Tuolumne, Tuhoumne, and Yowlumne (Lichtenstein, et al., 2010).

The Yokuts depended on a mixed subsistence economy, emphasizing fishing; game hunting and fowling; and collecting shellfish, roots, and seeds. The concentrated supply of foods that existed in Yokuts territory allowed them to remain relatively sedentary. The names and approximate locations of almost 50 Southern Yokuts villages are known. (Gayton, 1948; Kroeber, 1925; Latta, 1949; Wallace, 1978.)

The ethnographic and historic record concerning the Southern Valley Yokuts is noticeably minimal regarding their use of the eastern South Coast Ranges. The testimony of living members of the Santa Rosa Rancheria of Tachi Yokuts indicates use of the South Coast Ranges for major villages, resource procurement, and trade with Costanoans. Some researchers (CSUFF Laboratory of Anthropology, 2003; Pritchard, 1970) have suggested that the foothills may have provided respite from adverse seasonal conditions in the San Joaquin Valley. Tachi Yokuts gathered or obtained milkweed, mica or gypsum crystals, sandstone, deer grass, small rushes, elderberries, gooseberries (*Ribes speciosum*), and California golden poppy (*Eschscholtzia* sp.). Southern Valley Yokuts also traded different kinds of steatite and acted as middlemen in the trans-Sierran obsidian and pigment trade with Salinan and Chumash, which would have occasioned forays into the South Coast Ranges (Latta, 1949).

The Interior Chumas

Little is known ethnographically about the Interior Chumash, one of the largest cultures among the Native American tribes in California. The establishment of missions in southern California scattered and decimated the members of what was once called the Chumash Nation. Few ethnographic data about the Chumash groups are available, but explorer's journals, mission records, and archaeology have provided some information.

The Chumash territory extended from Santa Maria in the south to Salinas in the north and the San Joaquin-Kern system in the east. Some small fragment of the Chumash culture extended their territory easterly, near the southerly drainage of the San Joaquin-Kern river system (Kroeber, 1925). The Chumash share their northern boundary with the Salinan (Jones et al., 2007). Three subgroups compose the Interior Chumash: the Cuyama, the Emidgdiano, and the Castac. The project lies within Cuyama territory, which extended between the coast and the Temblor Range. Grant (1978) noted that very little is known about the tribes of this region because ethnographic information is almost nonexistent, few systematic archaeological investigations have been carried out in the region, and the territory is far from the mission lands, so no vital statistics were recorded. The meager information suggests that the Cuyama occupied about a dozen small settlements, most of which were in the well-watered Cuyama Valley, south of the reconductoring region on the opposite side of the Caliente Range. Since the current project area has little surface water and is otherwise limited in its resources, it was less attractive for long-term settlement. However, the herds of antelope and tule elk plus a spring seed crop would have made the area attractive for short-term resource procurement forays.

Salinan

The westernmost portion of the project also falls within the southern territory of the Salinan Indians. The Salinan have been conventionally subdivided into two main bodies: the Antoniaño or Northern, who occupied the northwest half of Salinan territory, and the Migueleño or Southern, who occupied the southeastern half. All known village locations for which names are recorded occur along the Estrella, San Antonio, Salinas, and Nacimiento rivers, along Cholame Creek to the east, and on the coast. The rapid demise of native culture after contact with European civilization left many gaps in the knowledge of aboriginal lifestyles. This is particularly true for the Temblor Range and Carrizo Plains region. Despite the work of ethnographers in Salinan territory, much of the documentation remains as raw notes, little of which has been published.

History

The project area lies within the Carrizo Plain, Temblor Range, and San Joaquin Valley, San Luis Obispo and Kern Counties. Overall, the project area is characterized by mountainous terrain with portions of agricultural development west of the Temblor Range and agricultural, industrial (including oil exploitation), and residential development east of the Temblor Range. The following historic context contains summaries of San Luis Obispo and Kern county history.

San Luis Obispo County

The remoteness and dry climate of the Carrizo Plain have been the primary factors shaping its history. In 1772, Mission San Luis Obispo de Tolosa was established as the fifth in what became a chain of 21 Spanish missions along the California coast (Lichtenstein et al., 2010).

Following the Treaty of Guadalupe-Hidalgo in 1848, which ended the Mexican-American War and ceded Alta California to the United States, California became the thirty-first state in the Union in 1850. Five years later, the Government Land Office began its survey of the Carrizo Plain with the purpose of opening the area to settlement. Before the land was made available to the public in 1856, a substantial portion of the region was withdrawn from sale and placed in the hands of the Atlantic and Pacific Railroad (Lichtenstein et al., 2010). Most of the remaining land was quickly swept up by Bay Area land speculators and large cattle interests.

In 1885, California released the railroad indemnity lands on the Carrizo Plain, making them available for public sale (Lichtenstein et al., 2010). The availability of land attracted a small number of settlers who took up 160-acre homesteads along the low hills on the northeast margin of the plain under the auspices of the Immigration Association of California. The homesteaders grew grain and raised livestock, but the isolation of the region, the lack of a consistent water source, and their relatively small land holdings weighed heavily against their efforts for long-term success. With no towns or urban development of any kind on the plains, the nearest accessible market center was San Luis Obispo.

In the early twentieth century, a fundamental change occurred in the agricultural economy of the Carrizo Plain that substantially altered land use, settlement patterns, and the natural landscape. While cattle raising remained a part of the economy, particularly in the southern Carrizo Plain, dry-land wheat farming became the dominant form of agriculture in the northern plain from the 1900s through the 1960s.

In the 1960s, the federal government introduced agricultural programs that established a national wheat acreage allotment, limiting the amount of wheat a single farmer could produce. The profitability of wheat farming in the plain had always depended on large-scale production, so the government-

imposed limits had a drastic effect on Carrizo Plain wheat farmers. Moreover, the soil, temperature extremes, limited rainfall, and lack of irrigation resources in the Carrizo Plain did not afford them the option of turning readily to other crops. While barley and alfalfa continue to be grown, much of the land has been allowed to revert to grazing (Lichtenstein et al., 2010). By the 1970s the amount of land left fallow in the plain had risen significantly, and although wheat farming continues on a small scale, the distinctive dry-farming economy and land-use patterns that it fostered are disappearing.

Kern County

The first Spanish explorer into present day Kern County is believed to be the acting Governor of California and Commander Don Pedro Fages, who entered the region in 1772 in effort to locate army deserters. In the early 1800s, missionaries such as Padre Juan Martin (1806) entered the area through the Carrizo Plain, though none established permanent residency. Kern County was officially organized in 1866 from portions of Mariposa and Tulare Counties and called "Buena Vista" until it was later renamed after Edward M. Kern, a topographer who went on two expeditions in the region.

During the 1840s, several Mexican land grants within present-day Kern County were established throughout the valley and formed the founding settlements, which later became towns (Beck and Haas, 1988). Kern became a major agricultural area during the mid-1800s. The increase of agriculture in the region brought on the need for irrigation development and when the state legislature passed the Swamp Land Act of 1857, approximately 400,000 acres of swamp land was reclaimed, much of which was in the Kern County area. Reclamation allowed for larger-scale farming in the region, which included cotton and hay crops.

Railroad development expanded rapidly throughout the state during the 1870s; small towns that developed along the railroad alignment led to further land development in Kern County by increasing residency (Burmeister, 1963). By the 1880s, Kern County became known for oil production. In 1864, the Buena Vista Petroleum Company was organized and incorporated. Within a few years, the company opened an oil refinery, which continued operation until 1867 when freight charges proved prohibitive. In 1899, oil was discovered in the Bakersfield area, bringing the county recognition as a prominent oil producer. During that same year, the first commercial oil well was drilled near the Kern River. Soon, the towns of Oil City, Oil Center, and Oildale were founded. Also during the late nineteenth century, the Kern River was first used for hydroelectricity. In 1910, the Lakeview Gusher Number One oil well blew, producing an unprecedented 18,000 barrels of oil in the first 24 hours, thus becoming the highest producing oil well in the history of the world. Today Kern County contributes approximately one-fourth of the state's oil production (Hoover et al., 1990).

The first decades of the twenty-first century in Kern County were marked by continual oil discovery, transportation, and electric development, which led to continued residential growth. Agriculture continued to be a prominent industry in the county. By the 1930s, orchards, fruit, and vegetables were among the most produced crops, along with field crops and grains. Production temporarily decreased during the World War II period, but increased again post war. By 1960, the county produced a wider variety of crops including field and seed crops, vegetables and fruit, livestock, poultry, and nursery products. (Kern County 1930, 1946, 1960.)

Local Archaeological Findings

ICF archaeologists surveyed the work areas, access roads, towers, and tension/pulls sites along the transmission line upgrades ROW from May 25 to May 27, 2010. The survey was accomplished by walking transects spaced 15 meters (m) apart where vegetation and contour relief permitted. In some areas of

difficult terrain or thick vegetation and low visibility, transects were spaced 15–20 m apart in order to conduct a more intuitive survey and check rodent disturbances, hills and cut bank profiles, and patches of bare land. One prehistoric isolated find was recorded during survey. Surveys were not conducted at the microwave reflector site.

A cultural resources inventory identified 12 previously recorded cultural resources, as well as two new historic archaeological sites, two prehistoric archaeological sites, one historic isolate, and three prehistoric isolates along the reconductoring segment.

Additionally, the cultural resources survey conducted within the six potential Caliente Switching Station sites from June 28 through July 1, 2010 by LSA found two additional sites (LSA, 2010). Resource LSA-PWR0901A-S4, historic scatter and rock piles, appears to be the same site as CM-1H. After publication of the Draft EIR, archaeologists from Ecology & Environment identified an additional prehistoric site in the area of Caliente Switching Station Site M3, and have performed initial shovel pit testing to define its boundaries.

The characteristics of each resource are summarized in Table Ap.4A-13.

Table Ap.4A-13. Cultural Resources Along the Reconductoring Route

Site Number	Description	Location Relative to Project Area	NRHP/CRHR Status
N/A	Morro Bay–Midway Transmission Line Corridor	Within project area	Recommended ineligible for CRHR
P-15-1493	Prehistoric site	In transmission line alignment	Unknown
P-15-4014 (CA-KER-4013	Prehistoric midden site with human remains	Distribution Line Crossing Tower 159, access road	Unevaluated
P-15-9736 (CA-KER-9736)	Light density, prehistoric artifact scatter	In transmission line alignment	Unevaluated
P-15-9737	Historic archaeological site; San Joaquin Light and Power Company	Adjacent	Unevaluated
P-15-10840	Isolate (chert flake)	Adjacent to access road	Ineligible for NRHP/CRHR
P-15-10841	Isolate (chert flake)	Adjacent to access road	Ineligible for NRHP/CRHR
I-5	Historic well, water trough and tank, and earthen reservoir	Adjacent to access road to Caliente Switching Station	Determined ineligible for CRHR; potential local planning consideration (6L)
I-6	Isolate; historic drawn spreader	Adjacent to access road to Caliente Switching Station	Determined ineligible for CRHR; potential local planning consideration (6L)
None	Carrisa Highway	Adjacent	Recommended ineligible for CRHR
None	Filos Property; historic ranch	Adjacent	Recommended ineligible for CRHR
None	Carrizo Plain Substation	Adjacent	Recommended ineligible for CRHR
CM-1H (LSA-PWR0901A-S4)	Historic refuse scatter	Near access road to Caliente Switching Station	Assumed eligible for NRHP/CRHR
CM-2	Prehistoric bedrock milling station	TPS-73	Assumed eligible for NRHP/CRHR
CM-3	Prehistoric bedrock milling station	LZ-48	Assumed eligible for NRHP/CRHR

Table Ap.4A-13. Cultural Resources Along the Reconductoring Route

Site Number	Description	Location Relative to Project Area	NRHP/CRHR Status
CM-4H	Possible prospect pit, historic refuse	Access road to TPS-48	Assumed eligible for NRHP/CRHR
CM-ISO-1H	Horseshoe	Access road through Caliente Switching Station	Ineligible for NRHP/CRHR
CM-ISO-2	CCS core	In transmission line alignment	Ineligible for NRHP/CRHR
CM-ISO-3	CCS flake	Out of project area	Ineligible for NRHP/CRHR
CM-ISO-4	CCS flake	Access road to TPS-43	Ineligible for NRHP/CRHR
CM-ISO—5	Obsidian flake	Access road to TPS—43	Ineligible for NRHP/CRHR
LSA-PWR0901A-S3	Historic watering/feeding/sanitation area for livestock	North of Caliente Switching Station Option 2	Assumed ineligible for NRHP/CRHR
BRM 1	Bedrock mortars	Within and near Caliente Switching Station Option 3	Assumed eligible for NRHP/CRHR
CM-5H	Glass and ceramic scatter	Vicinity TPS 139	Assumed eligible for NRHP/CRHR
CM-ISO-6	Prehistoric handstone	Vicinity tower 158	Ineligible for NRHP/CRHR

Paleontological Resources

In the project area, sedimentary rocks and unconsolidated deposits range in age from Paleocene (Lodo Formation, dating to about 58 to nearly 50 million years ago [Mya]) to Recent (i.e., Holocene), although substantial gaps in time interrupt the geologic record. Rocks in the area that date from the Paleocene until the late Miocene (Temblor and Monterey Formations, about 22 to 10 Mya) were primarily deposited under marine conditions. The Pliocene to Pleistocene Paso Robles Formation appears to document the final retreat of the sea as it includes fossil pinnipeds (seals and sea lions) and marine invertebrates to the west of the project vicinity as well as fossil horse remains (Carrizo Energy, with URS, 2007). Still younger Pleistocene to Recent deposits in the project vicinity all appear to have been deposited on land, mostly as alluvial fans.

The main fossiliferous units in the project area are the Miocene Monterey, Santa Margarita, and Caliente Formations, the Plio-Pleistocene Paso Robles Formation, and the overlying Quaternary alluvium (Lichtenstein et al., 2010).

The Monterey Shale Formation is mostly composed of fossils. Of the named organisms, only the fish remains are considered paleontologically significant, as they are vertebrate animals and do not occur in abundance. The depth of the sea and the distance from sources of terrestrially derived sediment fostered the thick accumulation of concentrated remains of microscopic marine organisms that, in turn, promoted the natural generation of much of the petroleum now tapped in the region (Peters et al., 2007). The Monterey Formation occurs at the surface in the project vicinity along most of the western flank and crest of the Temblor Range, east of the proposed sites of the Caliente Switching Station (CVSR Project).

Both marine and non-marine fossils have been collected from localities in the Paso Robles Formation (Addicott and Galehouse, 1973). Although confirmed vertebrate fossil localities are rare; the Paso Robles Formation has yielded vertebrate fossils at several localities in the region, including one nearby site (LACM 5659) that produced mastodon, bison, and camel remains (Lichtenstein et al., 2010). A locality

reported to be in the Paso Robles Formation near the project vicinity probably occurs in younger, overlying quaternary (Pliestocene) alluvium.

The Quaternary alluvium has produced fossil plant molds and fish scales that probably were eroded from older units rather than preserved in the alluvium (Lichtenstein et al., 2010). In addition to this formation, the University of California Museum of Paleontology (UCMP) database records the presence of vertebrate fossils from the uppermost Quaternary alluvium found at several localities within San Luis Obispo County. A vertebrate fossil locality in the Carrizo Plain, recorded as LACM Locality 5659, was found a short distance south of the west end of the project vicinity (McLeod, 2009). Twelve Pleistocene vertebrate fossil localities are recorded in Kern County (UCMP, 2010), but at least seven of these are in the asphalt deposits near McKittrick and are probably assignable to the Tulare Formation. The others have appeared in deposits assignable to the younger Quaternary units, but do not occur near the project vicinity.

Environmental Impacts

Impact C-1: Construction of the project could cause an adverse change to known cultural resources

Construction-related staging, traffic, and grading for the proposed project have the potential to damage sites of archaeological or cultural significance through crushing, trampling, or displacing materials. Damage to archaeological sites near work areas and access roads would occur without appropriate protective measures, resulting in sufficient damage to those sites to diminish site integrity and scientific information potential. Such damage would be a significant impact, according to 14 CCR 15064.5(b)(1) because the site's information potential would be compromised. The effect under Section 106 would be adverse unless avoided. Implementation of APM CR-4 would include the installment of silt fencing along existing access roads and would prohibit grading along fenced road segments. Silt fencing was selected for two reasons: (1) silt fencing does not attract undue attention to archaeological sites, and therefore, does not facilitate illicit collection of archaeological materials; and (2) construction contractors are accustomed to avoid running into or otherwise damaging silt fences. APM CR-4 would ensure that the impact to cultural resources from construction-related activities would be less than significant.

The proposed project entails the replacement and modification of an as-yet-undetermined number of transmission line towers. Construction work occurring near or on transmission line towers may result in significant impacts. The installation of distribution line crossing structures, Tower 159, and modifications to Tower 143, would involve vehicle traffic, the potential for grading, and the potential of excavation within the boundaries of archaeological sites. Sites within the vicinity of Towers 159 and 143, P-15-4014 and P-15-1493, are assumed to be eligible for listing in the NRHP and the CRHR and without appropriate protective measures, construction activities would likely result in the removal or damage of archaeological materials from these sites. The movement of construction equipment across the site would result in the damage and displacement of surface and near-surface archaeological constituents. This impact would be significant under CEQA and an adverse effect under Section 106 because it would diminish the information potential of these archaeological sites. Implementation of APM CR-5 (Obtain a clearance on the foreign transmission line crossing near Tower 159) would eliminate the need to build a crossing structure on site P-15-4014, ensuring the impact to the archaeological site would be less than significant. APM CR-6 (Protect transmission line crossing with a truck-mounted bucket) would eliminate the need for excavation into P-15-4014, and require a qualified archeologist to create a safe path for vehicle travel from the nearest road to the transmission line crossing. APM CR-7 (Build a low-impact crossing structure on P-15-4014) requires a low-impact, scaffold-style crossing structure on the surface of P-15-4014. APMs CR-5, -6, and -7 would each, separately, reduce impacts from construction work at

Towers 159 and 143 to less than significant levels. Each APM is sufficient to reduce the severity of the impact and need not be applied in concert with the others. Implementation APM CR-5 would result in the lowest impact on P-15-4014, and therefore, is the preferred choice. APM CR-5 may not be feasible for PG&E, however, in that a clearance on a foreign transmission line would result in temporary power supply reductions to a foreign energy service area. APMs CR-6 and -7 are provided as more feasible options.

Should PG&E determine that Tower 143 requires replacement; construction traffic, the removal of the tower, and installation of a new tower could damage surface and subsurface archaeological deposits at P-15-1493, reducing site integrity and information potential. This impact would be considered significant under CEQA and would be an adverse effect under Section 106. If feasible, APM CR-8 (Avoidance through project design) would be implemented to avoid replacing or modifying Tower 143 in any manner. As a secondary choice, APM CR-9 (Evaluate P-15-1493's significance and prepare and implement a site specific archaeological treatment plan) would ensure that, if replacement is necessary, the potential impact to P-15-1493 would be less than significant.

An archaeological survey of Switching Station alternative 3 identified the presence of prehistoric artifacts. One of these is within the planned area of disturbance at the site, and PG&E has stated that they will design around it. If it is not feasible to avoid the resource, data recovery activities will be undertaken. APM CR-7 (Avoidance through project design) and APM CR-2 (Unanticipated discoveries management) will ensure that impacts to this resource are less than significant.

Impact C-2: Construction of the project would cause an adverse change to unknown significant surface or buried prehistoric and historical archaeological sites or buried Native American human remains

Unknown significant surface or buried prehistoric and historical archaeological sites or buried human remains could be discovered during construction. Grading and earthwork would be minimal and would be limited to re-establishing existing access roads, pull and tension sites, construction laydown areas, and foundations for as many as 17 replacement towers. At the two switching stations and related microwave tower and reflector the land would be graded and the switching station areas would be surfaced with a combination of concrete pads, compacted road base for internal access roads and compacted earth. Table Ap.4A-14 lists project elements sensitive to the presence of buried archaeological sites.

Table Ap.4A-14. Project Elements Sensitive to Buried Sites

Project Element	Sensitivity	Impact Mechanism
Access road improvements	Varies; moderate to very high	Grading
Towers 3, 6, and 10	Moderately high	Excavation associated with tower removal and replacement
Towers 73-75, 80	High	Excavation associated with tower removal and replacement
Towers 99, 100, 109, 142–165	High to very high	Excavation associated with tower removal and replacement
Transmission line crossings 99, 159-160	High	Installation of crossing-structure poles
Distribution line crossings 145-146, 154-155, 158, 159-160	High (159-160 is very high)	Installation of crossing-structure poles
Road crossing work areas 109, 139, 162	High	Installation of crossing-structure poles
Belridge line crossing	High	Installation of crossing-structure poles

Particular sections of the project area have not been surveyed for the presence of cultural resources because of access limitations (standing crops). In addition, portions of the project area have not been defined in a sufficient level of detail to permit surveying (i.e., towers slated for replacement and modification). During construction of the project, construction crews may identify the need for staging and other work areas on property that has not been surveyed for the presence of cultural resources. Should construction activities occur in unexamined areas, NRHP- or CRHR-eligible cultural resources could be damaged. This would be a significant impact under CEQA and an adverse effect under Section 106. APMs CR-1 (Pre-construction worker education program), CR-2, CR-3, and CR-10 would reduce potential impacts to unknown archaeological or human remains sites.

APM CR-1 would require worker education programs for all personnel who may encounter and alter historical resources or unique archaeological properties. APM CR-2 (Unanticipated discoveries management) would ensure proper management of unanticipated discoveries of cultural resources. Discovery of cultural resources would be unlikely, as most work would occur on previously disturbed sites; however, in the unlikely event that Native American remains are discovered during construction, a significant impact would result if remains were treated improperly. APM CR-3 (Follow State Health and Safety Code Section 7050.5 if human remains are identified) would ensure that Native American remains discovered during construction would receive proper treatment. Implementation of APM CR-10 (Survey unexamined areas for the presence of cultural resources) would ensure that areas of new or redefined projects elements would be surveyed for sites of cultural significance prior to construction. With these APMs and mitigation measures applied, impacts to unknown archaeological sites and buried Native American remains would be less than significant.

Impact C-3: Construction of the project would potentially destroy or disturb significant paleontological resources

The only clearing and grading anticipated with the reconductoring of the transmission line would include the reestablishment of existing unpaved access roads. Construction of the Solar Switching Station and Caliente Switching Station and microwave tower would include grading of up to 9 acres each. The estimated depth of excavation is unknown. A potentially significant impact could occur if the project affects sensitive, previously undisturbed sediment or sedimentary rock. In areas underlain by geologic units assessed to have high paleontological sensitivity, project-related activities (such as replacement of transmission towers and establishment, improvement, or restoration of access roads) could result in significant impacts on these resources. Replacement of existing conductors and construction of temporary protective structures at road crossings, or any activities underlain by geologic units designated as low sensitivity, are not expected to cause significant impacts on paleontological resources

It is unlikely that shallow grading and excavations into the younger alluvium would encounter paleontological resources. Deeper excavations or grading may encounter finer-grained sediments or older Quaternary alluvium, which would have a higher potential for paleontological resources.

Deeper excavation may also encounter underlying Paso Robles Formation (Pleistocene and Pliocene age). If encountered, the possibility of impacting significant paleontological resources would be moderate to high, because several vertebrate fossil localities are present west of the region.

Because of the depth of the excavation and the moderate to high probability of encountering resources, the excavation could be considered a significant impact without mitigation. APMs PAL-1 (Paleontological Monitoring and Treatment Plan), PAL-2 (Paleontology Construction Monitoring), PAL-3 (Paleontological Data Recovery) and PAL-4 (Construction Personnel Training) are designed to ensure that impacts to paleontological resources during construction would be less than significant.

These measures would require the implementation of stop-work procedures and the development of a worker education program in conjunction with the monitoring of earthwork activities by a qualified professional paleontologist (a paleontological resource specialist).

3.8 Geology, Mineral Resources, and Soils

Environmental Setting

The San Andreas Fault is the most striking geologic feature in the vicinity of the reconductoring project and crosses the existing transmission corridor nearly perpendicularly at approximately MP 8. A segment of the transmission line would be located within the Alquist-Priolo Earthquake Zone and about 200 to 400 feet east of the nearest mapped fault trace. The Caliente Switching Station alternatives are located just to the east and the west of the Alquist-Priolo Earthquake Zone, with alternative 1 and alternative 3 representing the closest and farthest site locations from the boundary of the zone, respectively. The San Andreas Fault is zoned an active fault[3] in the project area and was the source of the Fort Tejon Earthquake on January 9, 1857. Surface rupture was reported along an approximately 220-mile segment of the fault from San Bernardino to Parkfield with offsets of up to 30 feet reported in the Carrizo Plain. The estimated moment magnitude of the earthquake was M7.9 at the epicenter near Cholame, about 30 miles north of the CVSR site (Arrowsmith, 1995). Recent studies of geomorphic features (Zielke et al., 2010) and detailed analysis of incised channels combined with new age dating (Grant Ludwig et al., 2010) indicate that the 1857 Fort Tejon Earthquake resulted in about 18.7 feet (5.3 meters) of fault slip and that this slip amount may be the upper limit of slip for the south central San Andreas Fault segment (Scharer, 2010).

According to the Working Group on California Earthquake Probabilities (WGCEP, 2008), the southern San Andreas fault has a 59 percent probability of generating a magnitude M6.7 or greater earthquake within the next 30 years. The history of earthquakes along the San Andreas Fault has caused a 300 to 1,500-foot-wide zone of deformation across the northeastern boundary of the CVSR site (Dibblee, 1973b; Engeo, 2008).

Engeo (2008) calculates the site peak ground acceleration from large earthquakes on the San Andreas Fault range from 0.5g to 0.85g for earthquake recurrence intervals of 350 to 1,000 years. Peak ground acceleration as high as 1.1g would occur in the transmission ROW for an earthquake recurrence interval of 2,500 years.

In addition, the transmission line crosses an area of landslide potential from MP 12 to MP 13, according to the Kern County General Plan Map (Map Code 8.3/2.2). Finally, a portion of the existing ROW is located on and adjacent to areas designated as Mineral and Petroleum areas (Map Code 8.4) in the Kern County General Plan (MP 16 to MP 19.5).

The Lokern ACEC (MP 21.5 to MP 30) is considered to have high potential for the occurrence of oil and gas; however, the ACEC lies in a northwest trending synclinal area, which is not considered highly prospective for oil and gas. Some deep wells have been drilled to find Miocene or older oil reservoirs directly to the southwest, but they have not resulted in oil production. Interest in the area continues as demonstrated by several large scale geophysical exploration projects (BLM, 1997).

[3] An active fault is defined by the State Mining and Geology Board as one that has had surface displacement within Holocene time (about the last 10,000 years).

Environmental Impacts

Impact G-1: Project would expose people or structures to potential substantial adverse effects as a result of problematic soils (e.g., corrosive or expansive soils, liquefaction, slope instability, landslides, or collapsible soil)

Switching Stations. Expansion potential for the soils at both the switching stations is moderate (NRCS, 2010). Expansive soils could cause differential and cyclical foundation movements that could cause damage and/or distress to equipment and structures, including concrete equipment slabs at the switching station. In addition, potential impacts associated with loose sands or other compressible or collapsible soils include excessive settlement, low foundation-bearing capacity, and limitation of year-round access to the transmission line and/or switching station facilities. Implementation of PG&E's design standards would prevent damage of this type at the switching station.

Reconductoring. The transmission line crosses an area of landslide potential from MP 12 to MP 13, according to the Kern County General Plan Map (Map Code 8.3/2.2). Heavy construction along this portion of the ROW could result in a safety hazard to personnel if a landslide were to occur as a result. APM GM-1 (Soft or loose soils during construction minimization) would ensure that soft or loose soils are stabilized during construction. If a landslide were to occur as a result of construction activities at MP 12 to MP 13, a significant hazard to construction personnel would result. APM GM-2 (Protect against slope instability) would ensure that unstable slopes are stabilized, and would reduce this impact to a less-than-significant level.

Impact G-2: Project would expose people or structures to potential substantial adverse effects as a result of seismically induced ground failure and/or groundshaking

Switching Stations. Strong to severe groundshaking may occur along the transmission corridor in the vicinity of MP 8 and the Caliente Switching Station during the life of the project. Local strong to severe groundshaking with vertical and horizontal ground accelerations that could exceed standard design stresses could result in damage or collapse of project structures. Seismically induced slope failures, such as landslides, could occur in the event of a large earthquake in areas with moderate to steep slopes. Moderate to steep slopes adjacent to the San Andreas Fault may be susceptible to seismically induced ground failure in the form of landsliding or ground cracking, resulting in damage to or collapse of project structures. Damage of structures could result in power outages, wildland fires, and injury or death to nearby people, which are all considered potentially significant impacts. Although it is impossible to fully negate the potential for severe to very strong ground shaking to cause damage to project structures in the event of a significant earthquake on the adjacent San Andreas fault, implementation of APM GM-3 (Reduce effects of groundshaking) would reduce the potential for catastrophic failures by allowing for appropriate structural design of facilities. With implementation of this measure, impacts would be less than significant.

Reconductoring. APM GM-3 is recommended for portions of the transmission line where strong to severe ground shaking is anticipated to support the final structural design of these facilities and reduce the potential impact to less than significant.

Impact G-3: Project would expose people or structures to potential substantial adverse effects as a result of surface fault rupture at crossings of active and potentially active faults

Although there are no residences or recreational trails located within 200 feet of the edge of the ROW or switching stations and there are no structures proposed for human occupancy, project facilities would be subject to hazards of surface fault rupture at crossings of the active San Andreas Fault.

Switching Stations. The Solar Switching Station would be located outside of the mapped Alquist-Priolo Earthquake Zone and impacts would be less than significant. Portions of the transmission line would be located within the Alquist-Priolo Earthquake Zone Site option 1 for the Caliente Switching Station is located about 200 to 400 feet east of the nearest mapped fault trace. Sites 2 through 6 are located at least 1,000 feet from the nearest San Andreas Fault trace. There is also a second Alquist-Priolo Zone mapped/located about 2 miles east of the new switching station location. The replacement transmission line towers and the Caliente Switching Station should be set back from fault traces to collapse in the event of surface rupture. Implementation of APM GM-4 (Avoid placement of project structures within active fault zones) would require a fault study to verify that no fault traces would pass through the Caliente Switching Station site and would ensure this impact would be less than significant.

Reconductoring. The reconductoring work would occur primarily on existing structures. However, for looping into the switching stations and for other design considerations, new poles or towers would be required. In particular, work associated with the Caliente Switching Station and replaced transmission line structures. Implementation of APM G-4 would require a fault study to verify that no fault traces would pass through tower locations and would ensure that this impact would be less than significant.

Impact G-4: Project would interfere with access to known mineral resources or damage a unique geologic feature

Switching Stations. U.S. Geological Service (USGS) Mineral Resource Data System (MRDS) for the project area was reviewed. The CVSR project site includes an inactive gypsum mine. Given that this onsite mine has not been active for many years, it is indicative that the grade/quality of the product (and proximity to market) can no longer sustain cost-effective extraction. A nearby gypsum mine has followed a very similar path, where commercial production has not been evident for many years. Given the relatively small footprint of the switching stations and that no specific resources have been identified at the proposed sites, no adverse impact related to access to mineral resources would occur and no mitigation is required.

Reconductoring. A portion of the existing ROW is located on and adjacent to areas designated as Mineral and Petroleum areas (Map Code 8.4) in the Kern County General Plan. According to the Land Use, Open Space, and Conservation Element of the Kern County General Plan, uses of Mineral and Petroleum areas shall be limited to activities directly associated with resource extraction. Approved land uses on Mineral and Petroleum designated lands include natural gas and geothermal resource extraction, power transmission facilities, and equipment storage stations. Because all work would be located in an existing transmission ROW, the construction work would not interfere with access to known mineral resources.

The reconductoring project would not be located in the vicinity of any known unique geologic features. As ground disturbance would be minimal and limited primarily to previously disturbed areas within an existing ROW, there would be no potential for the project to damage any unique geologic features.

The reconductoring project would not interfere with access to known mineral resources or damage any unique geologic features.

Impact G-5: Project would have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems

Wastewater used during the reconductoring and switching station work would be disposed of onsite or trucked to a sanitary sewer facility. Impacts related to soils adequately supporting septic tanks would not occur.

3.9 Hazards and Hazardous Materials

Environmental Setting

Sensitive Receptors. There are two structures (potentially occupied residences) within 1,000 feet of the existing transmission line at MP 0.6 and MP 1.2 in the Carrizo Plain and an additional 21 structures (potentially occupied residences) within 2,000 feet of the existing transmission line between MP 25 and MP 32.5 in the San Joaquin Valley. The existing transmission line is within 1,500 feet of numerous residences and one school in the community of Buttonwillow between MP 32.5 and MP 34.

Wildfire Risk. The switching station sites and the section of the Morro Bay–Midway 230 kV transmission line to be reconductored passes through areas of low and moderate fire hazard severity, as defined by the California Department of Forestry and Fire Protection (Cal Fire). The area of the westernmost portion of the existing transmission line and switching station sites in San Luis Obispo County is served by the Carrizo Plain Fire Station (Station 42) under the jurisdiction of Cal Fire, which provides fire protection services under contract with the County. This station is staffed 24 hours per day, three days per week; volunteer responders are on call the remaining four days. The eastern portion of the existing transmission line in Kern County is served by the Kern County Fire Department's Station 25 in Buttonwillow and Station 24 in McKittrick.

Existing Contamination. There are several documented contaminated sites located within 0.5 miles of the transmission ROW. The Clean Harbors Buttonwillow hazardous waste treatment and disposal facility is located approximately 0.25 miles north of the transmission line at MP 26. In addition, a documented release of gasoline into groundwater occurred at the Buttonwillow Fire Station located approximately 0.5 miles north of the transmission line at MP 34. A leaking underground petroleum gasoline tank (UST) at the fire station was detected and stopped in 1989 (RWQCB, 2010). The case is currently open with remediation underway under the oversight of the Kern County Local Oversight Program and the Central Valley Regional Water Quality Control Board (RWQCB). A second leaking UST was detected in 1997 at the Alvidres Unocal, adjacent to the Buttonwillow Fire Station (Geotracker, 2010). Tests for soil and groundwater contamination are undergoing and no remediation has begun (Geotracker, 2010). Three other leaking UST sites are located within 0.5 miles of the transmission line; however, these spills have been fully remediated and the cases are closed. Several documented releases of crude oil have been reported from the Cymric Oil Field, located within 0.25 miles of the transmission line at MP 18.5.

Disease Vectors. A disease vector is any organism capable of transmitting the causative agent of human disease or capable of producing human discomfort or injury, including mosquitoes, flies, fleas, cockroaches, mites, rats, or fungi. The accumulation of organic waste acts as an attractor for flies, fleas, cockroaches, rodents, and other mammals, which can be carriers of various human diseases. In addition, any depressed areas, ponds, or drainage channels would provide areas for the breeding of mosquitoes, which can be carriers of the West Nile Virus, a potentially fatal disease in humans.

The reconductoring project is located in an area that may harbor the fungus that causes the disease Valley Fever. Coccidioidomycosis, commonly known as Valley Fever, is a lung disease common in the

southwestern United States and northwestern Mexico. Valley Fever is caused by the fungus *Coccidioides immitis*, which grows in soils in areas of low rainfall, high summer temperatures, and moderate winter temperatures. These fungal spores become airborne when soil is disturbed by winds, construction, farming, and other activities. In susceptible people and animals, infection occurs when a spore is inhaled. People working in certain occupations such as construction, agriculture, and archaeology have an increased risk of exposure and disease because these jobs result in the disturbance of soils where fungal spores are found. Many domestic and native animals are susceptible to the disease, including dogs, horses, cattle, coyotes, rodents, bats, and snakes. Valley Fever infection is highest in California from June to November. Most Valley Fever cases are very mild. It is estimated that 60 percent or more of infected people either have no symptoms or experience flu-like symptoms and never seek medical attention.

Electromagnetic Fields. EMFs are associated with electromagnetic radiation. Electric and magnetic fields are common throughout nature and are produced by all living organisms. Concern over EMF exposure, however, generally pertains to human-made sources of electromagnetism and the degree to which they may have adverse biological effects or interfere with other electromagnetic systems. Possible health effects associated with exposure to EMFs have been the subject of scientific investigation since the 1970s. Reviews of the scientific literature have consistently indicated insufficient evidence of an association between EMF exposure and adverse health effects in humans (NIEHS, 1999; WHO, 1984, 1987, 2001, 2007).

On January 15, 1991, the CPUC initiated an investigation to consider its role in mitigating the health effects, if any, of electric and magnetic fields from utility facilities and power lines. A working group of interested parties, called the California EMF Consensus Group, was created by the CPUC to advise it on this issue. The Consensus Group's fact-finding process was open to the public, and its report incorporated concerns expressed by the public. Its recommendations were filed with the CPUC in March 1992. Based on the work of the Consensus Group, written testimony, and evidentiary hearings, the CPUC issued its decision (D.93-11-013) on November 2, 1993 to address public concern about possible EMF health effects from electric utility facilities. The CPUC concluded that it is not appropriate to adopt any specific numerical standard in association with EMF until there is a firm scientific basis for adopting any particular value.

Most recently the CPUC issued Decision D.06-01-042, on January 26, 2006, affirming the low-cost/no-cost policy to mitigate EMF exposure from new utility transmission and substation projects. This decision also adopted rules and policies to improve utility design guidelines for reducing EMF. The CPUC stated “at this time we are unable to determine whether there is a significant scientifically verifiable relationship between EMF exposure and negative health consequences.”

This continues to be the stance of the CPUC with regard to establishing standards for EMF exposure. Currently, the State has not adopted any specific limits or regulation on EMF levels related to electric power facilities. For these reasons, EMF is not considered in this analysis as a CEQA issue and no impact significance is presented. This information is presented to allow understanding of the issue by the public and decision-makers.

Environmental Impacts

Impact HZ-1: Create a hazard to people or the environment through the routine transport, use, or disposal of hazardous materials or as a result of an accidental release of hazardous materials

Hazardous or flammable materials used during construction would typically consist of small volumes of petroleum hydrocarbons and their derivatives (e.g., fuels, oils, lubricants, and solvents) required for the operation of construction equipment. These materials would be those routinely associated with the operation and maintenance of heavy construction equipment or other support vehicles, and would include gasoline, diesel fuel, and hydraulic fluids.

Minor spills or releases of hazardous materials could occur due to improper handling and/or storage practices during construction activities. Potential impacts related to minor spills would be largely avoided by training construction personnel in the handling and storage of hazardous materials in compliance with OSHA standards. The project as proposed would comply with OHSA and Cal/OSHA laws and guidelines to ensure personnel health and safety. In addition, APM HM-1/WQ-1 would ensure that an environmental training and monitoring program is developed and implemented for all personnel, APM HM-2 would establish a hazardous substance control and emergency response plan, and HM-3 would establish a site-specific health and safety plan. Implementation of these applicant proposed measures would ensure this impact would be less than significant and that the risk of spills and releases of hazardous materials is minimal and that accidental spills are properly cleaned up.

Switching Stations. It is anticipated that PG&E would periodically use herbicides to manage vegetation growth around switching stations. The switching stations would create new components to manage as compared to the existing transmission line. The application of herbicides for vegetation management would potentially pose a significant risk to human health or ecological receptors if applied incorrectly. APM HM-7 (Use licensed herbicide applicator) would ensure appropriate application of herbicides by qualified personnel, thus reducing this impact to a less than significant level.

Reconductoring. Construction equipment would mostly be refueled at landing zones or construction yards along the transmission line. Equipment may be refueled along the transmission line if necessary. The reconductoring work would result in the accumulation of minor amounts of hazardous waste on site. In addition, used motor oil, oil filters, and oily rags would typically be generated at PG&E's offsite maintenance facility. APM HM-2 would ensure that hazardous materials and hazardous waste would be collected in project-specific containers at the site and transported to a PG&E consolidation site and would be handled, stored, and disposed of in accordance with all applicable regulations by qualified personnel. In addition, any treated wood poles generated during construction would be considered hazardous waste and would be transported to a licensed Class 1 or composite-lined portion of a solid waste landfill in accordance with APM HM-2. Finally, APM HM-4 would ensure that on-site storage of hazardous materials is managed in accordance with all applicable regulations and that material safety data sheets are maintained and kept available on site, as applicable.

The old conductor would be disposed of in an appropriate landfill facility.

It is anticipated that PG&E would periodically use herbicides to manage vegetation growth around project structures and switching stations. The reconductoring work would extend the life of the transmission line and therefore extend the timeframe of vegetation management activities. The application of herbicides for vegetation management would potentially pose a significant risk to human health or ecological receptors if applied incorrectly. APM HM-7 (Use licensed herbicide applicator)

would ensure appropriate application of herbicides by qualified personnel, thus reducing this impact to a less than significant level.

Through implementation of APMs, impacts related to the transport, use, storage, or accidental release of hazardous materials would be less than significant.

Impact HZ-2: Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school

Switching Stations. There are no schools located within one-quarter mile of the proposed switching station sites.

Reconductoring. Buttonwillow Union Elementary school is located within one-quarter mile of the existing transmission line and could be impacted by hazardous materials onsite; however, only minor amounts of hazardous materials would be used on site, and only minor amounts of hazardous waste would be generated onsite. As discussed above under Impact HZ-1, APM HM-1/WQ-1 would ensure that an environmental training and monitoring program is developed and implemented for all personnel, APM HM-2 would establish a hazardous substance control and emergency response plan, and APM HM-3 would establish a site-specific health and safety plan. Implementation of these APMs would ensure that the risk of spills and releases of hazardous materials is minimal, and that accidental spills are properly cleaned up. In addition, APM HM-7 would ensure appropriate application of herbicides by qualified personnel, thus reducing potential impacts of the use of hazardous materials in the vicinity of a school to a less than significant level.

Impact HZ-3: Create a hazard to people or the environment as a result of being located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5

The Cortese List includes hazardous waste facilities, contaminated drinking water wells, sites listed as having underground storage tank leaks that have discharged into surface water or groundwater, and other sites that have had a known migration of hazardous materials or waste.

Switching Stations. There are no know locations on or near the switching station sites that are listed as hazardous materials sites.

Reconductoring. A database search along the reconductoring ROW revealed one site on the Cortese List (EDR, 2009a). A documented release of gasoline into groundwater occurred at the Buttonwillow Fire Station and one leaking UST adjacent to the fire station are located approximately 0.5 miles north of the transmission line at MP 34. Depth to groundwater at this site is approximately 27 feet below ground surface (Geotracker, 2010). Additionally, the Clean Harbors Buttonwillow hazardous waste treatment is a known site with releases of hazardous materials located north of the transmission line and presents a major threat to water quality. Depth to groundwater at the site has fluctuated between 80 and 280 feet below ground surface (Geotracker, 2010). Because depth to groundwater at both sites is below the anticipated level of grading, unanticipated contamination along the portions of the reconductoring ROW is unlikely.

Impact HZ-4: Create an aeronautical or motor vehicle hazard or result in a significant aerial obstruction within two miles of an airport or airstrip

Switching Stations. The switching station sites do not occur within two miles of an airport or airstrip.

Reconductoring. The existing transmission line does not occur within two miles of an airport or airstrip. The Elk Hills Airport is located approximately 3 miles south, and the Belridge Airstrip is located

approximately 4 miles north of the existing transmission line. The reconductoring work would include raising the heights of every other tower by approximately 20 feet, which would be a minor change relative to the existing structures and would not create a hazard for pilots taking off or landing at these airports.

Impact HZ-5: Expose people or structures to a risk of loss, injury, or death involving wildland fires

Project construction would involve the use of heavy equipment, welding, and other activities, including personnel smoking, which could cause a wildfire ignition at a work site, potentially resulting in a hazard to personnel or scattered structures in the vicinity of the project.

Switching Stations. Unlike operation of the existing transmission line, the construction of the two switching stations would introduce new electrical components into the area. Wildfire could result from accidental ignitions during construction, operations, or maintenance of the facilities. The switching stations would be designed, inspected, and maintained in accordance with CPUC's General Order 95, which sets forth standards for overhead electric lines, including minimum distances for conductor spacing and ground clearance, standards for calculating maximum sag, vegetation clearance requirements, and maintenance and inspection rules. Solar Switching Station would be in agricultural land and pose a low risk of wildfire during construction. In contrast, the Caliente Switching Station alternatives are in uncultivated grassland. APM HM-8 (Cease work during Red Flag Warnings) would ensure that non-emergency construction and maintenance activities cease during extreme fire weather conditions for the work area. Implementation of this mitigation measure would reduce the severity of this impact to a less than significant level.

APM HM-6 requires PG&E to provide a Fire Prevention and Response Plan to CPUC and local fire officials in advance of reconductoring work, Implement of APM HZ-6 for switching stations sites ensures that this impact is less than significant.

Reconductoring. The reconductoring project could potentially cause a wildfire hazard by igniting a wildfire during construction, operations, or maintenance, or by interfering with firefighting operations.

In addition, electrical fires from equipment during the operations phase of the reconductored line could ignite nearby vegetation. Fires can be started by transmission lines in the following ways:

- Vegetation contact with conductors
- Floating or wind-blown debris contact with conductors or insulators
- Conductor-to-conductor contact
- Dust or dirt on insulators
- Bullet, airplane, and helicopter contact with conductors or support structures
- Other third-party contact, such as Mylar balloons, kites, and wildlife
- System component failures
- Accidents during maintenance activities.

The risk of wildfire ignition during operation exists with the presence of the existing transmission line, and would not be increased relative to baseline conditions. The reconductoring would extend the operational life of the transmission line, which would extend the duration of the risk of a transmission line-related electrical fire that could result in a wildfire. The transmission line would be designed, inspected, and maintained in accordance with CPUC's General Order 95, which sets forth standards for overhead electric lines, including minimum distances for conductor spacing and ground clearance,

standards for calculating maximum sag, vegetation clearance requirements, and maintenance and inspection rules.

In addition, APM HM-6 would ensure that a fire prevention and response plan is submitted to the CPUC and local fire protection authorities for notification at least 30 days prior to construction. The plan would cover fire protection and prevention methods to be implemented during construction, including procedures to prevent electrical fires, fires from hazardous materials use, and fires from personnel smoking. Personnel would be required to park away from dry vegetation, to equip vehicles with fire extinguishers, to refrain from smoking, and to carry water, shovels, and fire extinguishers in times of high fire hazard. Fire risk from construction, operations, and maintenance activities would be low with conformance with General Order 95 and APM HM-6 and the moderate fire hazard severity of the landscape through which the line passes. Nonetheless, during extreme fire weather—high winds, high temperature, and low relative humidity— any ignition in a vegetation-dominated landscape could grow out of control and pose a risk to life and property in the surrounding area, resulting in a significant impact. APM HM-8 would ensure that non-emergency construction and maintenance activities cease during extreme fire weather conditions for the work area. Implementation of this mitigation measure would reduce the severity of this impact to a less than significant level.

Construction vehicles could interfere with emergency response vehicles in the project area if heavy truck traffic were to occur on arterial highways. Construction traffic for the proposed project would be minor and would be spread out over 34 miles during the 20 months of construction. Implementation of traffic safety practices in accordance with traffic laws would ensure that construction vehicles would not interfere with emergency response in the project area.

Impact HZ-6: Impair implementation of, or physically interfere with, an adopted emergency response plan or emergency evacuation plan

Construction vehicles could interfere with emergency response vehicles in the project area if heavy truck traffic were to occur on arterial highways. Construction traffic would be minor and would be spread out over 34 miles during the 20 months of construction. Implementation of traffic safety practices in accordance with traffic laws would ensure that construction vehicles would not interfere with emergency response in the project area. This would result in a less than significant impact.

Impact HZ-7: Create a hazard to the public or the environment by mobilizing existing contamination or generating disease vectors

The potential exists for contamination to occur in the transmission ROW, at the switching station sites, and along existing access roads as a result of unknown or unreported spills or leaks, or from illegal dumping. Contamination from petroleum products (gasoline, oil, and diesel) is one of the most common types of unknown contamination and is generally detectable by visual and olfactory observation. Waste from illegal dumping in rural areas can sometimes include hazardous waste, such as waste from clandestine drug manufacturing. In addition, the potential exists for agricultural chemical residue to be encountered in agricultural areas during project grading or excavation.

Switching Stations and Reconductoring. Limited grading is expected to be required to reestablish existing access roads and to construct the switching station sites. Excavation would be limited to installing new tower foundations and switching station components, as necessary. APM HM-5 would ensure that soils suspected of being contaminated are removed, tested, and if contaminated above hazardous levels, contained and disposed of at a licensed waste facility.

Reconductoring and switching station construction work would occur in an area favorable to the growth of the Valley Fever vector, the fungus *Coccidioides immitis*, which grows in soils in areas of low rainfall, high summer temperatures, and moderate winter temperatures. Construction activities would disturb the soil and cause the fungal spores to become airborne, potentially putting construction personnel and wildlife at risk of contracting Valley Fever. However, most Valley Fever cases are very mild, and more than half of infected people either have no symptoms or experience flu-like symptoms and never seek medical attention. In addition, APM AIR-5 for minimizing fugitive dust would also minimize the likelihood of Valley Fever.

Implementation of APMs HM-5 and AIR-5 would result in a less than significant impact from mobilizing existing contamination and generating disease vectors.

3.10 Land Use and Recreation

Environmental Setting

The northern boundary of the Carrizo Plain National Monument (CPNM) is located approximately seven miles south of the existing transmission line and is considered a recreational and wildlife resource of local, regional, and Statewide importance (BLM, 2007). In addition, Buttonwillow Park is located approximately 0.5 miles north of the existing transmission line. No other developed recreational facilities are located in the vicinity of the transmission line.

The Solar Switching Station would be located north of the existing PG&E transmission line corridor within the Topaz Project boundary, approximately one mile north of Highway 58. The site has been previously disturbed by dry-land farming and has a zoning designation of Agriculture (AG).

There are two structures (potentially occupied residences) within 1,000 feet of the existing transmission line at MP 0.6 and MP 1.2 in the Carrizo Plain, and there are an additional 21 structures (potentially occupied residences) within 2,000 feet of the existing transmission line between MP 25 and MP 32.5 in the San Joaquin Valley. The nearest potential residence is located within 100 feet of the ROW at MP 0.6.

The Solar Switching Station would be located north of the existing PG&E transmission line corridor within the Topaz Project boundary, approximately one mile north of Highway 58. The nearest residence to the switching station (APN 072-301-003) would be over 3,500 feet southwest of the proposed site. In addition, two occupied residences would be between 4,500 and 5,250 feet northeast of the Solar Switching Station (APNs 072-051-026 and 072-061-030, respectively) and in close proximity to the reconductoring activities in the existing ROW as well.

The Caliente Switching Station site alternatives would be located just south of the transmission corridor at MP 7.3 and approximately 2 miles north of Highway 58. The sites are currently on undeveloped grazing land with a zoning designation of Agriculture (AG). The nearest residence would be more than 2 miles away (APN 072-111-033).

Environmental Impacts

Impact LU-1: Construction would temporarily disrupt, displace or divide land uses

Switching Stations. The switching stations would be constructed adjacent to the existing transmission corridor. Construction of the Solar Switching Station would take place in the middle of the Topaz project and would not disrupt, displace, or divide land uses. The Caliente Switching Station would be constructed approximately 2 miles from Highway 58 and from the CVSR project site. However, as a

single site, it would not temporarily disrupt, displace, or divide land uses. Adjacent land required during construction may be affected. APM LU-1 (Agriculture impacts avoidance) is applicable to the reconductoring work, ensuring that PG&E would work with farmers and ranchers to minimize disruption. The construction of the Caliente Switching Station may temporarily adversely affect the use of adjacent land for grazing and is also subject to APM LU-1. Implementation of this measure would ensure that this impact to land use would be less than significant.

Reconductoring. Reconductoring work would occur in an existing ROW using existing access roads. Several pull and tension sites would be located in active cropland and would temporarily disturb crop production at these locations. Because the terms of the landowner ROW agreement include provisions for PG&E to perform transmission upgrade work, temporary construction activities would be considered an existing land use in a multi-use ROW. In addition, APM LU-1 ensures that PG&E would work with farmers and ranchers to conduct work between harvest and planting periods, whenever possible, or provide compensation to landowners for crop losses. Therefore, temporary disruption of crop production for pull and tension sites would be considered a less than significant land use impact.

Impact LU-2: Operation and maintenance of the project would permanently disrupt, displace or divide land uses

Switching Stations. The Solar Switching Station would be accessed by existing paved and dirt roads off of Bitterwater Road and Highway 58. In addition, the Topaz EIR includes analysis of the proposed gravel access roads within the Topaz project site, which would also be used to access the Solar Switching Station. The Caliente Switching Station site alternatives would be accessed via existing access roads or by new unpaved access roads extending from existing access roads. The switching station would be constructed adjacent to the existing transmission corridor. Construction of the roads would result in a permanent disruption of the land, but would not displace or divide existing land uses. Therefore, the impact would be considered less than significant.

Reconductoring. The proposed reconductoring work would occur in an existing ROW using existing access roads, and would not permanently disrupt, displace, or divide land uses. Therefore, the impact would be considered less than significant.

Impact LU-3: Construction, operation and maintenance would conflict with a federal, State or local land use plan, goal, standard or policy adopted for the purpose of avoiding or mitigating an environmental effect

Switching Stations. None of the switching stations sites has applicable to it a federal, State or local land use plan, goal, standard, or policy adopted for the purpose of avoiding or mitigating an environmental effect.

Reconductoring. The existing transmission line passes through the BLM-managed Lokern ACEC from MP 22.5 to MP 30. The Lokern ACEC contains 3,110 acres of federal land and has been identified by the USFWS and CDFG as an area important for the conservation and recovery of endangered species (BLM, 1996). BLM's management objective of the Lokern ACEC is to manage the ACEC in cooperation with local landowners and other State, federal, and local governments as a natural ecosystem for the benefit of threatened and endangered species and their habitats, while recognizing the rights and needs of authorized users of public lands (BLM, 1996). PG&E is an authorized user of the ROW through the ACEC, and all reconductoring work would comply with the PG&E HCP. Reconductoring work would therefore not jeopardize the management objectives of the Lokern ACEC and would result in a less-than-significant impact on land use plans.

Impact R-1: Construction activities would temporarily reduce, disrupt or preclude access and visitation to established recreational areas

The Carrizo Plains National Monument (CPNM) is located approximately seven miles south of the existing transmission corridor and Buttonwillow Park is located approximately 0.5 miles north of the existing transmission line. Highway 58 is considered a recreational bicycle route within San Luis Obispo County. Class III bike lanes are present from U.S. 101 to Pozo Road. Class III bike lanes provide a right-of-way designated by signs or permanent markings, are shared with pedestrians or motorists, and may or may not provide striped shoulders or a wide curb lane (Caltrans, 2003; SLOCOG, 2005). Access to these recreational facilities would not be affected by construction activities on the line or the switching stations. No other recreational facilities exist in proximity to the transmission line or switching stations. There would be no impact on access to recreational activities as a result of the reconductoring project.

Impact R-2: Operation and maintenance would permanently reduce, disrupt or preclude access and visitation to established recreational areas

As discussed above, the three recreational facilities in the vicinity of the transmission line and switching stations. These facilities would not be impacted by project-related activities since maintenance activities would be carried out by teams of two to four personnel and would be infrequent. There would be no impact on access to recreational activities as a result of operation and maintenance of the reconductored transmission line or the new switching stations.

Impact R-3: Construction or operation and maintenance activities would increase the use of established recreational facilities such that substantial physical deterioration would occur or be accelerated

Any substantial increase in personnel use of campgrounds at the CPNM, particularly during the winter and spring, could exceed the CPNM's maintenance and patrolling resources, which could result in a substantial physical deterioration of the CPNM's recreational facilities and amenities.

Switching Stations. The Caliente Switching Station would be constructed during Phase 1 of the CVSR project allowing the proposed CVSR to begin operation as soon as the first tracker systems are deployed and can generate solar power. The Solar Switching Station site would be cleared and graded during the start of the construction period for the Topaz project, and construction of the switching station would begin after site preparation activities were completed. The switching stations would be completed during the first year of installation, allowing the proposed solar projects to begin operation as soon as the solar modules are deployed and can generate solar power.

Reconductoring. Reconductoring work, including tower replacement and modification construction would be completed primarily by PG&E employees. Some work is likely to be contracted, including helicopter and crane operations, foundation construction, specialty transport, grading, and earth work. The construction activities related to this project are expected to take approximately 20 months to complete.

The maximum estimated number of personnel required for construction labor is approximately 50 individuals. These individuals would either reside in the surrounding area or be housed temporarily in the vicinity of the transmission line. It is anticipated that the majority of temporary housing for personnel would be located in Bakersfield, Kern County. Therefore, temporary workers would not be expected to increase the use of camp sites in the Carrizo Plain National Monument, resulting in a less-than-significant impact.

Impact R-4: Construction or operation and maintenance activities would change the character of a recreational area or program, diminishing its recreational value

As discussed above under aesthetic resources, all changes in the visual environment related to reconductoring would occur to an existing transmission line and would be minor. The Caliente and Solar Switching Stations would be located on the north side of Highway 58 and would not be visible from the CPNM. These visual changes would not diminish the character of the CPNM, which is located seven miles away, or of Buttonwillow Park, which occurs in a landscape with a predominantly industrial character. There would therefore be no impact on the character of a recreational facility as a result of reconductoring work.

Impact R-5: Construction or operation and maintenance would result in the degradation or loss of designated wilderness lands or a wilderness study area

The transmission line and switching stations do not pass through or in the vicinity of any wilderness land or wilderness study area. The nearest wilderness study area is over 17 miles from the transmission line, and the transmission line would not be visible from the wilderness study area. There would therefore be no impacts on wilderness or wilderness study areas as a result of reconductoring work.

3.11 Noise

Environmental Setting

Transmission lines can generate a small amount of sound energy during corona activity. The audible noise tends to be faint in fair weather conditions on higher voltage lines. During wet weather conditions, water drops collect on the conductors and increase corona activity so that a crackling or humming sound may be heard near the line. This noise is caused by small electrical discharges from the water drops.

There are two structures that are potentially occupied residences within 1,000 feet of the existing transmission line at MP 0.6 and MP 1.2 in the Carrizo Plain. There are an additional 21 structures that are potentially occupied residences within 2,000 feet of the existing transmission line between MP 25 and MP 32.5 in the San Joaquin Valley. The nearest potential residence at MP 0.6 is located within 100 feet of the ROW.

The Solar Switching Station would be located north of the existing PG&E transmission line corridor within the Topaz Project boundary, approximately 1 mile north of Highway 58. The nearest residence to the switching station (APN 072-301-003) would be over 3,500 feet southwest of the proposed site. In addition, two occupied residences would be between 4,500 and 5,250 feet northeast of the Solar Switching Station (APNs 072-051-026 and 072-061-030, respectively) and in close proximity to the reconductoring activities in the existing ROW as well. The Caliente Switching Station sites alternatives would be located approximately 2 miles north of Highway 58 and the nearest residence to the switching station would be more than 2 miles away (APN 072-111-033).

Environmental Impacts

Impact NS-1: Construction noise would substantially disturb sensitive receptors and violate local rules, standards, and/or ordinances

Short-term construction noise would occur from the use of equipment for reestablishment of roads, tower replacement, tower raises, conductor installation, switching station construction, and site

restoration. The duration of construction would last for 20 months. The reconductoring work would be distributed over a 35-mile distance, minimizing the duration of construction noise-related impacts to each sensitive receptor in the vicinity of the transmission line. The switching station sites are 1 to 2 miles from the nearest receptors. The Caliente Switching Station would be cleared, graded and constructed during Phase 1 of CVSR project construction. The switching station would be completed during the first year of installation, allowing the proposed CVSR to begin operation as soon as the first tracker systems are deployed and can generate solar power. The Solar Switching Station site would be cleared and graded during the start of the construction period for the Topaz project, and construction of the switching station would begin after site preparation activities were completed. The switching stations would be completed during the first year of installation, allowing the proposed solar project to begin operation as soon as solar modules are deployed and can generate solar power.

Several APMs would reduce construction noise-related impacts. APM NO-1 would require compressors and other small stationary equipment to be shielded with portable barriers in proximity to residential areas. APM NO-2 would encourage the use of equipment with noise-control features. APM NO-3 would direct equipment exhaust stacks away from buildings. APM NO-4 would route traffic away from residential areas. APM NO-5 would ensure that residents are notified of the timeframe of construction activities. Implementation of these APMs would reduce construction noise-related impacts to less than significant levels.

Impact NS-2: Construction activity would temporarily cause groundborne vibration or groundborne noise

Construction activities would result in some minor amounts of groundborne vibration resulting from the use of large construction equipment and haul trucks; however, such groundborne noise or vibration would attenuate rapidly from the source and would not be perceptible outside of the construction areas.

Switching Stations. There are no potential receptors near the switching station sites. Therefore, this would be a less than significant impact at the switching station sites.

Reconductoring. Reconductoring work is not anticipated to require blasting or impact-pile driving that could cause vibration impacts at close distances; in the unlikely event that blasting or impact-pile driving occurs, it would be limited to the mountainous Temblor Range area, which supports no residences in the vicinity of the transmission line. As such, no sources of groundborne vibration or groundborne noise would be expected to affect receptors outside of the work areas, and impacts related to groundborne vibration and noise would be less than significant.

Impact NS-3: Permanent noise levels would increase due to operation of project-related stationary noise sources

Switching Stations. Two switching stations would be built as part of the reconductoring project: the Caliente Switching Station at the CVSR project site and the Solar Switching Station at the Topaz project site. No notable noise sources would be associated with the Caliente Switching Station. For comparison to the substation, the noise levels of a large transformer would be approximately 40 dB Leq at 200 feet (SunPower, 2009a). Such noise levels would not only be low but would be generated over a mile away from any residences. Therefore, a less than significant increase in the permanent noise levels of the project area would result from operating the Caliente Switching Station.

For the Solar Switching Station, noise levels associated with the switching station would be associated with the breakers, which are estimated to produce maximum continuous noise levels of 79.6 dBA Leq at

3 feet or less than 45 dB Leq at 200 feet (PG&E, 2010). The maximum impulse noise level from the breakers would be approximately 105.1 dB Lmax at 50 feet (PG&E, 2010) and would generally occur when a breaker gets thrown, which occurs infrequently. In the instance of a breaker being thrown, an instantaneous maximum noise level of 68.4 dB Lmax would occur at a distance of 3,400 feet. The County's maximum impulsive noise limits for stationary noise sources are 65 dB during daytime and 60 dB at nighttime. However, the noise level at the nearest residence, which is greater than 3,500 feet away, would be lower. In addition, breaker operation is infrequent, occurring during emergency operations, testing, or maintenance events. Because of the distance to the nearest residence, the infrequency of breaker operation, and the nature of the noise as a sing impulse even rather than a repeated or extended noise event, the impact from breaker operation would be less than significant.

Reconductoring. Using computer modeling software developed by the Bonneville Power Administration (BPA)(BPA, 1977), audible noise values can be calculated for transmission lines experiencing corona activity. This modeling indicates that, during wet weather conditions, audible noise levels of approximately 46.6 to 49.6 A-weighted decibels (dBA) would occur within the ROW for a similar transmission line loop operating at 230 kV. These calculated levels are below the U.S. Environmental Protection Agency (EPA) outdoor activity noise guideline of 55 dBA and are similar to the range of audible noise levels measured in general rain conditions (41 to 63 dBA) (EPA, 1974; Institute of Electrical and Electronics Engineers, 1974; Miller, 1978). Under fair weather conditions, the calculated audible noise levels of approximately 21.6 to 24.6 dBA within the ROW for a similar transmission line loop operating at 230 kV are below the sound level for a library (35 dBA). Audible noise decreases with increasing distance away from the ROW. This level of corona noise exists under current baseline conditions, and it is not anticipated that additional noise impacts related to the corona effect would occur for the reconductoring project. Any increase in corona noise would be very small and would be less than significant.

Impact NS-4: Routine inspection and maintenance activities would increase ambient noise levels

Switching Stations. The two switching stations would require maintenance, extending the duration of inspection and maintenance activities over time. Nonetheless, inspection and maintenance activities would be minimal and would not result in an increase in the ambient noise level in the vicinity of the switching stations. Noise impacts related to inspection and maintenance activities would therefore be less than significant.

Reconductoring. Routine inspection and maintenance of the transmission line occur under existing baseline conditions, and these activities would not increase with transmission line reconductoring. The reconductoring work would extend the useful lifetime of the transmission line, extending the duration of inspection and maintenance activities over time. Nonetheless, inspection and maintenance activities would be minimal and would not result in an increase in the ambient noise level in the vicinity of the transmission line. Noise impacts related to inspection and maintenance activities would therefore be less than significant.

3.12 Population and Housing

Environmental Setting

Reconductoring work and construction of the switching stations would be carried out primarily by PG&E employees, and the contracted workforce would be minimal, with a maximum estimated number of personnel required for construction labor at 50 individuals. These individuals would either reside in the

surrounding area, or be housed temporarily in the vicinity of the transmission line. It is anticipated that the majority of temporary housing for personnel would be located in Bakersfield, western Kern County. Bakersfield has a 7 percent housing vacancy rate with 8,173 vacant homes (US Census Bureau, 2008).

Environmental Impacts

Impact PH-1: Project labor force requirements would create a substantial demand for labor or a change in local employment

Switching Stations and Reconductoring. Reconductoring work and construction of the switching stations would be carried out primarily by PG&E employees, and the contracted workforce would be minimal. The total peak construction workforce would be approximately 50 persons. Reconductoring would therefore create a minimal demand for labor and would have a less than significant impact on local employment.

Impact PH-2: Construction workers would require housing that exceeds the supply of local housing or temporary housing facilities

Switching Stations and Reconductoring. As described above reconductoring work and construction of the switching stations would be carried out primarily by PG&E employees, and the contracted workforce would be minimal. The maximum estimated number of personnel required for construction labor is approximately 50 individuals. These individuals would either reside in the surrounding area, or be housed temporarily in the vicinity of the transmission line. It is anticipated that the majority of temporary housing for personnel would be located in Bakersfield, western Kern County. Bakersfield has 8,173 vacant homes, which is vastly greater than the small number of individuals that may require temporary housing as a result of the reconductoring work. Reconductoring would therefore have a less-than-significant impact on local housing.

Impact PH-3: Presence of the project would decrease property values

Switching Stations and Reconductoring. Because all work would occur on existing transmission lines, there would be no potential for the reconductoring work to affect property values in the vicinity of the line. Only a single property is located within 1,000 feet of the ROW or switching stations. From the vantage point of this property, aesthetic impacts would be less than significant due to the low degree (20 feet) of visual change in tower height (see Section 3.2). Impacts to property values would not occur .

3.13 Public Services, Utilities, and Service Systems

Environmental Setting

Physical impacts to public services, utilities, and service systems are usually associated with population in-migration and growth in an area, which increase the demand for a particular service, leading to the need for expanded or new facilities. Service providers serving the area of the transmission line and switching stations are located within San Luis Obispo and Kern Counties. Therefore, the study area for the public services analysis is comprised of these two counties.

Public Services

Police Protection

The existing transmission line to be reconductored is located within the San Luis Obispo County Sheriff's and the Kern County Sheriff's jurisdiction. The Sheriff's departments provide service to the unincorporated areas of San Luis Obispo County and Kern County, respectively. The switching stations would both be located in San Luis Obispo County. The San Luis Obispo Sheriff's Department is located at 1585 Kansas Avenue, San Luis Obispo, CA. There are approximately 159 sworn personnel within the Department, which provides service to the unincorporated areas of San Luis Obispo County (CESF, 2007). The Kern County Sheriff's Department is located at 1350 Norris Road, Bakersfield, CA. There are approximately 1,330 sworn and civilian employees within the Department, which provides service to unincorporated areas of Kern County (KCSO, 2010).

The California Highway Patrol (CHP) is the primary law enforcement agency for state highways and roads. The CHP divisions covering highways within the project area are the Coastal Division at 675 California Boulevard, San Luis Obispo, CA and the Central Division at 5179 North Gates Avenue, Fresno, CA. The CHP Coastal Division has 530 uniformed officers and the Central Division has 667 uniformed officers (CESF, 2007; CHP, 2010).

Fire Protection

The California Department of Forestry and Fire Protection (Cal Fire) functions as the San Luis Obispo County Fire Department (SLCFD) under a contract with the County of San Luis Obispo. The SLFCD operates with approximately 180 full-time State employees, supplemented by up to 100 State seasonal fire fighters, 300 County paid-call and reserve fire fighters, and 120 State inmate fire fighters. Additionally, SLCFD contracts services to towns of Los Osos and Avila Beach. Cal Fire also provides service to the City of Pismo Beach, and during the non-fire season, to the town of Cayucos (Cal Fire, 2010).

The Kern County Fire Department (KCFD) provides fire protection services for unincorporated areas of Kern County and some cities. The KCFD operates with approximately 625 permanent employees, supplemented by up to 79 civilian personnel, and 100 extra help. Over 546 uniformed firefighters are stations in 46 fire stations through Kern County, including in Buttonwillow (KCFD, 2010). The nearest fire stations to the reconductoring length of the transmission line include the Buttonwillow fire station (Station 25), the McKittrick fire station (Station 24), and the Wasco Station (Station 31).

Schools

There are four unified school districts within San Luis Obispo County: Paso Robles Unified School District, Shandon Unified School District, Atascadero Unified School District, and New Cuyama School District (CESF, 2007). There are three unified elementary school districts and two high school districts within the regional setting in Kern County: Buttonwillow Union School District, Belridge Elementary School District, McKittrick School District, Kern Union High, and Taft Union High (Kern County, 2010a).

Hospitals

There are three hospitals that are located within 60 miles of the Carrizo Plain in San Luis Obispo. Twin Cities Hospital, with 84 beds, is approximately 55 miles from the project site. Twin Cities Hospital has a 24-hour emergency department and is the priority hospital for ambulance and air transport. This hospital is located at 1100 Las Tablas Road in Templeton.

French Hospital Medical Center, with 112 beds, is approximately 50 miles from the projects site. French Hospital Medical Center has an ICU department, 24-hour emergency department, and a helipad for air transport. French Hospital Medical Center is located at 1911 Johnson Avenue in San Luis Obispo.

Sierra Vista Regional Medical Center is approximately 50 miles from the Carrizo Plain and has 165 beds. Sierra Vista Regional Medical Center has a 24-hour emergency room as well as an ICU department. This hospital is located at 1010 Murray Avenue in San Luis Obispo (CESF, 2007).

A number of hospitals are located in Bakersfield, Kern County approximately 25 miles east of Buttonwillow. Bakersfield Memorial Hospital has a 24-hour emergency department. It is located at 420 34th Street.

Mercy Hospital has 272 beds and is approximately 25 miles east of the western end of the reconductoring project. Mercy Hospital has full-service acute care and a 24-hour emergency department. It is located at 2251 Truxtun Avenue.

San Joaquin Community Hospital, also in Bakersfield, has 255 beds and an emergency department. It is located at 2615 Chester Avenue.

Utilities and Service Systems

A variety of local purveyors in San Luis Obispo and Kern Counties provide and maintain utility and service system facilities associated with electricity, water, stormwater and wastewater, solid waste, and natural gas. Municipally operated lines provide sewer services in the area. Similarly, stormwater flows are conveyed by the flood control facilities within the City of Corona. Underground Service Alert (also known as USA or "Dig Alert"), a non-profit organization supported by utility firms, provides specific information on the location of underground utilities to contractors upon request, prior to construction. Table Ap.4A-15 summarizes the utilities providers serving the Project area. Table Ap.4A-16 describes the solid waste capacity of landfills serving San Luis Obispo and Kern Counties.

Table Ap.4A-15. San Luis Obispo and Kern Counties Utility Providers

Natural Gas	PG&E, Southern California Gas Company*
Electricity	PG&E, Southern California Edison
Water	County of San Luis Obispo Public Works Department (San Luis Obispo County); Buena Vista Water Storage District (Kern County); Belridge Water Storage District (Kern County)
Wastewater	County of San Luis Obispo Public Works Department (San Luis Obispo County); Buttonwillow County Water District (Kern County); North of the River Sanitary (Kern County)
Telecommunications	Pacific Bell
Solid Waste	San Luis Obispo County: Mid-State Solid Waste & Recycling, Mission Country Disposal, Paso Robles Country Waste, San Luis Garbage, San Miguel Garbage, South County Sanitary Services Kern County: American Refuse, Westside Waste Management

Source: County, 2010b; County, 2010c; WAKC, 2009; Kern County, 2010b.
*El Paso Natural Gas and Kern River Gas Transmission Line own natural gas pipelines in Kern County; however, these lines do not serve and would not be expected to serve the project.

Table Ap.4A-16. Solid Waste Capacity

Facility Name	Total Capacity (cubic yards)	Remaining Capacity (cubic yards)	Remaining Capacity	Maximum Throughput (tons per day)
Cold Canyon Landfill	10,900,000	2,800,000	26%	1,200
Chicago Grade Landfill	8,950,220	8,329,699	93%	500
Paso Robles Landfill	6,495,000	5,327,500	82%	450
Shafter-Wasco Landfill	11,635,500	7,901,339	68%	888
Taft Landfill	8,787,547	6,679,433	76%	419

Source: CalRecycle, 2010a; CalRecycle, 2010b; CalRecycle, 2010c; CalRecycle, 2010d; CalRecycle, 2010e.

Environmental Impacts

Impact PS-1: Project construction and operation would place demands on public services

Switching Stations and Reconductoring. Project construction would occur over the course of 20 months, requiring a maximum workforce of 50 workers per month. Reconductoring work and switching station construction would be carried out primarily by PG&E employees, and the contracted workforce would be minimal. At this time, the number of PG&E employees that would come from within San Luis Obispo and Kern Counties is unknown; however, it is reasonable to assume that the majority of the workforce would come from the PG&E employees within San Luis Obispo and Kern Counties. As such, few if any workers would temporarily relocate to accommodations within San Luis Obispo and Kern Counties for the duration of construction activities. A minor increase in the workforce in San Luis Obispo and Kern Counties would have minimal effect on public services and facilities in the overall region.

No additional full-time staff would be required during operations of the reconductored line or switching stations. Maintenance of the reconductored line and switching stations is not expected to change from what is currently required.

Fire Protection

Switching Stations and Reconductoring. The influx of up to 50 workers to the Carrizo Plain would increase the area population and result in new demands on public services for the duration of construction activities. The demands would be spread throughout the 34-mile region of the reconductoring work and would not be focused at one specific site, except for at the two switching station sites for a temporary period. For the majority of the reconductoring work, construction activities are not anticipated to increase the demand for fire protection services in a way that would result in the need for new or altered facilities; however, the limited capabilities of the existing fire protection services in San Luis Obispo County in the immediate vicinity of the Carrizo Plain are inadequate to respond to emergencies along the portion of the transmission line near the CVSR and Topaz solar projects. Currently, the nearest fire station located on Soda Lake Road is staffed only three days per week. Worker commute traffic and construction and operational activities along the portion of the transmission line in San Luis Obispo County would increase the potential for accidents, fire, or other medical emergencies. Additionally, the remote nature of the project site and the type of fire equipment stationed at the Soda Lake Road facility limits the ability of Cal Fire/San Luis Obispo County Fire Department or other emergency medical services to adequately respond to incidents in the area.

While transmission lines can start fires due to conductor failure, the reconductoring of an existing transmission line would not create an additional risk above the existing risk levels. Much of the recon-

ductoring route is in farmland; the remainder of the route is in dry landscape with sparse vegetation. The switching stations would maintain vegetation clearance of 100 feet around the perimeter of the fenceline in accordance with California Public Resources Code 4291. This would reduce any risk of wildfire as a result of ignitions at the switching stations to less than significant.

APM HM-6 requires the Applicant to prepare and submit a Fire Prevention and Response Plan to the CPUC and local fire protection authorities for notification that would include fire protection and prevention methods for all components of the project during construction and would reduce the risk of fire and burden to the San Luis Obispo County Fire Department. In addition, in APM BO-1, PG&E commits to minimization of fire hazards. With the incorporation of these two APMs, the impact would be considered adverse, but less than significant.

Police Protection

Switching Stations and Reconductoring. The San Luis Obispo and Kern Counties Sheriff's Departments provide police protection along the transmission line reconductoring route and surrounding area. The response time for the San Luis Obispo County Sheriff's Department to the portion of the route in San Luis Obispo County is 35 to 40 minutes. The Kern County Sheriff's Department Station is located in Buttonwillow, from less than 1 mile to up to 25 miles from the transmission line. Construction activities are not anticipated to increase the demand for police protection services in the area. The construction and operation of the reconductored line and switching stations would neither result in a need for additional police facilities nor affect response times or other service performance.

Schools

Switching Stations and Reconductoring. Construction activities would require few if any temporary workers to relocate to the study area. Additionally, it is unlikely that the workers would also relocate their children for this period. Therefore, the temporary addition of construction workers to the study area's population is not anticipated to increase school enrollment. No full time employees would be required during the operation of the line. As such, there would be no additional children relocated to the study area.

Impact PS-2: Project construction and operation would place demands on local water, wastewater, and solid waste facilities

Switching Stations and Reconductoring. As described for Impact PS-1, reconductoring and switching station work is unlikely to result in a population increase to the study area. Therefore, increased population as a result of project construction or operation would not substantially increase demands on water, wastewater, or solid waste facilities.

Water would be used for dust suppression, fire control, and other construction purpose during construction of the transmission reconductoring and switching stations. Reclaimed water would be used whenever possible. Portable toilets brought to staging areas for construction crews would be emptied into septic tanks or municipal sewage systems. Water required for consumption by construction crews would be minimal. Only minor amounts of water would be required during operation of the transmission line and switching stations for routine insulator washing maintenance, and this would only occur above baseline conditions to the extent that reconductoring increases the useful lifetime of the transmission line and the switching stations would introduce new components, slightly increasing the duration and extent of washing activities over the long term. Therefore, impacts of reconductoring the transmission line and switching station construction on water and wastewater system would be less than significant.

Solid waste generated during construction would include debris such as old insulator strings, towers requiring replacement (assumed at 10 percent), and concrete, plastics, scrap metal, and similar material. Soils from drilling, trenching, or excavation would be screened and separated for use as backfill at the site of origin to the maximum extent possible. Waste generated during construction would be hauled to nearby landfills or an approved transfer or recycling station. As stated above, once the old conductors and insulators are removed, they would be recycled or disposed of in an appropriate landfill facility. In accordance with San Luis Obispo County's construction debris demolition and recycling program, at least 50 percent of the project waste (by weight) would be recycled.

The Applicant has stated that during construction, solid waste would be removed and recycled or disposed of in appropriate facilities. Consequently, impacts associated with solid waste disposal would be less than significant.

Impact PS-3: Project construction or operation would substantially affect the amount of County property tax revenues and/or fees

Switching Stations and Reconductoring. The transmission reconductoring would occur along an existing ROW, and would require minimal new structures. The Caliente and Solar Switching Stations would be constructed adjacent to the existing ROW. The project would not require the removal of any existing business and would create a minimal impact to existing businesses due to the remote location of the transmission line and switching stations.

Petroleum extraction activities and agricultural operations occur within and adjacent to the ROW. Impacts to petroleum activities are considered less than significant because no construction impacts would result in a loss of petroleum extraction operations and would be short-term at any one location.

Reconductoring work would temporarily restrict crop production or damage crops if activities occurred during the growing season. APM LU-1 would ensure avoidance of harvest and planting periods where and whenever possible and provide compensation to landowners for crop loss and other reasonable costs after completion of construction. Because of the minimal amount of land that would be disturbed, the short duration of the impact, and because this impact would not result in significant revenue impacts, it is considered adverse but less than significant.

Employment of construction personnel would be beneficial to local businesses and the regional economy through increased expenditure of wages for goods and services. Contractor personnel would be drawn from local populations in San Luis Obispo and Kern Counties, creating new temporary employment in these counties. Construction personnel would purchase food, beverages, and other commodities, which would provide economic benefit to the local economy.

3.14 Transportation and Circulation

Environmental Setting

The section of the Morro Bay–Midway 230 kV transmission line to be reconductored generally parallels Highway 58 immediately north of the proposed CVSR and proposed Topaz solar project until it reaches the Midway Substation. The Caliente and Solar Switching Stations would both be located north of Highway 58. The reconductoring project begins approximately 32 miles east of U.S. 101 and ends approximately 2.7 miles west of I-5, crossing Highway 33 (West Side Highway), and is located approximately 18 miles south of Highway 46.

Regional roadways that may be accessed by construction include U.S. 101, I-5, and Highways 41, 46, 58, and 33. Shell Creek Road and Bitterwater Road may also be used for access to the reconductoring site. Operational traffic would be minor. Roadways in this region fall under the jurisdiction of the California Department of Transportation (Caltrans) District 5, Caltrans District 6, the County of San Luis Obispo, the County of Kern, and the California Highway Patrol (CHP).

Existing roadway and traffic conditions of the roadways expected to be used by project-related construction traffic are presented below. The discussion of roadways is based on information obtained from the San Luis Obispo County Department of Public Works, the County of San Luis Obispo Transportation Plan, the Kern County General Plan, and Caltrans.

Existing Roadway Network

Highway 101

Highway 101 is a north/south freeway extending in California from Los Angeles to the Oregon border. Highway 101 is west of the reconductoring project and has four lanes in each direction with interchanges at Highways 46 and 58.

Highway 58

State Highway 58 is an east/west state highway that extends from U.S. 101 north of San Luis Obispo to Barstow. In the project region, Highway 58 is a moderately curvy two lane highway with lane widths that vary from 10 to 12 feet. The roadway has portions of unpaved shoulders that vary from good condition to being overgrown with vegetation. The portion of roadway between Soda Lake Road and Seven Mile Road has many dips. From San Luis Obispo to the Kern County line to the east, Highway 58 has shoulders of zero to two feet on rolling terrain with moderate to steep grades and sharp turns (Caltrans, 2003). From the Kern County line east to I-5, Highway 58 is a two-lane conventional highway with lane widths of 9 feet to 12 feet and shoulder widths of zero feet over mountainous terrain, except for the section in Buttonwillow where it is a 4-lane conventional highway (Caltrans, 2004).

Highway 58 is designated as a State truck route as well as a California Legal Advisory Route with an advisory for kingpin-to-rear axle (KPRA)[4] length to be less than 30 feet. This advisory means that travel on this route by trucks with a KPRA length of 30 feet or more is not advised. This advisory applies to the portion of Highway 58 located between Highway 229 (west of the reconductoring) and Highway 33. Additionally, motor homes and motor coaches (buses) over 40 feet in length are prohibited on Highway 58 between Highway 229 and Highway 33 (Caltrans, 2005).

Highway 46

Highway 46 is an east/west state highway that extends from U.S. 1 in Cambria to Highway 99 north of Bakersfield and intersects I-5. In the project area, Highway 46 is a two lane highway with a posted speed limit of 55 mph. The lane width varies from 10 to 12 feet, with paved and unpaved shoulders. Pavement condition is generally good. Passing lanes are present along portions of roadway. Turn-outs occur approximately every one to two miles.

[4] KPRA (kingpin-to-rear-axle) length is the distance between the rear axle of the trailer and the point at which the trailer connects to the back of the semi tractor.

Highway 41

Highway 41 is an east/west state highway that extends from Highway 1 in Morro Bay to State Route 140 in Mariposa County. In the project region, Highway 41 junctions with Highway 46 near San Juan Road. Highway 41 is a two lane highway with a posted speed limit of 55 mph. The lane width varies from 10 to 12 feet, with paved shoulders. Pavement condition is generally good. No passing lanes are present along this portion of roadway.

Highway 33

Highway 33 (West Side Highway) is a north/south state highway that extends from Highway 101 near the City of Ventura to State Route 5 southeast of Tracy in San Joaquin County. In the project region, West Side Highway junctions with Highway 58. West Side Highway is a two lane highway with a posted speed limit of 55 mph. The lane width varies from 11 to 12 feet and shoulders are very narrow. Pavement condition is generally good. No passing lanes are present along this portion of roadway.

Lokern Road

Lokern Road is a Kern County Road that extends from west of Lost Hills to Highway 58. Pavement condition is fair to poor.

Bitterwater Road

Bitterwater Road is a San Luis Obispo County Road that extends south from Highway 46 to Highway 58 west of the project site. The total roadway width varies from 20 to 24 feet and has portions of unpaved shoulders in fair condition. The southern portion of the roadway has a yellow center line stripe which separates travel lanes. No posted speed limit is present along the roadway, except at curves. Pavement condition is fair to poor. Seven cattle guards are present across the roadway.

Shell Creek Road

Shell Creek Road is a San Luis Obispo County Road that extends south from San Juan Road to Highway 58 west of the project site. The roadway varies from 18 to 20 feet in width, with portions of unpaved shoulders in poor condition, and has some gentle curves. The roadway is occasionally closed due to flooding. Pavement condition is generally poor. Two cattle guards are present across the southern portion of the roadway.

San Juan Road/Sweetwater Road

San Juan Road/Sweetwater Road is a San Luis Obispo County Road that extends from Highway 46 in Shandon to Highway 58 west of the project site. The roadway has some gentle curves and varies in width from 20 to 24 feet, with portions of an unpaved shoulder in poor condition. Approximately 120 feet of the northern portion of the roadway is unpaved. The roadway is occasionally closed due to flooding. Pavement condition is generally poor.

Table Ap.4A-17. Existing Roadway Segment Traffic Volumes and Level of Service (LOS)

Roadway Segment	Traffic Volume (both directions)			Percent of Truck Traffic (daily)	LOS
	Daily	AM	PM		
Highway 58: West of Shell Creek Road	825	67	72	21.3	B
Highway 58: Shell Creek Road to Project Entry Road	780	62	68	21.3	A
Highway 58: Project Entry Road to Hwy 33	350	28	30	21.3	A
Highway 33: North of Highway 58	1,800	NA	NA	26	C
Highway 33: South of Highway 58	2,900	NA	NA	33	C
SR 46: West of Hwy 41 (West Junction)	12,000	931	1,129	17	D
SR 46: East of Hwy 41 (West Junction)	7,700	595	672	21.6	D
San Juan Road/Shell Creek Road	383	57	52	NA	A
Lokern Road (East of Lost Hills Road)	430	NA	NA	NA	NA
Bitterwater Road	48	9	9	NA	NA

Source: Fehr & Peers, 2010; Caltrans, 2007.

Existing traffic volumes on roadway segments in the project site vicinity are shown in Table Ap.4A-17.

Transit and Rail Service

A Southern Pacific Railroad line passes through the ROW at MP 34.9. Highway 58 and Highway 41 are used by school buses servicing the Atascadero Unified School District (USD). Currently for the 2009-2010 school year, Atascadero USD bus Routes 4, 5, and 7 travel along portions of either Highway 58 or Highway 41, although, the schedule and routes are subject to change each year (AUSD, 2010). Highway 33 is used by school buses servicing the Taft Union High School District in the vicinity of Taft, south of the reconductoring region (TUHSD, 2010).

Route 4. This bus travels along westbound Highway 58 for approximately 40 miles each weekday morning and makes several stops on Highway 58 between Soda Lake Road (4 miles west of the project site) at 6:19 AM and Shell Creek Road at 6:55 AM, arriving at Atascadero Junior High School at 7:35 AM. The bus travels the reverse route on eastbound Highway 58 in the afternoon, departing Atascadero Junior High School at 3:00 PM and arriving Soda Lake Road at 4:40 PM

Route 5. This bus travels along eastbound Highway 58 for approximately 7 miles each weekday morning from Huer Huero Road at 6:10 AM to La Panza Road at 6:20 AM. The bus travels the reverse route in the afternoon from approximately 3:48 PM to 4:00 PM

Route 7. This bus travels along westbound Highway 58 for approximately 3.5 miles each weekday morning from Parkhill Road at 7:09 AM to Santa Margarita Elementary School at 7:15 AM. In the afternoon, the bus travels approximately 1 mile on westbound Highway 58 from Parkhill Road to its last stop at 4:57 PM

Bicycle and Recreation Facilities

Highway 58 is considered a recreational bicycle route within San Luis Obispo County. Class III bike lanes are present from Highway 101 to Pozo Road. Class III bike lanes provide a right-of-way designated by

signs or permanent markings, are shared with pedestrians or motorists, and may or may not provide striped shoulders or a wide curb lane (Caltrans, 2003; SLOCOG, 2005).

There are some Class III lanes where shoulders exist along Highway 58 between Pozo Road and the proposed project site, but shoulders are nonexistent in many areas. Highway 58 is popular with recreational bicycle riders due to the rural setting and relatively low traffic volumes (Caltrans, 2003).

Highway 33 from its District 6 beginning at the San Luis Obispo County Line to its District 6 terminus at the Merced County is opened to bicycle travel (Caltrans, 2007).

Air Transportation

No airports are located within a 2-mile range of the proposed reconductoring. The nearest airports are the California Valley Airport located in California Valley along Soda Lake Road, approximately 4.3 miles south of the closest reconductoring project infrastructure, and the Elk Hills Buttonwillow Airport, located south of Buttonwillow, approximately 2.6 miles south of the closest reconductoring project infrastructure.

Construction and Operational Traffic

The reconductored line would be located north of Highway 58, beginning approximately two miles east of Bitterwater Road at the Solar Switching Station and ending at the Midway Substation approximately 2.7 miles west of I-5. Primary access to the reconductoring region from the west would be from Highway 58 and from the east would be either via I-5 to Highway 58 or from Highway 33 just south of Lokern Road. All construction pull and tension sites would be accessible from existing roads although some existing access roads may require widening.

The reconductoring project would be constructed over a total of approximately 20 months and is expected to begin in March 2011. The Caliente Switching Station would be constructed during Phase 1 of the CVSR project. The switching station would be completed during the first year of installation, allowing the proposed CVSR to begin operation as soon as the first tracker systems are deployed and can generate solar power. The Solar Switching Station site would be cleared and graded during the start of the construction period for the Topaz project, and construction of the switching station would begin after site preparation activities were completed. The switching stations would be completed during the first year of installation, allowing the proposed solar project to begin operation as soon as solar modules are deployed and can generate solar power.

Construction Worker Traffic. The reconductoring would require a maximum construction workforce of 50 workers per day. A variety of construction equipment would be required, as is shown on Table Ap.4A-3. It is expected that the construction workers would be existing PG&E crew.

A helicopter would be used for tower erection at sites located in terrain inaccessible by crane or areas with sensitive resources that would be aggravated by crane-related. Helicopters eliminate land disturbance associated with crane pads, tower site laydown areas, and the trucks and tractors used for steel delivery to structure sites. All construction work in remote work sites would be completed by hand with the assistance of portable compressors, portable hydraulic accumulators, portable concrete mixers, or buckets of ready-mix concrete that would be flown into the tower sites.

Operation Worker Traffic. No operation worker traffic would be required other than for occasional maintenance of the line and switching stations.

Environmental Impacts

The effects of the addition of project-related traffic to the regional roadway system were evaluated along selected roadway segments and intersections. The term LOS (level of service) is used to measure and describe the operational status of the local roadway network. An intersection or roadway segment's level of service can range from LOS A (indicating free-flow traffic conditions with little or no delay), to LOS F (representing oversaturated conditions where traffic flows exceed design capacity, resulting in long queues and delays).

Impact TR-1: Project implementation would increase congestion and travel delays on regional and local roadways or exceed an established level of service standard

Switching Stations and Reconductoring. Construction of the transmission reconductoring would generate additional traffic on regional and local roadways. Construction worker commute trips and equipment and materials deliveries would increase existing traffic volumes in the project area.

Construction would require a maximum of 50 workers. Workers would travel to and from the reconductoring region most likely in personal vehicles or in PG&E vehicles. Most workers would be expected to travel to the transmission line region via eastbound and westbound Highway 58 and PG&E stated it would encourage carpooling to job staging areas to the extent feasible.

Daily approximately 6 to 8 construction-related heavy trucks (including up to 2 tractor-trailer units) and approximately 10 medium size vehicles (assuming an average of 20 workers and up to 2 workers per car) would travel to each reconductoring site. Different locations along the transmission line would be accessed via either Highway 46 to Shell Creek Road to eastbound Highway 58, Highway 33 to Lokern Road, or I-5 to westbound Highway 58. The construction crews generally pull the new conductors through one to five miles of transmission towers at a time. Project traffic would not appreciably alter existing LOS or significantly add to existing traffic on project roadways. Temporary road closures could occur along sections of the line requiring overhead crossings such as along Highway 33. Road closures are expected to be brief. Helicopter operations may require highway or roadway closures. Any necessary encroachment permits would be obtained from the affected agencies.

Significant impacts to Caltrans and County roadways are defined to occur when: (a) the addition of project traffic causes roadway operations to degrade from an acceptable level (LOS C or better) to an unacceptable level (LOS D or worse), or (b) if project-related traffic is added to a roadway operating at an unacceptable level (LOS D or worse). Most of the roadways used to access the reconductoring site are operating at LOC C or higher, as shown in Table Ap.4A-10, above. However, under existing conditions, Highway 46 from Jardine Road to Highway 33 operates at an unacceptable LOS D during the AM and PM peak hours.

Since the roadway segment currently operates at an unacceptable LOS, any addition of traffic by the project is considered significant impact according to Caltrans criteria. While the APM TF-1 would require PG&E to develop a project-specific Traffic Management Plan, it does not require minimizing or avoiding use of Highway 46 to access the reconductoring site during peak hours. As such, APM TF-2 (Prepare and implement traffic control plan) would be required to ensure that any impacts to Highway 46 be reduced to a level that is less than significant.

Impact TR-2: Construction would temporarily disrupt school bus services

Switching Stations and Reconductoring. Construction of the reconductoring would result in increased traffic on Highway 58 and Highway 41 during a portion of the construction. Although school bus routes

and schedules are subject to change each year, there are currently (2009-2010 school year) three school buses from the Atascadero USD that travel these roads in the morning and afternoon to transport students to and from schools in Santa Margarita and Atascadero (AUSD, 2010). Project traffic would result in a minor increase in traffic at any one construction site and would be temporary at each construction site. Project-related traffic would not result in substantial delays to existing roadway traffic. Buses traveling on project haul routes generally would be going in the opposite direction of project traffic flow and at times of day when little project traffic would be on the road. Also, school buses travel along relatively short segments of the project construction routes. Therefore, project-related traffic would not be expected to result in substantial delays to buses operating under the current Atascadero USD bus routes and schedules and the impact would be adverse, but less than significant.

Impact TR-3: Construction would create unsafe conditions on public roadways

Switching Stations and Reconductoring. The reconductoring project would occur primarily along transmission line access roads set back from Highway 58 and Lokern Road and would not include any design features that would result in limited site access or decreased sight lines along the roadways. Additionally, as described above under Impact TR-1 (Project implementation project would increase congestion and travel delays on regional and local roadways or exceed an established level of service standard), project-related construction traffic is not expected to result in substantial delays to existing traffic on any of the roadway segments that would be used by construction traffic. Therefore, construction traffic would not result in substantial delays to emergency service providers or others.

Near the proposed Topaz Solar Project and CVSR sites (from the Solar Switching Station and Caliente Switching Station, respectively), the proposed construction travel route would traverse Highway 58 and Shell Creek Road and would travel directly past the Carrisa Plains Elementary School during the AM peak hour when students are being dropped off at school. All students are picked up and dropped off within the drop-off and pick-up area located on school grounds. Construction traffic would not present a direct safety hazard to students at the school; however, the addition of construction-related traffic driving past the school in during morning peak hours could increase the potential for conflicts between school traffic and construction traffic. Implementation of APM TF-2 (Prepare and implement traffic control plan) would improve traffic safety in the vicinity of the Carrisa Plains Elementary School by requiring the installation of signs in the vicinity of the school to warn drivers (of construction-related vehicles and otherwise) of school-related traffic and by requiring the placement of signage along Highway 58 in general to warn drivers of construction-related traffic. Implementation of this measure would ensure impacts to traffic safety would be less than significant.

The addition of approximately 6 to 8 truck trips per day at each reconductoring location and the switching stations during project construction presents the potential for damage to public roads within the project area. With implementation of APM TF-3 (Repair roadway damage), any road damaged by project construction would be repaired to its pre-project condition to ensure that any damage to local roadways would not pose a safety hazard to motorists and impacts would be less than significant.

Impact TR-4: Project implementation would conflict with adopted policies, plans, or programs supporting alternative transportation modes

There are no pedestrian or public transit facilities in the vicinity of the reconductoring alignment or switching stations. Highway 58 is a designated Class III bicycle route and Highway 33 is open to bicycles; however, implementation of the reconductoring would not adversely affect bicycle traffic. Therefore, the reconductoring would not conflict with adopted polices, plans, or programs supporting alternative transportation.

3.15 Water Resources

Environmental Setting

The existing transmission line to be reconductored and the proposed switching stations are located within the Carrizo Plain groundwater basin from MP 1 to MP 7.5 and the San Joaquin Valley groundwater basin, Kern County sub-basin from MP 17 to MP 35. The transmission line crosses several unnamed agricultural canals, the West Side Canal (Kern River Flood Canal), several unnamed natural drainages, Salt Creek, and Temblor Creek.

Environmental Impacts

Impact WR-1: Substantially deplete local groundwater supplies or interfere with groundwater recharge

Switching Stations and Reconductoring. Groundwater would not be used by the project. The reconductoring and switching station project's minimal water requirements would be satisfied with water tanks brought into the work area from off site. The reconductoring portion of the project would not interfere with groundwater recharge, as construction would take place almost entirely on previously disturbed areas within an existing ROW.

Creation of new impervious surfaces associated with the proposed upgrades could interfere with groundwater recharge by reducing the amount of surface area through which precipitation and surface water percolates to underlying aquifers. Up to 18 acres of new impervious surfaces would result from construction of the Solar and Caliente Switching Stations. Implementation of APM WQ-4 (Install pervious and/or high-roughness groundcover where applicable) would ensure that groundcover for the new switching stations would be comprised of a pervious and/or high-roughness material to reduce infiltration and runoff impacts to a less than significant level. With implementation of APM WQ-4, the proposed upgrades would not substantially deplete local groundwater supplies or the interference with groundwater recharge, and impacts would be less than significant.

Impact WR-2: Substantially alter the existing drainage pattern of the site in a manner that results in flooding on- or off-site

Switching Stations and Reconductoring. The reconductoring work would make use of temporary bridges to span sensitive water crossings and replacement towers would be sited outside of the 100-year floodplain. The two switching stations would not be located within a 100-year floodplain, but they would introduce a small amount of new impervious area. The transmission and switching station components would not significantly alter the existing drainage pattern of the landscape in a manner that could result in flooding.

Impact WR-3: Construction activity and excavation could degrade water quality due to erosion and sedimentation

Switching Stations and Reconductoring. Water quality would be degraded if construction activities, including grading for reestablishing access roads, were to result in erosion during the wet season. Implementation of APM WQ-1/HM-1 would ensure that an environmental training and monitoring program is developed and implemented for all personnel. APM WQ-2 would ensure preparation of a project-specific SWPPP that would specify best management practices (BMP) to minimize erosion and sedimentation. APM WQ-3 would ensure preparation of an Erosion Control and Sediment Transport

Plan (ECSTP) to further minimize erosion and sedimentation. With implementation of these APMs, impacts related to erosion and sedimentation would be less than significant.

Impact WR-4: Creation of new impervious areas could cause increased runoff resulting in flooding or increased erosion downstream

Switching Stations and Reconductoring. The creation of new impervious areas is discussed under Impact WR-1 (Substantially deplete local groundwater supplies or interfere with groundwater recharge). There would be no net gain in impervious surface areas created by the transmission line corridor reconductoring work. Tower replacements, should they occur, would require concrete foundations for footings. These very small impervious surfaces would represent replacements of the existing footings, resulting in no net gain in impervious surface areas.

As discussed under Impact WR-1, construction of the two new switching stations would introduce up to 18 acres of impervious area (up to 9 acres at each switching station). The effect of these project features on site-specific infiltration and runoff rates would vary greatly, depending upon final groundcover. As described in APM WQ-4 (Install pervious and/or high-roughness groundcover where applicable), infiltration rates following project implementation would be maximized through use of high-porous groundcover, thus minimizing runoff. Any changes in runoff that would occur in response to this new impervious area would be localized and temporary and would not have the potential to result in flooding or increased erosion downstream, thus impacts would be less than significant.

Figures for Appendix 4A

Figures for Appendix 4A are included on the CD in the EIR front cover. For printed appendices, the Appendix 4A figures follow this page.

- Figure Ap.4A-1. PG&E Solar-Midway Transmission Upgrades
- Figure Ap.4A-2a. PG&E Solar-Midway Transmission Upgrades – Sheet 1 of 6
- Figure Ap.4A-2b. PG&E Solar-Midway Transmission Upgrades – Sheet 2 of 6
- Figure Ap.4A-2c. PG&E Solar-Midway Transmission Upgrades – Sheet 3 of 6
- Figure Ap.4A-2d. PG&E Solar-Midway Transmission Upgrades – Sheet 4 of 6
- Figure Ap.4A-2e. PG&E Solar-Midway Transmission Upgrades – Sheet 5 of 6
- Figure Ap.4A-2f. PG&E Solar-Midway Transmission Upgrades – Sheet 6 of 6
- Figure Ap.A4-3. Solar Switching Station Preliminary Design
- Figure Ap.4A-4a. Caliente Switching Station
- Figure Ap.4A-4b. Caliente Switching Station Alternatives
- Figure Ap.4A-4c Switching Station Site 3 and M3 Comparison
- Figure Ap.4A-4d Conceptual Grading and Plan Drawing
- Figure Ap.4A-4e Microwave Reflector Location Options
- Figure Ap.4-5. Typical Cage-Top and Fiber Optic Extensions

4. References

Althouse and Meade, Inc (Althouse and Meade). 2009. Biological Report for the Topaz Solar Farm. October 2009.

Arrowsmith, J. R. 1995. "Coupled tectonic deformation and geomorphic degradation along the San Andreas Fault system." PhD Dissertation thesis, Stanford University. [online]: http://activetectonics.asu.edu/carrizo/cargeo.html.

BLM (Bureau of Land Management). 1996. Carrizo Plain Natural Area Plan. November 1996. [online]: http://www.blm.gov/ca/st/en/fo/bakersfield/Programs/planning/cpnm_plan.html. Accessed July 20, 2009.

Bureau of Land Management (BLM). 2007. *Visitor Resources Map - Carrizo Plain National Monument*. Revised April 19, 2007. [online]: http://www.blm.gov/ca/st/en/fo/bakersfield/Programs/carrizo/carrizomap.html. Accessed July 17, 2009.

Cal Fire. 2010. San Luis Obispo County Fire Department. [online]: http://www.calfireslo.org/. Accessed February 3.

California Air Resources Board (CARB). 2007. California 1990 Greenhouse Gas Emissions Level and 2020 Emissions Limit. November.

_____. 2008. Climate Change Scoping Plan, Framework for Change, as Approved December 2008, Pursuant to AB32.

Carrizo Energy Solar Farm (CESF). 2007. Application for Certification to the California Energy Commission [07-AFC-8]. October.

Climate Action Team (CAT). 2006. Climate Action Team and California Environmental Protection Agency. Climate Action Team Report to Governor Schwarzenegger and the Legislature. March.

_____. 2009. Draft Biennial Report. March.

County of San Luis Obispo Air Pollution Control District (APCD). 2009a. CEQA Air Quality Handbook. A Guide for Assessing the Air Quality Impacts for Projects Subject to CEQA Review. December.

County (County of San Luis Obispo). 2010b. Garbage Services. [online]: http://www.slocounty.ca.gov/PW/Franchise_Administration/Garbage_Services.htm. Accessed February 4.

_____. 2010c. Other Franchises. [online]: http://www.slocounty.ca.gov/PW/Franchise_Administration/OtherFranchises.htm. Accessed February 4.

California Highway Patrol (CHP). 2010. CHP Central Division <http://www.chp.ca.gov/depts_divs_offs/401.html> Accessed March 17, 2010.

California Public Utilities Commission (CPUC). 2009. Final Mitigated Negative Declaration and Supporting Initial Study for Pacific Gas and Electric Company's Seventh Standard Substation Project (A.09-03-004). October.

_____. 2010. Cabrillo-Santa Ynez 115 kV Reconductoring Project Initial Study/Mitigated Negative Declaration Draft. January.

CalRecycle. 2010a. Facility/Site Summary Details: Cold Canyon Landfill Solid Waste DS (40-AA-0004). [online]: http://www.calrecycle.ca.gov/SWFacilities/Directory/40-AA-0004/Detail/. Accessed February 2.

_____. 2010b. Facility/Site Summary Details: Chicago Grade Landfill (40-AA-0008). [online]: http://www.calrecycle.ca.gov/SWFacilities/Directory/40-AA-0008/Detail/. Accessed February 2.

_____. 2010c. Facility/Site Summary Details: City Of Paso Robles Landfill (40-AA-0001). [online]: http://www.calrecycle.ca.gov/SWFacilities/Directory/40-AA-0001/Detail/. Accessed February 2.

_____. 2010d. Facility/Site Summary Details: Shafter-Wasco Sanitary Landfill (15-AA-0057). [online]: http://www.calrecycle.ca.gov/SWFacilities/Directory/15-AA-0057/Detail/. Accessed March 18, 2010.

_____. 2010e. Facility/Site Summary Details: Taft Sanitary Landfill (15-AA-0061). [online]: http://www.calrecycle.ca.gov/SWFacilities/Directory/15-AA-0061/Detail/. Accessed March 18, 2010.

California Department of Transportation (Caltrans). 2007. Transportation Concept Report State Route 33. Caltrans District 6 Office of System Planning. March 2007.

_____. 2005. Motorcoach and Motorhome Network Map, District 5. http://www.dot.ca.gov/hq/traffops/trucks/bus-mh/busmap-d05.pdf. Dated October 17, 2005. Accessed August 4, 2008.

_____. 2004. Transportation Concept Report. Caltrans District 6 Office of System Planning. December 2004.

_____. 2003. Transportation Concept Report. Caltrans District 5 Office of System Planning. November 2003.

California Air Resources Board (CARB). 2010a. Current Air Quality Standards. [online] http://www.arb.ca.gov/html/ds.htm. Accessed February.

California Energy Commission (CEC). 2010. California Energy Almanac, California Electrical Energy Generation, 1997 to 2008. [online]: http://energyalmanac.ca.gov/electricity/electricity_generation.. Accessed February 2010.

Dibblee, Jr., T. W. 1973b. "Regional Geologic Map of San Andreas and Related Faults in Carrizo Plain, Temblor, Caliente, and La Panza Ranges and Vicinity, California." U.S. Geological Survey Miscellaneous Geologic Investigations Map I-757.

EDR (Environmental Data Resources, Inc.). 2010. EDR DataMap Area Study: Solar Project +, San Francisco, CA. Inquiry Number: 02724731.1r. March 22.

Engeo Incorporated. 2008. "Geotechnical Exploration, PG&E California Valley Solar Ranch, San Luis Obispo County, California." October 3.

EPA (U.S. Environmental Protection Agency). 1974. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. No. 550/9-74-004, Washington, D.C.

Fehr & Peers. 2010. California Valley Solar Ranch Transportation Assessment. March 5.

Geotracker. 2010. State Water Resources Control Board Geotracker. <https://geotracker.waterboards.ca.gov/> Accessed May, 2010.

Glassow, M. A. 1996. *Purisimeño Chumash Prehistory: Maritime Adaptations along the Southern California Coast. Case Studies in Archaeology.* Harcourt Brace College Publishers, New York.

Grant Ludwig, L., Akciz, S., Noriega, G., Zielke, O., and Arrowsmith, J. R. 2010. "Climate-Modulated Channel Incision and Rupture History of the San Andreas Fault in the Carrizo Plain." Science, Vol. 327, p. 1117-1119. February 26.

Hildebrandt, W. R., K. R. McGuire, and J. S. Rosenthal. 2009. "Human Behavioral Ecology and Historical Contingency: A Comment on the Diablo Canyon Archaeological Record." *American Antiquity* 74, in press.

ICF (ICF International). 2010. Biological Resources Report for the Carrizo to Midway Reconductoring Project and Addendum. Prepared by ICF International. Prepared for Pacific Gas and Electric Company. May 2010.

Institute of Electrical and Electronics Engineers. 1974. *Psychoacoustics- Proceedings of a Workshop*, No. 74CHO967-0-PWR.

Intergovernmental Panel on Climate Change (IPCC). 2007. Climate Change 2007: Synthesis Report, the Fourth IPCC Assessment Report. May.

Jones, T. L. 1995. *Transitions in Prehistoric Diet, Mobility, Exchange, and Social Organization along California's Big Sur Coast.* Unpublished Ph.D. dissertation, University of California, Davis.

Jones, T. L., and K. A. Klar. 2007. *California Prehistory, Colonization, Culture, and Complexity* edited by T. L. Jones and K. A. Klar. AltaMira Press, New York.

Jones, T. L., K. Davis, G. Farris, S. D. Grantham, T. W. Fung, and B. Rivers. 1994. "Toward a Prehistory of Morro Bay: Phase II Archaeological Investigations for the Highway 41 Widening Project, San Luis Obispo County, California." On file Caltrans, District 5. San Luis Obispo, California.

Kern County. 2004. Guidelines for Preparing an Air Quality Assessment for use in Environmental Impact Reports. <http://www.co.kern.ca.us/planning/pdfs/AirQualityAssessmentPreparationGuidelines.pdf> Accessed May, 2010.

Kern County Fire Department (KCFD). 2010. Department Profile <http://www.kerncountyfire.org/about.php> Accessed March 17, 2010.

Kern County Sheriff's Office (KCSO). 2010. Sheriff's Office <http://www.kernsheriff.com/Pages/default.aspx> Accessed March 17, 2010.

Kern County. 2010a. Kern County School District Maps. <http://kcsos.kern.org/Research/Data/Gis/MapGallery> Accessed March 17, 2010.

Kern County. 2010b. Kern County Online Mapping System. <http://maps.co.kern.ca.us/imf/sites/krn_pub/launch.jsp> Accessed March 18, 2010.

King, C. 1990. *The Evolution of Chumash Society: A Comparative Study of Artifacts used in Social System Maintenance in the Santa Barbara Channel Region before AD 1804*. Garland Publishing, New York.

Lichtenstein, Robert, Randy Baloian, Damon Haydu, and Barry A. Price. 2010. Cultural and Paleontological Resources Investigations for the Proposed Topaz Solar Farm, California Valley, San Luis Obispo County. April.

Miller, L.N. 1978. *Sound Levels of Rain and Wind in the Trees*, Noise Control Engineering, Vol. 11, No. 3, pp. 101-109, November/December.

Mills, W., M. F. Rondeau, and T. L. Jones. 2005. "A Fluted Point from Nipomo, San Luis Obispo County, California." *Journal of California and Great Basin Anthropology* 25(2):214-220.

National Institute of Environmental Health Sciences. 1999. Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields. NIH No. 99-4493.

NRCS, 2010. National Resources Conservation Service – Web Soil Survey. [online]: http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx. Accessed March 2, 2010.

PG&E (Pacific Gas and Electric Company). 2007. PG&E's San Joaquin Valley Operations and Maintenance Multi-species Habitat Conservation Plan. December.

PG&E (Pacific Gas and Electric Company). 2010. PG&E Solar-Midway 230 kV Transmission Line Upgrades Environmental Data and Reports. January-June 2010.

San Joaquin Valley Air Pollution Control District (SJVAPCD). 2009. Ambient Air Quality Standards and Valley Attainment Status. http://www.valleyair.org/aqinfo/attainment.htm. Accessed June 24.

San Luis Obispo County. 2002. http://www.sloplanning.org/gis/mapimagepdf/Fairy_Shrimp_Crit_Hab.pdf Accessed March 10, 2010.

San Luis Obispo County (County). 2010. California Valley Solar Ranch Project Environmental Impact Report. May 2010.

Scharer, K. 2010. "Changing Views of the San Andreas Fault." Science, Vol. 327, p. 1089-1090. February 26.

SLOCOG (San Luis Obispo Council of Governments). 2005. The 2005 Regional Transportation Plan for San Luis Obispo County.

SunPower. 2009a. Responses to EIR Data Request #1. December 21.

Taft Union High School District (TUHSD). 2010. Bus Schedule 2009-2010 School Year. <http://www.taft.k12.ca.us/19651041174744117/lib/19651041174744117/bus_schedules.pdf> Accessed March 25, 2010.

U.S. Census Bureau. 2008. 2006-2008 American Community Survey: Bakersfield, California. Online at: http://factfinder.census.gov. Accessed March 25, 2010.

United States Fish and Wildlife Service (USFWS) and California Department (CDFG). 2006. PG&E San Joaquin Valley Operations and Maintenance Program HCP Final Environmental Impact Statement/Environmental Impact Report. December.

Water Association of Kern County (WAKC). 2009. Who's Who in Kern County Water. Online at: http://www.wakc.com/whoswho.pdf. Accessed March 18, 2010.

WHO. (World Health Organization). 1984. Environmental Health Criteria 35. Extremely Low Frequency Fields.

_____. 1987. Environmental Health Criteria 69. Magnetic Fields.

_____. 2001. World Health Organization, Fact Sheet No. 263, October 2001, Electromagnetic Fields and Public Health, Extremely Low Frequency Fields and Cancer.

_____. 2007. Environmental Health Criteria 238. Extremely Low Frequency Fields.

Zielke, O., Arrowsmith, J. R., Grant Ludwig, L., Akciz, S. 2010. "Slip in the 1857 and Earlier Large Earthquakes along the Carrizo Plain, San Andreas Fault." Science, Vol. 327, p. 1119-1122. February 26.

Appendix C
Farmlands Correspondence and Analysis

FARMLAND CONVERSION IMPACT RATING

As stipulated in the Farmland Protection Policy Act (FPPA), federal agencies must identify and take into account the adverse effects of their activities on the preservation of farmland. The criteria developed by the Secretary of Agriculture include a land evaluation for which the NRCS provides the score based on the relative value of the farmland, and a site assessment for which the federal agency considers criteria other than the agricultural value of the land. A summary of the Farmland Conversion Impact Rating (FCIR) of the Topaz Solar Farm project is provided below.

LAND EVALUATION

NRCS completed the land evaluation portion of the AD-1006 on January 5, 2011, and determined that 7,671 acres in Study Area A and 6,193 acres in Study Area B are considered Farmland of Local Importance. Farmland of Local Importance meets the soils criteria for Prime Farmland or Farmland of Statewide Importance, but is not irrigated. Accordingly, NRCS assigned a land evaluation score of 71 to Study Area A and a score of 65 to Study Area B. The land evaluation score represents the relative value of agricultural production of the farmland to be converted, to other farmland in the same local government jurisdiction.

SITE ASSESSMENT

The site assessment portion of the FCIR is based on 12 factors, independent of the agricultural value of the land, that determine the suitability of a site for protection as farmland. In each of the 12 factors a number rating system is used to determine which sites deserve the most protection from conversion to non-farm uses. The higher the number value given to a proposed site, the more protection it will receive. Each criterion is allotted a maximum score of 10, 15, or 20, depending upon its relative importance. Table C-1 lists the maximum possible scores for each criterion and summarizes the assigned scores to each study area being considered for the Topaz Solar Farm project. A summary of how each score was determined for the project site is discussed in the sections below.

Table C-1
Farmland Conversion Impact Rating Site Assessment Criteria

Criterion	Maximum Points	Assigned Points Study Area A	Assigned Points Study Area B
Area in Non-Urban Use	15	15	15
Perimeter in Non-Urban Use	10	9	10
Percent of Site being Farmed	20	20	20
Protection Provided by State and Local Government	20	0	20
Distance from Urban Built-up Area	15	15	15
Distance to Urban support Services	15	10	10
Size of Present Farm Unit compared to Average	10	10	10
Creation of Non-Farmable Farmland	10	0	0
Availability of Farm Support Services	5	2	2
On-Farm Investments	20	5	5
Effects of Conversion on Farm Support Services	10	1	1
Compatibility with Existing Agricultural Use	10	0	0
Totals	**160**	**87**	**108**

1. ***Area in non-urban use***

This criterion considers the amount of land in non-urban use within a one-mile radius of the proposed Topaz Solar Farm project site. According to the site assessment guidelines, the "non-urban" land use includes agricultural land, rangeland, forest, golf courses, unpaved parks and recreational areas, mining sites, farm storage, water bodies, rural roads and roads without houses or buildings, open space, wetlands, fish productions, and pasture or hayland.

Google Earth aerials were used to estimate the total land area within a one-mile radius of (but excluding) the project site. This area was estimated to be 14,700 acres for Study Area A and 11,300 for Study Area B. Nearly all structures and residential buildings within this area, with the exception of Carrisa Plains Elementary School, were determined to be farm-related. In addition to the school, which covers approximately 9 acres of land, the only other urban use is Highway 58, which encompasses, at maximum width, approximately 23 acres within a one-mile radius of Study Area A and 18 acres within a one-mile radius of Study Area B. Accordingly, more than 99 percent of land within one mile of both Study Areas A and B are in non-urban use. Therefore, in consideration of the point system below, a score of 15 is assigned for both site alternatives for this criterion.

Scoring for Criterion 1

Percent Non-Urban Use within One Mile	Points
90 percent or greater	15
85 to 89 percent	14
80 to 84 percent	13
75 to 79 percent	12
70 to 74 percent	11
65 to 69 percent	10
60 to 64 percent	9
55 to 59 percent	8
50 to 54 percent	7
45 to 49 percent	6
40 to 44 percent	5
35 to 34 percent	4
30 to 34 percent	3
25 to 29 percent	2
21 to 24 percent	1
20 percent or less	0

2. ***Perimeter in non-urban use***

This criterion considers the amount of land adjacent to the project site that is in non-urban use.

The majority of the site is located in a predominantly rural area, adjacent to agricultural lands and open spaces. The only non-urban land use bordering Study Areas A and B is Highway 58. Based on Google Earth aerials, the Study Area A perimeter is 25 miles with 4 miles bordering Highway 58. Therefore, as 84 percent of Study Area A borders on land in non-urban use, a score of 9 was assigned to this alternative. Study Area B received a score of 10 for this criterion because more than 97 percent of the 17-mile perimeter of this site is adjacent to land that is in non-urban use.

Scoring for Criterion 2

Percent of Perimeter in Non-urban Use	Points
90 percent or greater	10
82 to 89 percent	9
74 to 81 percent	8
65 to 73 percent	7
58 to 64 percent	6
50 to 57 percent	5
42 to 49 percent	4
34 to 41 percent	3
27 to 33 percent	2
21 to 26 percent	1
20 percent or less	0

3. *Percent of site being farmed*

This factor evaluates how much of the site has been farmed or managed for agricultural purposes for more than five of the last ten years. Land that has been left to grow native vegetation without management or harvest is considered abandoned and therefore not considered farmed. More than 90 percent of both Study Areas A and B have been farmed in the form of rotational dry-farming. Accordingly, a maximum score of 20 is awarded for both Study Areas A and B to this criterion.

Scoring for Criterion 3

Percent Being Farmed	Points
90 percent or greater	20
86 to 89 percent	19
82 to 85 percent	18
78 to 81 percent	17
74 to 77 percent	16
70 to 73 percent	15
66 to 69 percent	14
62 to 65 percent	13
58 to 61 percent	12
54 to 57 percent	11
50 to 53 percent	10
46 to 49 percent	9
42 to 45 percent	8
38 to 41 percent	7
35 to 37 percent	6
32 to 34 percent	5
29 to 31 percent	4
26 to 28 percent	3
23 to 25 percent	2
20 to 22 percent	1
20 percent or less	0

4. *Protection Provided by State and Local Government*

This factor evaluates the extent to which state and local government and private programs protect the site from conversion. State programs considered for this criterion include tax relief, "right to farm" laws, agricultural districting, land use controls such as agricultural zoning, development rights, Governor's Executive order, and voluntary or mandatory state programs. The California Land Conservation Act of 1965, commonly referred to as the Williamson Act, is a voluntary state program that was enacted to keep agricultural land from being converted to urban land uses. Study Area B includes 1,795 acres of land under Williamson Act contract, 1,212 acres of which would likely be within the Option B project development (fenced) boundary. No Williamson Act lands are within Study Area A. In addition, the San Luis Obispo County General Plan designates all land parcels within both Study Areas A and B for agricultural use.

However, according to the General Plan, agricultural designation allows many land uses with a land use permit, including energy generation (San Luis Obispo County 2010b). The Project Proponent has applied for a CUP to allow a solar facility as a permitted use on the site.

According to the site assessment criteria guidelines, if the proposed site has ever been subject to any state and local government or private programs or policies, it should receive the maximum score of 20. Otherwise, a score of 0 should be awarded. Accordingly, as no state or local programs or policies are in place for the Study Area A, this site has been awarded a score of 0. On the other hand, because some parcels of land within Study Area B are currently under Williamson Act, a score of 20 is awarded to Study Area B for this criterion.

Scoring for Criterion 4

Protection Provided by State or Local Government	Points
Site is protected	20
Site is not protected	0

5. *Distance from Urban Built-up Area*

This criterion determines the proximity of the site to existing urban or build-up areas characterized by a minimum population of 2,500.

The nearest urban areas to the project site with populations greater than 2,500 are Arroyo Grande, Atascadero, and Taft, which are 34 to 37 miles from the project site. Therefore, in consideration of the point system below, a score of 15 points has been awarded to both Study Areas A and B.

Scoring for Criterion 5

Distance from an Urban or Built-Up Area	Points
The site is 2 miles or more from an urban build-up area	15
The site is more than 1 miles but less than 2 miles from an urban built-up area	10
The site is less than 1 mile, but is not adjacent to an urban built-up area	5
The site is adjacent to and urban built-up area	0

6. *Distance to Urban Support Services*

This criterion determines the extent of existing infrastructure that could facilitate non-agricultural development. Facilities that could promote nonagricultural use include water and sewer lines, gas and power lines, roads, fire and police protection, and schools. The fewer facilities that are in place, the more difficult it is to develop the area. Therefore, a higher score is awarded for a site that is further away from such facilities. The following assessment scaling is used for this criterion:

Scoring for Criterion 6

Distance from Urban Support Services	Points
None of the services exits nearer than 3 miles from the site	15 points
Some of the services exits more than 1 miles but less than 3 miles from the site	10 points
All of the services exist with ½ mile of the site	0 points

There are no water, sewer, or gas services present at the project site. The closest police station is in San Luis Obispo, over 35 miles west of the project site. The nearest fire station is on Soda Lake Road south of project site, approximately 2.2 miles away from Study Area A and nearly 3.4 miles from Study Area B. PG&E's Morro Bay to Midway 230-kV transmission line passes both Study Areas A and B and Carrisa Plains Elementary School is located 2,100 feet (0.4 mile) from Study Area A and 2,900 feet (0.5 mile) from Study Area B. As indicated, some of the facilities are within 1 to 3 miles of the project site, while others are beyond the 3-mile radius. Accordingly a score of 10 is awarded to this criterion for both Study Areas A and B.

7. *Size of Present Farm Unit Compared to Average*

This criterion determines how much protection the site should receive, according to its size in relation to the average farming unit size within the county. The following point system is designed so that larger parcels of lands would receive a higher score, as they possess more agricultural use value.

Scoring for Criterion 7

Parcel Size Compared to Average County Size	Points
Same size of larger than average (100 percent)	10
95 percent of average	9
90 percent of average	8
85 percent of average	7
80 percent of average	6
75 percent of average	5
70 percent of average	4
65 percent of average	3
60 percent of average	2
55 percent of average	1
50 percent or below county average	0

According to the USDA 2007 Census of Agriculture, the average farm size in San Luis Obispo County is 492 acres. Option A encompasses up to 4,100 acres of land to be converted directly, and Option B encompasses up to 4,000 acres, both of which are larger than the county's average farm unit. Therefore, a score of 10 is assigned to this criterion for both study areas.

8. *Creation of Non-Farmable Farmland*

This criterion considers how the proposed project would affect the remaining portions of the farm. Conversions that make the rest of the property nonfarmable include any development which blocks accessibility to the rest of the site such as highways, railroads, dams, or development along the front of the site restricting access to the rest of the property.

The Topaz Solar Farm project would require only a portion of some properties within the study area boundaries. However, as the proposed project is fully compatible with agricultural land use on lands adjacent to it, the remaining portions of land not included within the fenced areas may still be used for agricultural uses, including grazing. Therefore, according to the point system below, a score of 0 is assigned for this criterion for both of the alternatives being considered for the Topaz Solar Farm Project.

Scoring for Criterion 8

Amount of Land Not Including the Site Which Becomes Non-farmable	Points
25 percent or greater	10
23 to 24 percent	9
21 to 22 percent	8
19 to 20 percent	7
17 to 18 percent	6
15 to 16 percent	5
13 to 14 percent	4
11 to 12 percent	3
9 to 10 percent	2
6 to 8 percent	1
5 percent or less	0

9. *Availability of Farm Support Services*

This factor is used to assess whether there are adequate support facilities, activities, and industry to maintain the existing agricultural business. The more support facilities that are available to the agricultural operation, the more feasible it is to continue farming. There are a few support facilities and agricultural businesses adjacent to the proposed Topaz Project site and nearby in the community of California Valley. Accordingly, a score of 2 is awarded to this criterion for both Study Areas A and B.

Scoring for Criterion 9

Percent of Services Available	Points
100 percent	5
75 to 99 percent	4
50 to 74 percent	3
25 to 49 percent	2
1 to 24 percent	1
No services	0

10. On-farm Investments

This factor assesses the quantity of agricultural facilities such as barns, storage buildings, fruit trees and vines, field terraces, drainage, irrigation, waterways, or other soils and water conservation measures on the proposed site. If a significant agricultural infrastructure exists on site, the site should receive the highest amount of points towards protection from conversion or development.

Based on aerial images in Google Earth, there appear to be few scattered agricultural facilities on the proposed site. There are more agricultural facilities nearby on Bitterwater Road to the northwest of Study Area A and along the western border of Study Area B. Along the southern border of Study Area A, which borders Highway 58, there are a few more potential agricultural facilities. Based on these aerial images, approximately 25 to 29 percent on-farm investment exist at the project site. Therefore, in accordance with the scoring system below, a score of 5 has been awarded to both of the alternatives.

Scoring for Criterion 10

Amount of On-farm Investment	Points
As much or more than necessary to maintain production	20
95 to 99 percent	19
90 to 94 percent	18
85 to 89 percent	17
80 to 84 percent	16
75 to 79 percent	15
70 to 74 percent	14
65 to 69 percent	13
60 to 64 percent	12
55 to 59 percent	11
50 to 54 percent	10
45 to 49 percent	9
40 to 44 percent	8
35 to 39 percent	7
30 to 34 percent	6
25 to 29 percent	5
20 to 24 percent	4
15 to 19 percent	3
10 to 14 percent	2
5 to 9 percent	1
0 to 4 percent	0

11. Effects of Conversion on Farm Support Services

This factor determines whether there are other agriculturally related activities, businesses, or jobs dependent upon the working of the pre-converted site in order to remain in production. The more people and farming activities relying upon this land, the more protection it should receive.

As discussed above, there are not extensive support services and facilities in or near Topaz Solar Farm project site. As a result, conversion of proposed farmlands would represent a minimal effect on other farms in the area by reducing the overall demand for support services. However, considering the large size of land to be converted, there may still be a 10 to 19 percent reduction in demand for support services in the area. Accordingly, a score of 1 point is awarded to this criterion for both Study Areas A and B.

Scoring for Criterion 11

Amount of Reduction of Support Services if Converted	Points
Substantial reduction (100 percent)	10
90 to 99 percent	9
80 to 89 percent	8
70 to 79 percent	7
60 to 69 percent	6
25 to 29 percent	5
20 to 24 percent	4
15 to 19 percent	3
10 to 14 percent	2
5 to 9 percent	1
0 to 4 percent	0

12. Compatibility with Existing Agricultural Use

This factor determines if the conversion of the proposed agricultural site will eventually cause the conversion of neighboring farmland as a result of incompatibility with the new use of the land. The more incompatible the proposed conversion with agriculture, the more protection the site receives.

Unlike residential uses, which are often intolerant of the noise, dust, and smell associated with nearby farmland, the proposed Topaz Solar Farm is fully compatible with nearby agricultural operations. Therefore, a score of 0 is assigned to this criterion for the Topaz Solar Farm project site.

Scoring for Criterion 12

Compatibility with Existing Agricultural Use	Points
Proposed project is incompatible with existing agricultural use of surrounding farmland	10
Proposed project is tolerable of existing agricultural use of surrounding farmland	9 to 1
Proposed project is compatible with existing agricultural use of surrounding farmland	0

United States Department of Agriculture
NRCS Natural Resources Conservation Service

65 Main St., Suite 108
Templeton CA 93465
(805) 434-0396
FAX (805) 434-0284

January 5, 2011

Amy Cordle
EMPSi Environmental Management and Planning Solutions, Inc.
12154 Darnestown Road #344
Gaithersburg, MD 20878

Subject: Topaz Solar Farm: Revised Farmland Conversion Impact Rating

I have revised the Farmland Conversion Impact Rating (Form AD-1006) to account for no developed irrigation system, and Farmland of Local Importance. The form AD-1006 dated 1/5/11 supersedes all previous forms for this project.

Soils may be Prime Farmland and Farmland of Statewide Importance if they produce a crop in 7 out of ten years or are irrigated and produce a crop in 8 out of 10 years. Soils on the Carrizo Plain are usually planted 5 out of 10 years when there is no irrigation. See the following website for the National Soil Survey Handbook, Section 557.5(a)(2)(i):

http://soils.usda.gov/technical/handbook/contents/part622.html#ex1

There is Farmland of Local Importance on both Options A and B according to the Farmland Mapping and Monitoring Programs maps. Farmland of Local Importance meets the soils criteria for Prime Farmland or Farmland of Statewide Importance, but is not irrigated. See the attached maps and this website:

http://www.consrv.ca.gov/dlrp/fmmp/Pages/Index.aspx

Here is the definition Local Important Farmland according to this website:

http://www.consrv.ca.gov/dlrp/fmmp/Documents/Local_definitions_00.pdf

"Farmland of Local Importance is land of importance to the local economy, as defined by each county's local advisory committee and adopted by its Board of Supervisors. Farmland of Local Importance is either currently producing, or has the capability of production, but does not meet the criteria of Prime Farmland, Farmland of Statewide Importance, or Unique Farmland. Authority to adopt or to recommend changes to the category of Farmland of Local Importance rests with the Board of Supervisors in each county.

San Luis Obispo

United States Department of Agriculture
NRCS Natural Resources Conservation Service

65 Main St., Suite 108
Templeton CA 93465
(805) 434-0396
FAX (805) 434-0284

Local Important (L): areas of soils that meet all the characteristics of Prime or Statewide, with the exception of irrigation. Additional farmlands include dryland field crops of wheat, barley, oats, and safflower.

Local Potential (LP): lands having the potential for farmland, which have Prime or Statewide characteristics and are not cultivated."

In Option A there are 7671 acres of Local Important Farmland (L + LP), and 129 acres of Grazing Land (G).

In Option B there are 6193 acres of Local Important Farmland (L + LP) and 107 acres of Grazing Land (G).

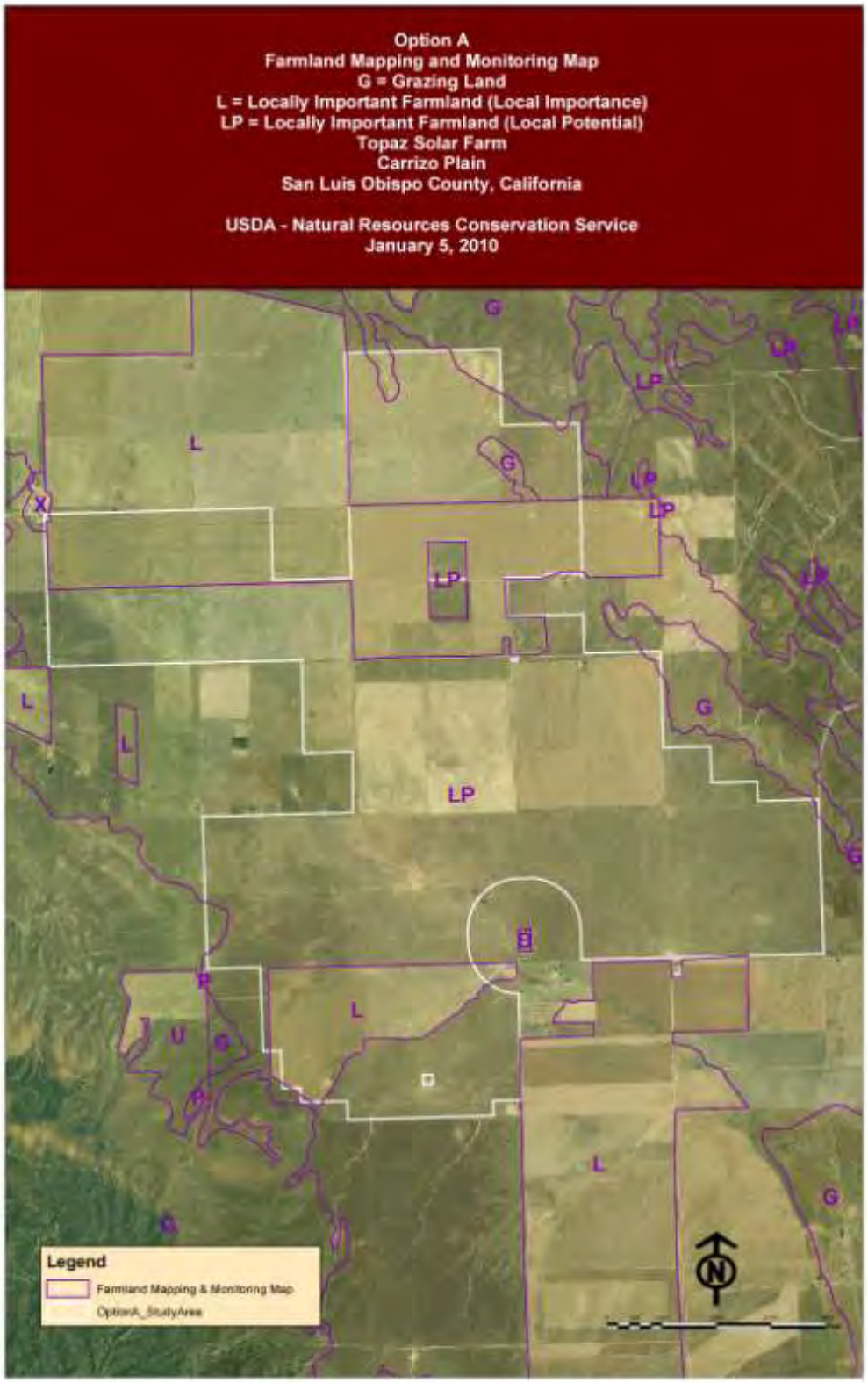
Acres for Local Important Farmland appear on form AD-1006 on line IV B.

If you disagree with this determination, please write a letter to me explaining why you disagree.

Ken Oster
Area Resource Soil Scientist

United States Department of Agriculture
NRCS Natural Resources Conservation Service

65 Main St., Suite 108
Templeton CA 93465
(805) 434-0396
FAX (805) 434-0284

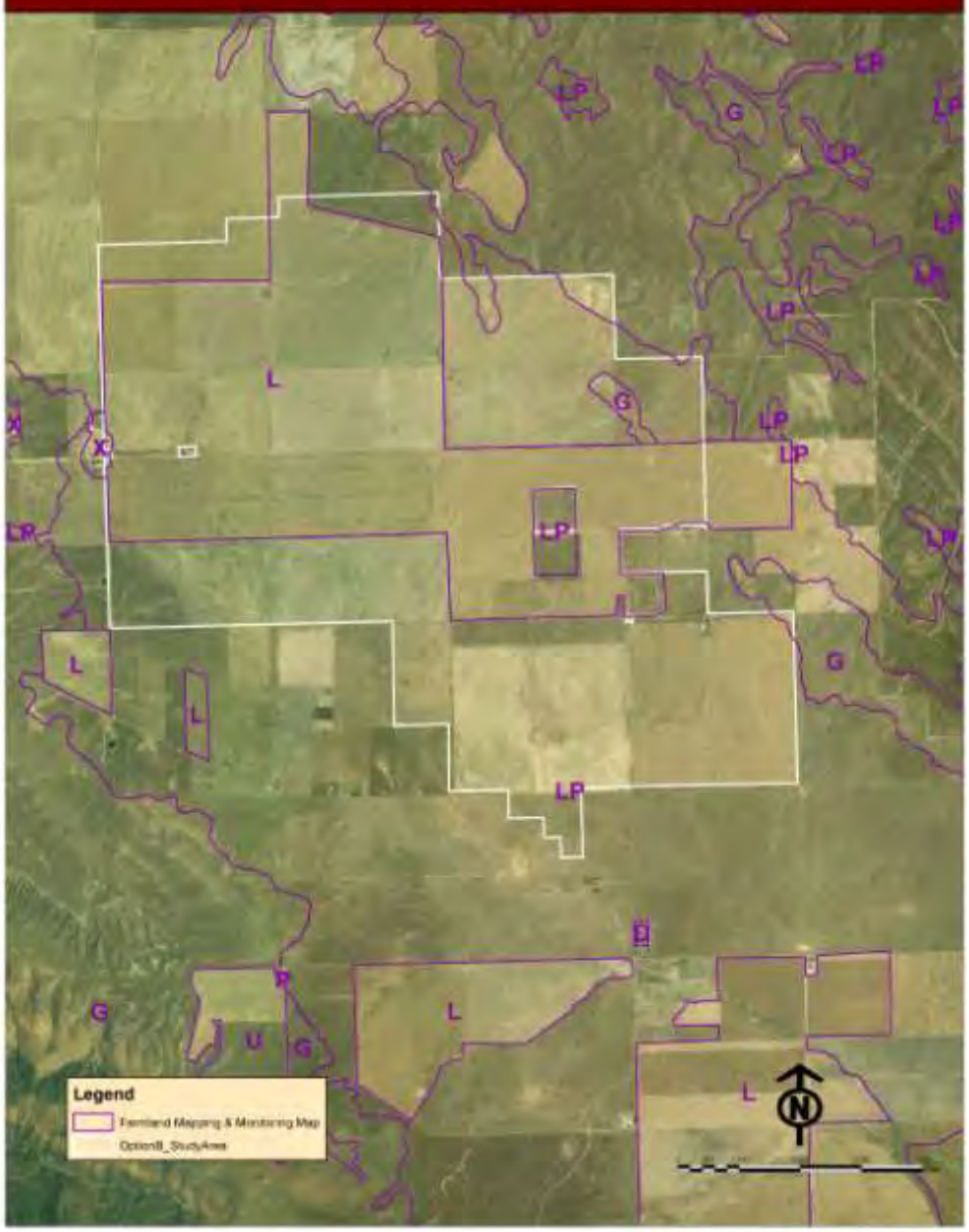


United States Department of Agriculture
NRCS Natural Resources Conservation Service

65 Main St., Suite 108
Templeton CA 93465
(805) 434-0396
FAX (805) 434-0284

Option B
Farmland Mapping and Monitoring Map
G = Grazing Land
L = Locally Important Farmland (Local Importance)
LP = Locally Important Farmland (Local Potential)
Topaz Solar Farm
Carrizo Plain
San Luis Obispo County, California

USDA - Natural Resources Conservation Service
January 5, 2010



U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request 12/14/10
Name Of Project Topaz Solar Farm	Federal Agency Involved Department of Energy
Proposed Land Use PV Solar Generating Facility	County And State San Luis Obispo County, California
PART II *(To be completed by NRCS)*	Date Request Received By NRCS 12/14/10

Does the site contain prime, unique, statewide or local important farmland? *(If no, the FPPA does not apply -- do not complete additional parts of this form).*	Yes ☑	No ☐	Acres Irrigated 98,898	Average Farm Size 492
Major Crop*(s)* wine grapes, broccoli, grain hay	Farmable Land In Govt. Jurisdiction Acres: 299,572 % 14		Amount Of Farmland As Defined in FPPA Acres: 270,407 % 13
Name Of Land Evaluation System Used CA Revised Storie Index	Name Of Local Site Assessment System None		Date Land Evaluation Returned By NRCS 1/5/11

PART III *(To be completed by Federal Agency)*	Alternative Site Rating Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly	4,100.0	4,000.0		
B. Total Acres To Be Converted Indirectly	3,700.0	2,300.0		
C. Total Acres In Site	7,800.0	6,300.0	0.0	0.0
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	0.0	0.0		
B. Total Acres Statewide And Local Important Farmland	7,671.0	6,193.0		
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted	2.8	2.3		
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value				
PART V *(To be completed by NRCS)* Land Evaluation Criterion Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)*	71	65	0	0

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(These criteria are explained in 7 CFR 658.5(b)*	Maximum Points	Site A	Site B	Site C	Site D
1. Area In Nonurban Use	15	15	15		
2. Perimeter In Nonurban Use	10	9	10		
3. Percent Of Site Being Farmed	20	20	20		
4. Protection Provided By State And Local Government	20	0	20		
5. Distance From Urban Builtup Area	15	15	15		
6. Distance To Urban Support Services	15	10	10		
7. Size Of Present Farm Unit Compared To Average	10	10	10		
8. Creation Of Nonfarmable Farmland	10	0	0		
9. Availability Of Farm Support Services	5	2	2		
10. On-Farm Investments	20	5	5		
11. Effects Of Conversion On Farm Support Services	10	1	1		
12. Compatibility With Existing Agricultural Use	10	0	0		
TOTAL SITE ASSESSMENT POINTS	160	87	108	0	0
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)*	100	71	65	0	0
Total Site Assessment *(From Part VI above or a local site assessment)*	160	87	108	0	0
TOTAL POINTS *(Total of above 2 lines)*	260	158	173	0	0

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? Yes ☐ No ☐

Reason For Selection:

(See Instructions on reverse side)

This form was electronically produced by National Production Services Staff

Clear Form

Form AD-1006 (10-83)

STEPS IN THE PROCESSING THE FARMLAND AND CONVERSION IMPACT RATING FORM

Step 1 – Federal agencies involved in proposed projects that may convert farmland, as defined in the Farmland Protection Policy Act (FPPA) to nonagricultural uses, will initially complete Parts I and III of the form.

Step 2 – Originator will send copies A, B and C together with maps indicating locations of site(s), to the Natural Resources Conservation Service (NRCS) local field office and retain copy D for their files. (Note: NRCS has a field office in most counties in the U.S. The field office is usually located in the county seat. A list of field office locations are available from the NRCS State Conservationist in each state).

Step 3 – NRCS will, within 45 calendar days after receipt of form, make a determination as to whether the site(s) of the proposed project contains prime, unique, statewide or local important farmland.

. Step '4 – In cases where farmland covered by the FPPA will be converted by the proposed project, NRCS field offices will complete Parts II, IV and V of the form.

Step 5 – NRCS will return copy A and B of the form to the Federal agency involved in the project. (Copy C will be retained for NRCS records).

Step 6 – The Federal agency involved in the proposed project will complete Parts VI and VII of the form.

Step 7 – The Federal agency involved in the proposed project will make a determination as to whether the proposed conversion is consistent with the FPPA and the agency's internal policies.

INSTRUCTIONS FOR COMPLETING THE FARMLAND CONVERSION IMPACT RATING FORM

Part I: In completing the "County And State" questions list all the local governments that are responsible for local land controls where site(s) are to be evaluated.

Part III: In completing item B (Total Acres To Be Converted Indirectly), include the following:

1. Acres not being directly converted but that would no longer be capable of being farmed after the conversion, because the conversion would restrict access to them.

2. Acres planned to receive services from an infrastructure project as indicated in the project justification (e.g. highways, utilities) that will cause a direct conversion.

Part VI: Do not complete Part VI if a local site assessment is used.

Assign the maximum points for each site assessment criterion as shown in § 658.5 (b) of CFR. In cases of corridor-type projects such as transportation, powerline and flood control, criteria #5 and #6 will not apply and will, be weighed zero, however, criterion #8 will be weighed a maximum of 25 points, and criterion #11 a maximum of 25 points.

Individual Federal agencies at the national level, may assign relative weights among the 12 site assessment criteria other than those shown in the FPPA rule. In all cases where other weights are assigned relative adjustments must be made to maintain the maximum total weight points at l60.

In rating alternative sites, Federal agencies shall consider each of the criteria and assign points within the limits established in the FPPA rule. Sites most suitable for protection under these criteria will receive the highest total scores, and sites least suitable, the lowest scores.

Part VII: In computing the "Total Site Assessment Points" where a State or local site assessment is used and the total maximum number of points is other than 160, adjust the site assessment points to a base of 160. Example: if the Site Assessment maximum is 200 points, and alternative Site "A" is rated 180 points:

$$\frac{\text{Total points assigned Site A}}{\text{Maximum points possible}} = \frac{180}{200} \times 160 = 144 \text{ points for Site "A."}$$

Site Assessment Scoring for the Twelve Factors Used in FPPA

The Site Assessment criteria used in the Farmland Protection Policy Act (FPPA) rule are designed to assess important factors other than the agricultural value of the land when determining which alternative sites should receive the highest level of protection from conversion to non agricultural uses.

Twelve factors are used for Site Assessment and ten factors for corridor-type sites. Each factor is listed in an outline form, without detailed definitions or guidelines to follow in the rating process. The purpose of this document is to expand the definitions of use of each of the twelve Site Assessment factors so that all persons can have a clear understanding as to what each factor is intended to evaluate and how points are assigned for given conditions.

In each of the 12 factors a number rating system is used to determine which sites deserve the most protection from conversion to non-farm uses. The higher the number value given to a proposed site, the more protection it will receive. The maximum scores are 10, 15 and 20 points, depending upon the relative importance of each particular question. If a question significantly relates to why a parcel of land should not be converted, the question has a maximum possible protection value of 20, whereas a question which does not have such a significant impact upon whether a site would be converted, would have fewer maximum points possible, for example 10.

The following guidelines should be used in rating the twelve Site Assessment criteria:

1. How much land is in non-urban use within a radius of 1.0 mile from where the project is intended?

More than 90 percent:	15 points
90-20 percent:	14 to 1 points
Less than 20 percent:	0 points

This factor is designed to evaluate the extent to which the area within one mile of the proposed site is non-urban area. For purposes of this rule, "non-urban" should include:

- Agricultural land (crop-fruit trees, nuts, oilseed)
- Range land
- Forest land
- Golf Courses
- Non paved parks and recreational areas
- Mining sites
- Farm Storage
- Lakes, ponds and other water bodies
- Rural roads, and through roads without houses or buildings
- Open space
- Wetlands
- Fish production
- Pasture or hayland

Urban uses include:

- Houses (other than farm houses)
- Apartment buildings
- Commercial buildings
- Industrial buildings
- Paved recreational areas (i.e. tennis courts)
- Streets in areas with 30 structures per 40 acres
- Gas stations

- Equipment, supply stores
- Off-farm storage
- Processing plants
- Shopping malls
- Utilities/Services
- Medical buildings

In rating this factor, an area one-mile from the outer edge of the proposed site should be outlined on a current photo; the areas that are urban should be outlined. For rural houses and other buildings with unknown sizes, use 1 and 1/3 acres per structure. For roads with houses on only one side, use one half of road for urban and one half for non-urban.

The purpose of this rating process is to insure that the most valuable and viable farmlands are protected from development projects sponsored by the Federal Government. With this goal in mind, factor S1 suggests that the more agricultural lands surrounding the parcel boundary in question, the more protection from development this site should receive. Accordingly, a site with a large quantity of non-urban land surrounding it will receive a greater
number of points for protection from development. Thus, where more than 90 percent of the area around the proposed site (do not include the proposed site in this assessment) is non-urban, assign 15 points. Where 20 percent or less is
non-urban, assign 0 points. Where the area lies between 20 and 90 percent non-urban, assign appropriate points from 14 to 1, as noted below.

Percent Non-Urban Land within 1 mile	**Points**
90 percent or greater	15
85 to 89 percent	14
80 to 84 percent	13
75 to 79 percent	12
70 to 74 percent	11
65 to 69 percent	10
60 to 64 percent	9
55 to 59 percent	8
50 to 54 percent	7
45 to 49 percent	6
40 to 44 percent	5
35 to 39 percent	4
30 to 24 percent	3
25 to 29 percent	2
21 to 24 percent	1
20 percent or less	0

2. How much of the perimeter of the site borders on land in non-urban use?

More than 90 percent:	l0 points
90 to 20 percent:	9 to 1 point(s)
Less than 20 percent:	0 points

This factor is designed to evaluate the extent to which the land adjacent to the proposed site is non-urban use. Where factor #1 evaluates the general location of the proposed site, this factor evaluates the immediate perimeter of the site. The definition of urban and non-urban uses in factor #1 should be used for this factor.

In rating the second factor, measure the perimeter of the site that is in non-urban and urban use. Where more than 90 percent of the perimeter is in non-urban use, score this factor 10 points. Where less than 20 percent, assign 0 points. If a road is next to the perimeter, class the area according to the

use on the other side of the road for that area. Use 1 and 1/3 acre per structure if not otherwise known. Where 20 to 90 percent of the perimeter is non-urban, assign points as noted below:

Percentage of Perimeter Bordering Land	Points
90 percent or greater	10
82 to 89 percent	9
74 to 81 percent	8
65 to 73 percent	7
58 to 65 percent	6
50 to 57 percent	5
42 to 49 percent	4
34 to 41 percent	3
27 to 33 percent	2
21 to 26 percent	1
20 percent or Less	0

3. How much of the site has been farmed (managed for a scheduled harvest or timber activity) more than five of the last ten years?

More than 90 percent:	20 points
90 to 20 percent:	19 to 1 point(s)
Less than 20 percent:	0 points

This factor is designed to evaluate the extent to which the proposed conversion site has been used or managed for agricultural purposes in the past 10 years.

Land is being farmed when it is used or managed for food or fiber, to include timber products, fruit, nuts, grapes, grain, forage, oil seed, fish and meat, poultry and dairy products.

Land that has been left to grow up to native vegetation without management or harvest will be considered as abandoned and therefore not farmed. The proposed conversion site should be evaluated and rated according to the percent, of the site farmed.

If more than 90 percent of the site has been farmed 5 of the last 10 years score the site as follows:

Percentage of Site Farmed	Points
90 percent or greater	20
86 to 89 percent	19
82 to 85 percent	18
78 to 81 percent	17
74 to 77 percent	16
70 to 73 percent	15
66 to 69 percent	14
62 to 65 percent	13
58 to 61 percent	12
54 to 57 percent	11
50 to 53 percent	10
46 to 49 percent	9
42 to 45 percent	8
38 to 41 percent	7
35 to 37 percent	6
32 to 34 percent	5
29 to 31 percent	4
26 to 28 percent	3

23 to 25 percent	2
20 to 22 percent percent or Less	1
Less than 20 percent	0

4. Is the site subject to state or unit of local government policies or programs to protect farmland or covered by private programs to protect farmland?

Site is protected:	20 points
Site is not protected:	0 points

This factor is designed to evaluate the extent to which state and local government and private programs have made efforts to protect this site from conversion.

State and local policies and programs to protect farmland include:

State Policies and Programs to Protect Farmland

1. Tax Relief:

   A. Differential Assessment: Agricultural lands are taxed on their agricultural use value, rather than at market value. As a result, farmers pay fewer taxes on their land, which helps keep them in business, and therefore helps to insure that the farmland will not be converted to nonagricultural uses.

      1. Preferential Assessment for Property Tax: Landowners with parcels of land used for agriculture are given the privilege of differential assessment.

      2. Deferred Taxation for Property Tax: Landowners are deterred from converting their land to nonfarm uses, because if they do so, they must pay back taxes at market value.

      3. Restrictive Agreement for Property Tax: Landowners who want to receive Differential Assessment must agree to keep their land in - eligible use.

   B. Income Tax Credits

   Circuit Breaker Tax Credits: Authorize an eligible owner of farmland to apply some or all of the property taxes on his or her farmland and farm structures as a tax credit against the owner's state income tax.

   C. Estate and Inheritance Tax Benefits

   Farm Use Valuation for Death Tax: Exemption of state tax liability to eligible farm estates.

2. "Right to farm" laws:

   Prohibits local governments from enacting laws which will place restrictions upon normally accepted farming practices, for example, the generation of noise, odor or dust.

3. Agricultural Districting:

   Wherein farmers voluntarily organize districts of agricultural land to be legally recognized geographic areas. These farmers receive benefits, such as protection from annexation, in exchange for keeping land within the district for a given number of years.

4. Land Use Controls: Agricultural Zoning.

Types of Agricultural Zoning Ordinances include:

A. Exclusive: In which the agricultural zone is restricted to only farm-related dwellings, with, for example, a minimum of 40 acres per dwelling unit.

B. Non-Exclusive: In which non-farm dwellings are allowed, but the density remains low, such as 20 acres per dwelling unit.

Additional Zoning techniques include:

A. Slidinq Scale: This method looks at zoning according to the total size of the parcel owned. For example, the number of dwelling units per a given number of acres may change from county to county according to the existing land acreage to dwelling unit ratio of surrounding parcels of land within the specific area.

B. Point System or Numerical Approach: Approaches land use permits on a case by case basis.

LESA: The LESA system (Land Evaluation-Site Assessment) is used as a tool to help assess options for land use on an evaluation of productivity weighed against commitment to urban development.

C. Conditional Use: Based upon the evaluation on a case by case basis by the Board of Zoning Adjustment. Also may include the method of using special land use permits.

5. Development Rights:

A. Purchase of Development Rights (PDR): Where development rights are purchased by Government action.

Buffer Zoning Districts: Buffer Zoning Districts are an example of land purchased by Government action. This land is included in zoning ordinances in order to preserve and protect agricultural lands from non-farm land uses encroaching upon them.

B. Transfer of Development Rights (TDR): Development rights are transferable for use in other locations designated as receiving areas. TDR is considered a locally based action (not state), because it requires a voluntary decision on the part of the individual landowners.

6. Governor's Executive Order: Policy made by the Governor, stating the importance of agriculture, and the preservation of agricultural lands. The Governor orders the state agencies to avoid the unnecessary conversion of important farmland to nonagricultural uses.

7. Voluntary State Programs:

A. California's Program of Restrictive Agreements and Differential Assessments: The California Land Conservation Act of 1965, commonly known as the Williamson Act, allows cities, counties and individual landowners to form agricultural preserves and enter into contracts for 10 or more years to insure that these parcels of land remain strictly for agricultural use. Since 1972 the Act has extended eligibility to recreational and open space lands such as scenic highway corridors, salt ponds and wildlife preserves. These contractually restricted lands may be taxed differentially for their real value. One hundred-acre districts constitute the minimum land size eligible.

Suggestion: An improved version of the Act would state that if the land is converted after the contract expires, the landowner must pay the difference in the taxes between market value for the land and the agricultural tax value which he or she had been

paying under the Act. This measure would help to insure that farmland would not be converted after the 10 year period ends.

B. Maryland Agricultural Land Preservation Program: Agricultural landowners within agricultural districts have the opportunity to sell their development rights to the Maryland Land Preservation Foundation under the agreement that these landowners will not subdivide or develop their land for an initial period of five years. After five years the landowner may terminate the agreement with one year notice.

   As is stated above under the California Williamson Act, the landowner should pay the back taxes on the property if he or she decides to convert the land after the contract expires, in order to discourage such conversions.

C. Wisconsin Income Tax Incentive Program: The Wisconsin Farmland Preservation Program of December 1977 encourages local jurisdictions in Wisconsin to adopt agricultural preservation plans or exclusive agricultural district zoning ordinances in exchange for credit against state income tax and exemption from special utility assessment. Eligible candidates include local governments and landowners with at least 35 acres of land per dwelling unit in agricultural use and gross farm profits of at least $6.000 per year, or $18,000 over three years.

8. Mandatory State Programs:

A. The Environmental Control Act in the state of Vermont was adopted in 1970 by the Vermont State Legislature. The Act established an environmental board with 9 members (appointed by the Governor) to implement a planning process and a permit system to screen most subdivisions and development proposals according to specific criteria stated in the law. The planning process consists of an interim and a final Land Capability and Development Plan, the latter of which acts as a policy plan to control development. The policies are written in order to:

   - prevent air and water pollution;
   - protect scenic or natural beauty, historic sites and rare and irreplaceable natural areas; and
   - consider the impacts of growth and reduction of development on areas of primary agricultural soils.

B. The California State Coastal Commission: In 1976 the Coastal Act was passed to establish a permanent Coastal Commission with permit and planning authority The purpose of the Coastal Commission was and is to protect the sensitive coastal zone environment and its resources, while accommodating the social and economic needs of the state. The Commission has the power to regulate development in the coastal zones by issuing permits on a case by case basis until local agencies can develop their own coastal plans, which must be certified by the Coastal Commission.

C. Hawaii's Program of State Zoning: In 1961, the Hawaii State Legislature established Act 187, the Land Use Law, to protect the farmland and the welfare of the local people of Hawaii by planning to avoid “unnecessary urbanization”. The Law made all state lands into four districts: agricultural, conservation, rural and urban. The Governor appointed members to a State Land Use Commission, whose duties were to uphold the Law and form the boundaries of the four districts. In addition to state zoning, the Land Use Law introduced a program of Differential Assessment, wherein agricultural landowners paid taxes on their land for its agricultural use value, rather than its market value.

D. The Oregon Land Use Act of 1973: This act established the Land Conservation and Development Commission (LCDC) to provide statewide planning goals and guidelines.

Under this Act, Oregon cities and counties are each required to draw up a comprehensive plan, consistent with statewide planning goals. Agricultural land preservation is high on the list of state goals to be followed locally.

If the proposed site is subject to or has used one or more of the above farmland protection programs or policies, score the site 20 points. If none of the above policies or programs apply to this site, score 0 points.

5. How close is the site to an urban built-up area?

The site is 2 miles or more from an urban built-up area	15 points
The site is more than 1 mile but less than 2 miles from an urban built-up area	10 points
The site is less than 1 mile from, but is not adjacent to an urban built-up area	5 points
The site is adjacent to an urban built-up area	0 points

This factor is designed to evaluate the extent to which the proposed site is located next to an existing urban area. The urban built-up area must be 2500 population. The measurement from the built-up area should be made from the point at which the density is 30 structures per 40 acres and with no open or non-urban land existing between the major built-up areas and this point. Suburbs adjacent to cities or urban built-up areas should be considered as part of that urban area.

For greater accuracy, use the following chart to determine how much protection the site should receive according to its distance from an urban area. See chart below:

Distance From Perimeter of Site to Urban Area	Points
More than 10,560 feet	15
9,860 to 10,559 feet	14
9,160 to 9,859 feet	13
8,460 to 9,159 feet	12
7,760 to 8,459 feet	11
7,060 to 7,759 feet	10
6,360 to 7,059 feet	9
5,660 to 6,359 feet	8
4,960 to 5,659 feet	7
4,260 to 4,959 feet	6
3,560 to 4,259 feet	5
2,860 to 3,559 feet	4
2,160 to 2,859 feet	3
1,460 to 2,159 feet	2
760 to 1,459 feet	1
Less than 760 feet (adjacent)	0

6. How close is the site to water lines, sewer lines and/or other local facilities and services whose capacities and design would promote nonagricultural use?

None of the services exist nearer than 3 miles from the site	15 points
Some of the services exist more than one but less than 3 miles from the site	10 points
All of the services exist within 1/2 mile of the site	0 points

This question determines how much infrastructure (water, sewer, etc.) is in place which could facilitate nonagricultural development. The fewer facilities in place, the more difficult it is to develop an area. Thus, if a proposed site is further away from these services (more than 3 miles distance away), the site should be awarded the highest number of points (15). As the distance of the parcel of land to services decreases, the number of points awarded declines as well. So, when the site is equal to or further than 1 mile but less than 3 miles away from services, it should be given 10 points. Accordingly, if this distance is 1/2 mile to less than 1 mile, award 5 points; and if the distance from land to services is less than 1/2 mile, award 0 points.

Distance to public facilities should be measured from the perimeter of the parcel in question to the nearest site(s) where necessary facilities are located. If there is more than one distance (i.e. from site to water and from site to sewer), use the average distance (add all distances and then divide by the number of different distances to get the average).

Facilities which could promote nonagricultural use include:

- Water lines
- Sewer lines
- Power lines
- Gas lines
- Circulation (roads)
- Fire and police protection
- Schools

7. Is the farm unit(s) containing the site (before the project) as large as the average-size farming unit in the county? (Average farm sizes in each county are available from the NRCS field offices in each state. Data are from the latest available Census of Agriculture, Acreage of Farm Units in Operation with $1,000 or more in sales.)

As large or larger:	10 points
Below average: Deduct 1 point for each 5 percent below the average, down to 0 points if 50 percent or more is below average	9 to 0 points

This factor is designed to determine how much protection the site should receive, according to its size in relation to the average size of farming units within the county. The larger the parcel of land, the more agricultural use value the land possesses, and vice versa. Thus, if the farm unit is as large or larger than the county average, it receives the maximum number of points (10). The smaller the parcel of land compared to the county average, the fewer number of points given. Please see below:

Parcel Size in Relation to Average County Size	Points
Same size or larger than average (l00 percent)	10
95 percent of average	9
90 percent of average	8
85 percent of average	7
80 percent of average	6
75 percent of average	5
70 percent of average	4
65 percent of average	3
60 percent of average	2
55 percent of average	1
50 percent or below county average	0

State and local Natural Resources Conservation Service offices will have the average farm size information, provided by the latest available Census of Agriculture data

8. If this site is chosen for the project, how much of the remaining land on the farm will become non-farmable because of interference with land patterns?

Acreage equal to more than 25 percent of acres directly converted by the project	10 points
Acreage equal to between 25 and 5 percent of the acres directly converted by the project	9 to 1 point(s)
Acreage equal to less than 5 percent of the acres directly converted by the project	0 points

This factor tackles the question of how the proposed development will affect the rest of the land on the farm The site which deserves the most protection from conversion will receive the greatest number of points, and vice versa. For example, if the project is small, such as an extension on a house, the rest of the agricultural land would remain farmable, and thus a lower number of points is given to the site. Whereas if a large-scale highway is planned, a greater portion of the land (not including the site) will become non-farmable, since access to the farmland will be blocked; and thus, the site should receive the highest number of points (10) as protection from conversion

Conversion uses of the Site Which Would Make the Rest of the Land Non-Farmable by Interfering with Land Patterns

Conversions which make the rest of the property nonfarmable include any development which blocks accessibility to the rest of the site Examples are highways, railroads, dams or development along the front of a site restricting access to the rest of the property.

The point scoring is as follows:

Amount of Land Not Including the Site Which Will Become Non-Farmable	Points
25 percent or greater	10
23 - 24 percent	9
21 - 22 percent	8
19 - 20 percent	7
17 - 18 percent	6
15 - 16 percent	5
13 - 14 percent	4
11 - 12 percent	3
9 - 11 percent	2
6 - 8 percent	1
5 percent or less	0

9. Does the site have available adequate supply of farm support services and markets, i.e., farm suppliers, equipment dealers, processing and storage facilities and farmer's markets?

All required services are available	5 points
Some required services are available	4 to 1 point(s)
No required services are available	0 points

This factor is used to assess whether there are adequate support facilities, activities and industry to keep the farming business in business. The more support facilities available to the agricultural

landowner, the more feasible it is for him or her to stay in production. In addition, agricultural support facilities are compatible with farmland. This fact is important, because some land uses are not compatible; for example, development next to farmland cam be dangerous to the welfare of the agricultural land, as a result of pressure from the neighbors who often do not appreciate the noise, smells and dust intrinsic to farmland. Thus, when all required agricultural support services are available, the maximum number of points (5) are awarded. When some services are available, 4 to 1 point(s) are awarded; and consequently, when no services are available, no points are given. See below:

Percent of Services Available	Points
100 percent	5
75 to 99 percent	4
50 to 74 percent	3
25 to 49 percent	2
1 to 24 percent	1
No services	0

10. Does the site have substantial and well-maintained on farm investments such as barns, other storage buildings, fruit trees and vines, field terraces, drainage, irrigation, waterways, or other soil and water conservation measures?

High amount of on-farm investment	20 points
Moderate amount of non-farm investment	19 to 1 point(s)
No on-farm investments	0 points

This factor assesses the quantity of agricultural facilities in place on the proposed site. If a significant agricultural infrastructure exists, the site should continue to be used for farming, and thus the parcel will receive the highest amount of points towards protection from conversion or development. If there is little on farm investment, the site will receive comparatively less protection. See-below:

Amount of On-farm Investment	Points
As much or more than necessary to maintain production (100 percent)	20
95 to 99 percent	19
90 to 94 percent	18
85 to 89 percent	17
80 to 84 percent	16
75 to 79 percent	15
70 to 74 percent	14
65 to 69 percent	13
60 to 64 percent	12
55 to 59 percent	11
50 to 54 percent	10
45 to 49 percent	9
40 to 44 percent	8
35 to 39 percent	7
30 to 34 percent	6
25 to 29 percent	5
20 to 24 percent	4
15 to 19 percent	3
10 to 14 percent	2
5 to 9 percent	1
0 to 4 percent	0

11. Would the project at this site, by converting farmland to nonagricultural use, reduce the support for farm support services so as to jeopardize the continued existence of these support services and thus, the viability of the farms remaining in the area?

Substantial reduction in demand for support services if the site is converted	10 points
Some reduction in demand for support services if the site is converted	9 to 1 point(s)
No significant reduction in demand for support services if the site is converted	0 points

This factor determines whether there are other agriculturally related activities, businesses or jobs dependent upon the working of the pre-converted site in order for the others to remain in production. The more people and farming activities relying upon this land, the more protection it should receive from conversion. Thus, if a substantial reduction in demand for support services were to occur as a result of conversions, the proposed site would receive a high score of 10; some reduction in demand would receive 9 to 1 point(s), and no significant reduction in demand would receive no points.

Specific points are outlined as follows:

Amount of Reduction in Support Services if Site is Converted to Nonagricultural Use	**Points**
Substantial reduction (100 percent)	10
90 to 99 percent	9
80 to 89 percent	8
70 to 79 percent	7
60 to 69 percent	6
50 to 59 percent	5
40 to 49 percent	4
30 to 39 percent	3
20 to 29 percent	2
10 to 19 percent	1
No significant reduction (0 to 9 percent)	0

12. Is the kind and intensity of the proposed use of the site sufficiently incompatible with agriculture that it is likely to contribute to the eventual conversion of the surrounding farmland to nonagricultural use?

Proposed project is incompatible with existing agricultural use of surrounding farmland	10 points
Proposed project is tolerable of existing agricultural use of surrounding farmland	9 to 1 point(s)
Proposed project is fully compatible with existing agricultural use of surrounding farmland	0 points

Factor 12 determines whether conversion of the proposed agricultural site will eventually cause the conversion of neighboring farmland as a result of incompatibility of use of the first with the latter. The more incompatible the proposed conversion is with agriculture, the more protection this site receives from conversion. Therefor-, if the proposed conversion is incompatible with agriculture, the site receives 10 points. If the project is tolerable with agriculture, it receives 9 to 1 points; and if the proposed conversion is compatible with agriculture, it receives 0 points.

CORRIDOR - TYPE SITE ASSESSMENT CRITERIA

The following criteria are to be used for projects that have a linear or corridor - type site configuration connecting two distant points, and crossing several different tracts of land. These include utility lines, highways, railroads, stream improvements, and flood control systems. Federal agencies are to assess the suitability of each corridor-type site or design alternative for protection as farmland along with the land evaluation information.

For Water and Waste Programs, corridor analyses are not applicable for distribution or collection networks. Analyses are applicable for transmission or trunk lines where placement of the lines are flexible.

(1) How much land is in nonurban use within a radius of 1.0 mile form where the project is intended?

(2)	More than 90 percent	(3)	15 points
(4)	90 to 20 percent	(5)	14 to 1 point(s).
(6)	Less than 20 percent	(7)	0 points

(2) How much of the perimeter of the site borders on land in nonurban use?

(3)	More than 90 percent	(4)	10 point(s)
(5)	90 to 20 percent	(6)	9 to 1 points
(7)	less than 20 percent	(8)	0 points

(3) How much of the site has been farmed (managed for a scheduled harvest or timber activity) more than five of the last 10 years?

(4)	More than 90 percent	(5)	20 points
(6)	90 to 20 percent	(7)	19 to 1 point(s)
(8)	Less than 20 percent	(9)	0 points

(4) Is the site subject to state or unit of local government policies or programs to protect farmland or covered by private programs to protect farmland?

Site is protected	20 points
Site is not protected	0 points

(5) Is the farm unit(s) containing the site (before the project) as large as the average - size farming unit in the County? (Average farm sizes in each county are available from the NRCS field offices in each state. Data are from the latest available Census of Agriculture, Acreage of Farm Units in Operation with $1,000 or more in sales.)

As large or larger	10 points
Below average deduct 1 point for each 5 percent below the average, down to 0 points if 50 percent or more below average	9 to 0 points

(6) If the site is chosen for the project, how much of the remaining land on the farm will become non-farmable because of interference with land patterns?

Acreage equal to more than 25 percent of acres directly converted by the project	25 points
Acreage equal to between 25 and 5 percent of the acres directly convened by the project	1 to 24 point(s)
Acreage equal to less than 5 percent of the acres directly converted by the project	0 points

(7) Does the site have available adequate supply of farm support services and markets, i.e., farm suppliers, equipment dealers, processing and storage facilities and farmer's markets?

All required services are available	5 points
Some required services are available	4 to 1 point(s)
No required services are available	0 points

(8) Does the site have substantial and well-maintained on-farm investments such as barns, other storage building, fruit trees and vines, field terraces, drainage, irrigation, waterways, or other soil and water conservation measures?

High amount of on-farm investment	20 points
Moderate amount of on-farm investment	19 to 1 point(s)
No on-farm investment	0 points

(9) Would the project at this site, by converting farmland to nonagricultural use, reduce the demand for farm support services so as to jeopardize the continued existence of these support services and thus, the viability of the farms remaining in the area?

Substantial reduction in demand for support services if the site is convened	25 points
Some reduction in demand for support services if the site is convened	1 to 24 point(s)
No significant reduction in demand for support services if the site is converted	0 points

(10) Is the kind and intensity of the proposed use of the site sufficiently incompatible with agriculture that it is likely to contribute to the eventual conversion of surrounding farmland to nonagricultural use?

Proposed project is incompatible to existing agricultural use of surrounding farmland	10 points
Proposed project is tolerable to existing agricultural use of surrounding farmland	9 to 1 point(s)
Proposed project is fully compatible with existing agricultural use of surrounding farmland	0 points

Appendix D
Visual Simulation Methodology

Statement of Authenticity of
Truescape Limited

On behalf of

First Solar Inc.

TRUESCAPE
VISUAL COMMUNICATION

1. TRUESCAPE CREDENTIALS

1.1 Truescape has over 12 years experience working in the 3D Photo and Video Simulations industry. Truescape has completed a wide range of different visualisation projects from photo-simulations for simple projects to full computer generated 3D video simulations for complex projects. Truescape's client base spans many industry sectors such as solar, wind, transmission and generation across New Zealand, Australia, and the US.

1.2 Truescape adopts a team approach for project completion as each type and phase of a project calls for a different mix of specialised skill sets. This expertise spans many disciplines including photography, engineering, architecture, surveying, landscape architecture, 3D computer modelling, evidence preparation and presenting evidence as expert witnesses. All members of our staff have either formal qualifications or have undergone professional training and have direct experience working in each these specialised areas.

1.3 Truescape simulations have been produced as evidence in forums such as the New Zealand Environment and High Courts, Australia's Victorian Civil and Administrative Tribunal, the Supreme Court and the Connecticut Siting Council. Members of Truescape's staff have presented evidence as expert witnesses in these Courts, where our work has been subjected to cross-examination and accepted as evidence.

1.4 Truescape has assisted in providing survey controlled simulations for the following developments:

- 2003 – Meridian Energy, Te Apiti Farm, Council Hearing;
- 2004 – Meridian Energy, White Hill Farm, Council Hearing;
- 2004 – Southern Hydro, Dollar Wind Farm South Australia, Panel Hearing;
- 2005 – Genesis Energy, Awhitu Wind Farm, Environment Court;
- 2005 – Unison Energy, Hawkes Bay Wind Farm, Environment Court;
- 2006 – Meridian Energy, Project West Wind, Environment Court;
- 2006 – Acciona Energy, Wind Farm South Australia, Panel Hearing;
- 2007 – Invenergy, Moresville Wind Energy Park, New York; USA Permitting Hearing;

- 2008 – Bluewater Wind, Offshore Wind Farm, Maryland, USA; Permitting Hearing;
- 2008 – Bluewater Wind, Offshore Wind Farm, New Jersey, USA; Permitting Hearing
- 2008 – BP Alternative Energy – White Pines Project, Michigan, USA; Permitting
- 2008 - Meridian Energy, Project Mill Creek, Council Hearing
- 2008 – Meridian Energy, Project Hayes, Environment Court;
- 2009 – Meridian Energy; Project Central Wind; Environment Court
- 2010 – WestWind Energy, Australia, Permit Application;
- 2010 – Pacific Hydro; Australia, Panel Hearing;

2. SCOPE OF STATEMENT

2.1 First Solar Inc. engaged Truescape in October 2010 to provide:

- Seven survey controlled TrueView™ photo simulations from 7 pre-determined key observation point locations. The simulations are a tool to assist with the visual assessment of the proposed "Topaz Solar Farm LLC" project.
- Three computer-generated 3D-Drive-through simulations depicting the proposed Solar Farm as seen from a car driving along portions of Carrisa Highway (Blue Star Memorial Highway 58).

2.2 The scope of Truescape's work does not extend to the assessment or interpretation of the simulations for issues relating to the proposed Solar PV Array Projects visibility and its landscape and visual effects.

2.3 Page 4 provides validation of our methodology with post construction analysis of Project West Wind, a wind farm project in New Zealand.

2.4 We have set out the following in **Appendix A**

- Key Observation Point Locations and Camera Paths of 3D-Drive-through Simulations; (Page 5)
- An overview of the TrueView™ Photo Simulations; (Pages 6-7)
- An overview of the computer generated 3D-Drive-through Video Simulation; (Page 8)
- Methodology; (Pages 9-18)
- Model Input Data used to create the simulations; (Pages 19-23)

3 SUMARY AND CONCLUSION

3.1 The TrueView™ Photo-Simulations have been created using a robust methodology which when combined with the datasets outlined in this evidence sees these simulations generated using the most advanced and accurate technology available at the time of creation. Truescape consider the TrueView™ photo simulations accurately represent the primary human field of view of the Solar Farm when viewed from the surveyed view point positions at the same time of day and reflecting the same conditions as those on the day the photographs were taken.

3.2 Truescape consider that the video simulation of the Topaz Solar Farm Project depicts accurately the landform and panel positions based on the contour and engineering data provided to us. Foreground objects such as buildings, vegetation and road signage etc are representative of that actually seen on the journey simulated. Because of the parameters used in creating the video simulation, Truescape consider that the video is a fair representation of the potential views of the proposed solar farm.

VALIDATION OF THE TRUESCAPE METHODOLOGY

4.1 We have attached below some post construction analysis of the Project West Wind wind farm that compared a simulation against the completed project. This comparison demonstrates the accuracy of the TrueView methodology. In particular, it can be seen that the size and placement of the turbines in this simulation is identical to the wind farm that was constructed. It should be noted that the turbines in the simulation seem more obvious than the actual turbines in the photograph due to the atmospheric conditions experienced on the day the photograph was taken.

4.2 The simulation and photograph were produced 2 years and 7 days apart and both are taken at the same time of day so as to produce the same lighting and shadow conditions.

PHOTOPOINT 18 - GUN EMPLACEMENTS (LOOKING SOUTH TOWARDS WEST WIND)

SIMULATION OF PROJECT WEST WIND PRE CONSTRUCTION (February 2008)

GUN EMPLACEMENTS (LOOKING SOUTH)

PHOTOGRAPH OF PROJECT WEST WIND POST CONSTRUCTION (February 2010)

4.3 The methodology by which the Topaz Solar Farm LLC Photo Simulations were created is based upon the same survey accurate technology that was used to create the simulation above.

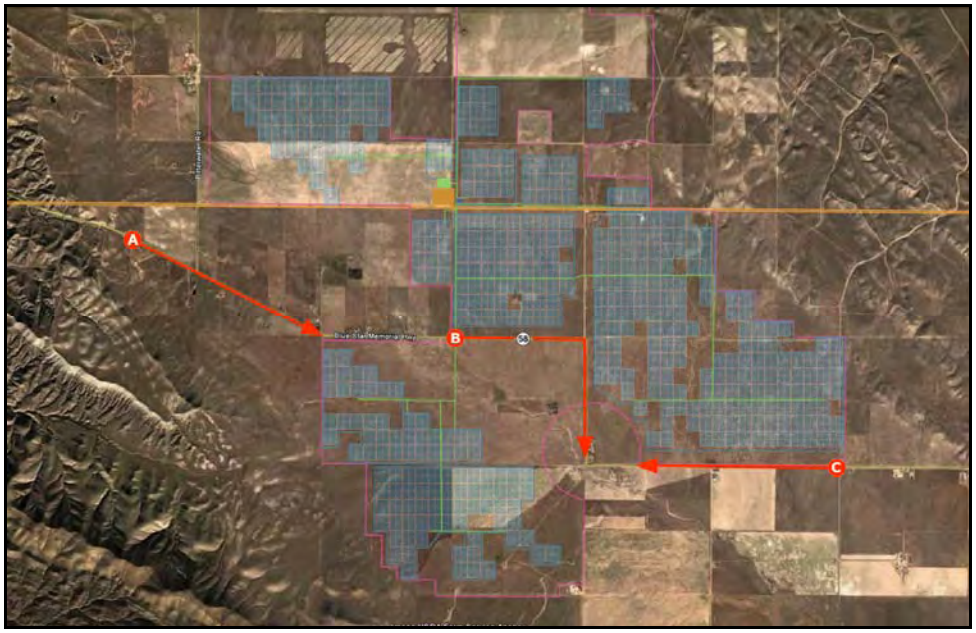
APPENDIX A

KEY OBSERVATION POINT LOCATIONS

- Location map depicting key observation point locations (KOP) used for the TrueView™ photo simulations.

VIDEO SIMULATION PATHS

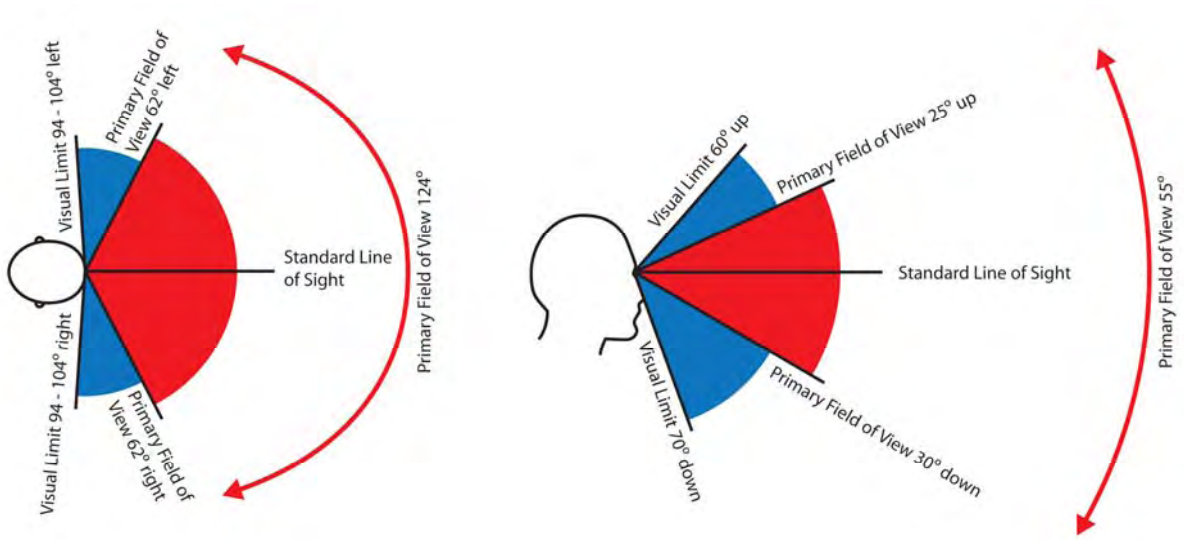
- Map showing the 3 camera paths of the computer generated 3D-Drive-through video simulations.



TrueView™ PHOTO SIMULATIONS

- A TrueView™ is a high resolution, true scale format photo simulation that represents **The Primary Human Field of View** that would be seen if standing 19.7 inches back from the actual photo point position at the same time of day and reflecting the same climatic conditions as those experienced on the day the photograph was taken.

PRIMARY HUMAN FIELD OF VIEW



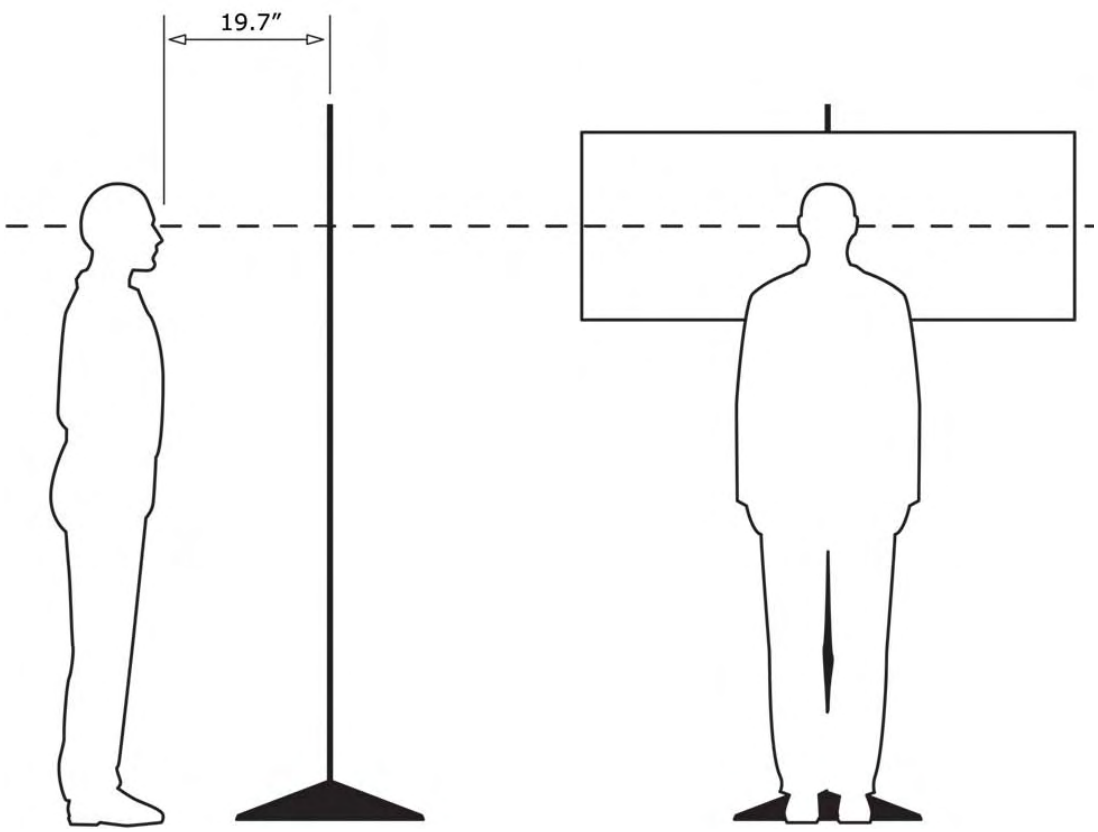
Primary Human Horizontal Field of View

Primary Human Vertical Field of View

Reference: Panero J. and Zelnick M. (1979)
Human dimension and interior space: A source book of design reference standards, London: The Architectural Press Ltd

Correct Viewing of TrueView™ Photo Simulations

- The TrueView™ simulations when viewed at the correct height and from a distance of 19.7 inches from the center of the image completely fill your field of view with the same view you would see at the photo point position.
- The image should be displayed level at such a height to allow the viewer line of sight to be directly at the centre of the image.
- The viewer should be looking forward at the centre of the image at all times to ensure correct viewing as shown below.



3D-DRIVE-THROUGH SIMULATION

- 3D Video Simulations are animated simulations generated using the contour data outlined on Page 19, overlaid with aerial photography. The solar panels, transmission towers and substation components are then placed accurately onto the model and the video is then generated.

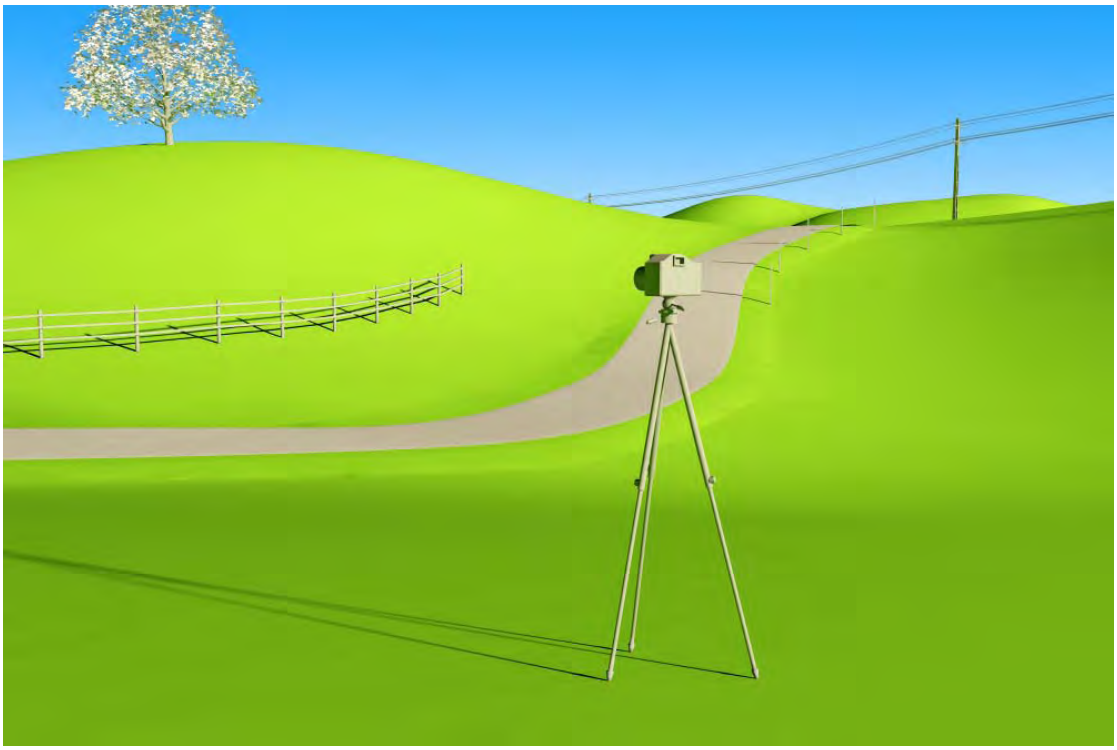
- 3D Video Simulations are an indicative depiction based on land form topography and include “clutter” objects such as vegetation, buildings and fences modelled in 3D.

- The accuracy of the 3D Video Simulations fall within the accuracy levels of the terrain contour data that was used to generate it, which is +/-1.5 ft within the project boundaries and +/-15 ft for terrain outside the project boundaries and roads not directly adjacent to the project.

- The camera in the video simulation is 4.9 ft above the road level and travels along the road not exceeding local speed limit with the view toward the solar farm.

- The image above is a representative screen-shot of the computer generated 3D-drive-by sequence along Carrisa Highway (Blue Star Memorial Highway 58)

THE SITE VISIT



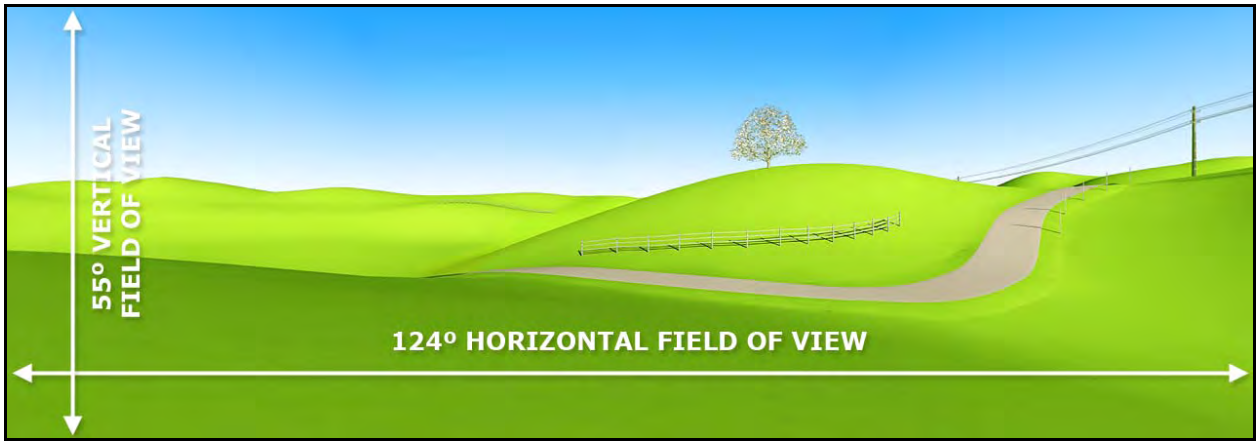
- The site visit is undertaken to capture the necessary photographs and ground mark the photo point position and identify additional reference points to enable the surveyor to survey fix the exact location of the camera.

- A digital SLR 1:1 21 mega pixel camera is used to take the photography. This camera produces photographs at a resolution and clarity as good as current technology will allow when generating simulations.

CREATING THE PRIMARY HUMAN FIELD OF VIEW IMAGE

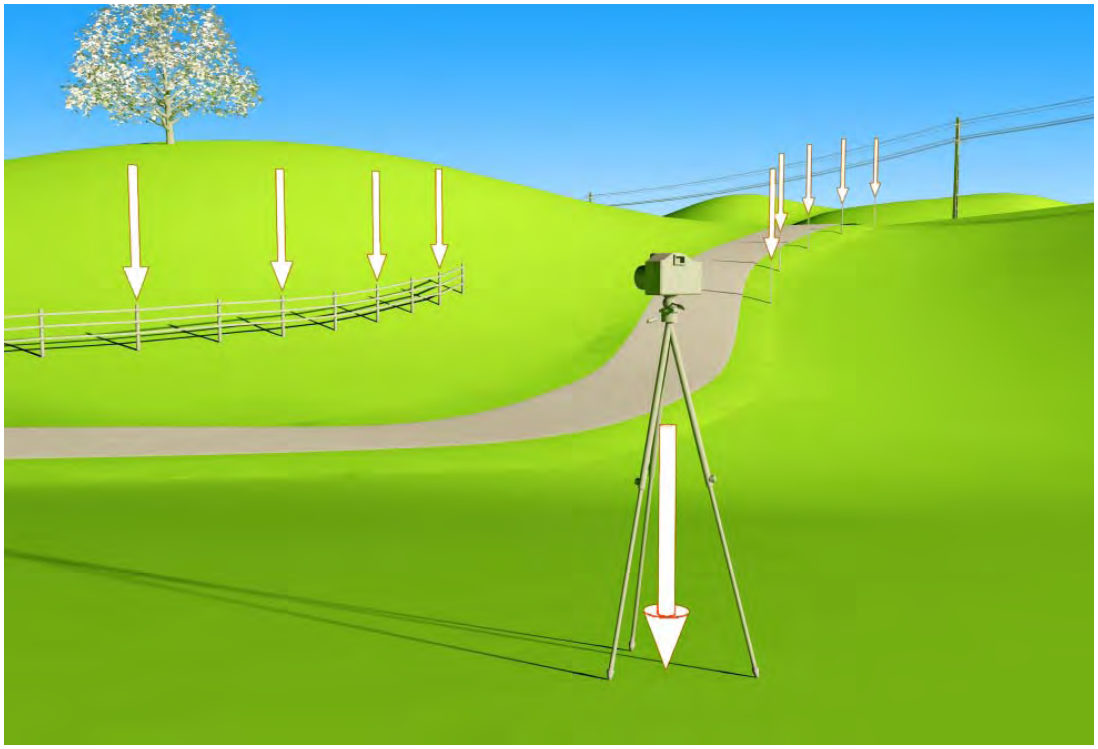
- The photographs are taken so that they overlap precisely to allow both the Primary Human Vertical and Horizontal Field of View to be recreated into a single primary human field of view image.

THE FINAL COLOUR ADJUSTED TrueView™ PHOTOGRAPHY



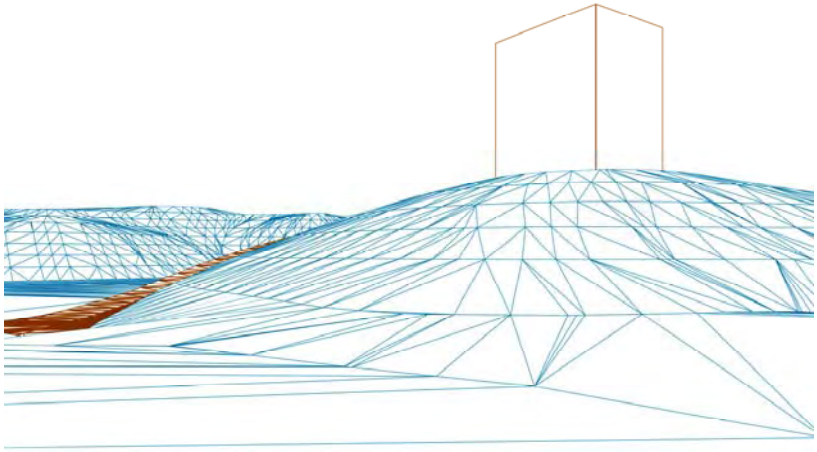
- Using the middle photographs as the benchmark, each of the adjoining photographs are colour adjusted to ensure consistency throughout the image. The TrueView™ photograph is now complete.

CAPTURING THE SURVEYED REFERENCE POINTS



- To accurately create a TrueView™ photo simulation the exact position of the camera is survey fixed by a surveyor.
- Additional reference points are identified during the site visit so that the 3D model can be accurately placed into the photo. These reference points include things like fences, vegetation, or temporary markers placed in the scene. The surveyor is directed to each of these points.

ALIGNING THE SURVEYED REFERENCE POINTS

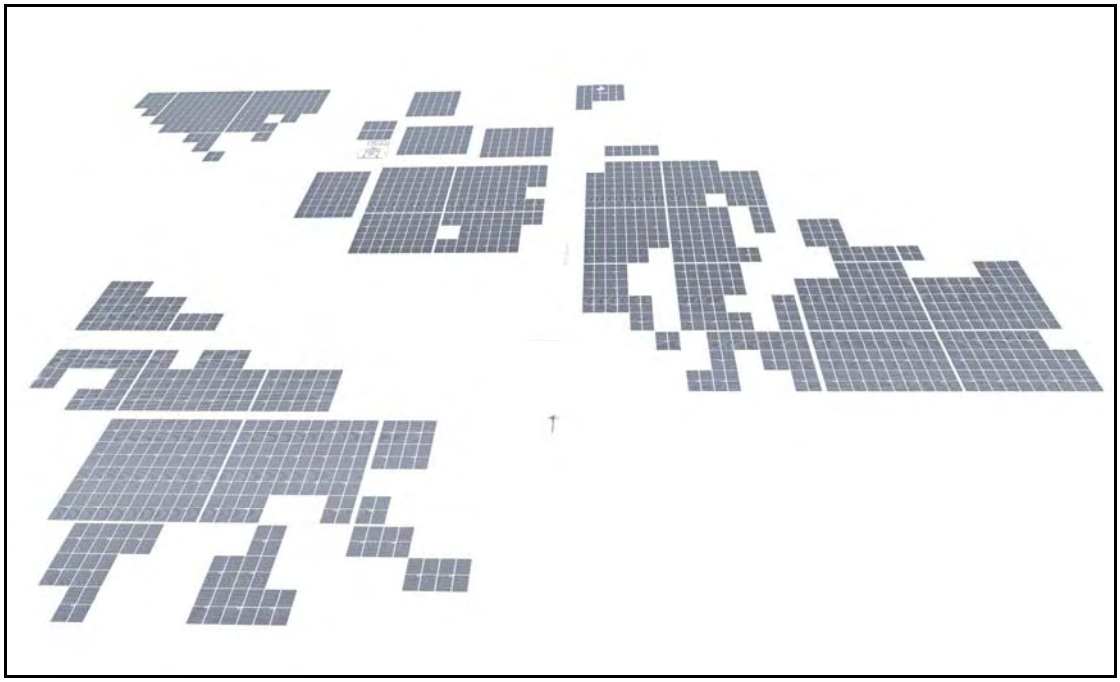


- The next step is to construct the 3D computer model. Using Autodesk® 3ds Max® 3D computer simulation software the survey fixed photo and reference points are imported into the 3D model. A “computer camera” is created to simulate the camera that captured the original photographs, including matching the focal length. The simulated “computer camera” is then positioned at the same survey coordinates as the physical observation point positions.

- The photographs are then incorporated into the computer model. This is done by correctly aligning the “computer camera” to match the surveyed reference points to the reference objects, and to the terrain if required.

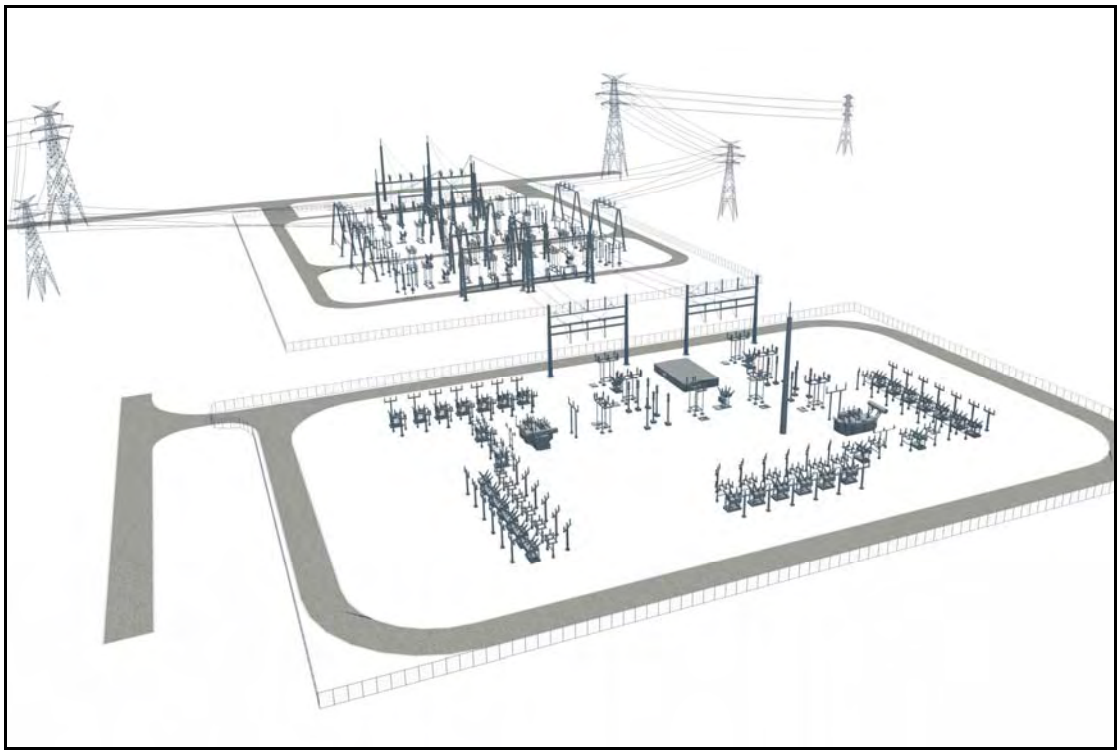
BUILDING THE PROPOSED PROJECT IN 3D

- The proposed project is then modelled in 3D in accordance with all dimensions, site layouts, colours and textures.

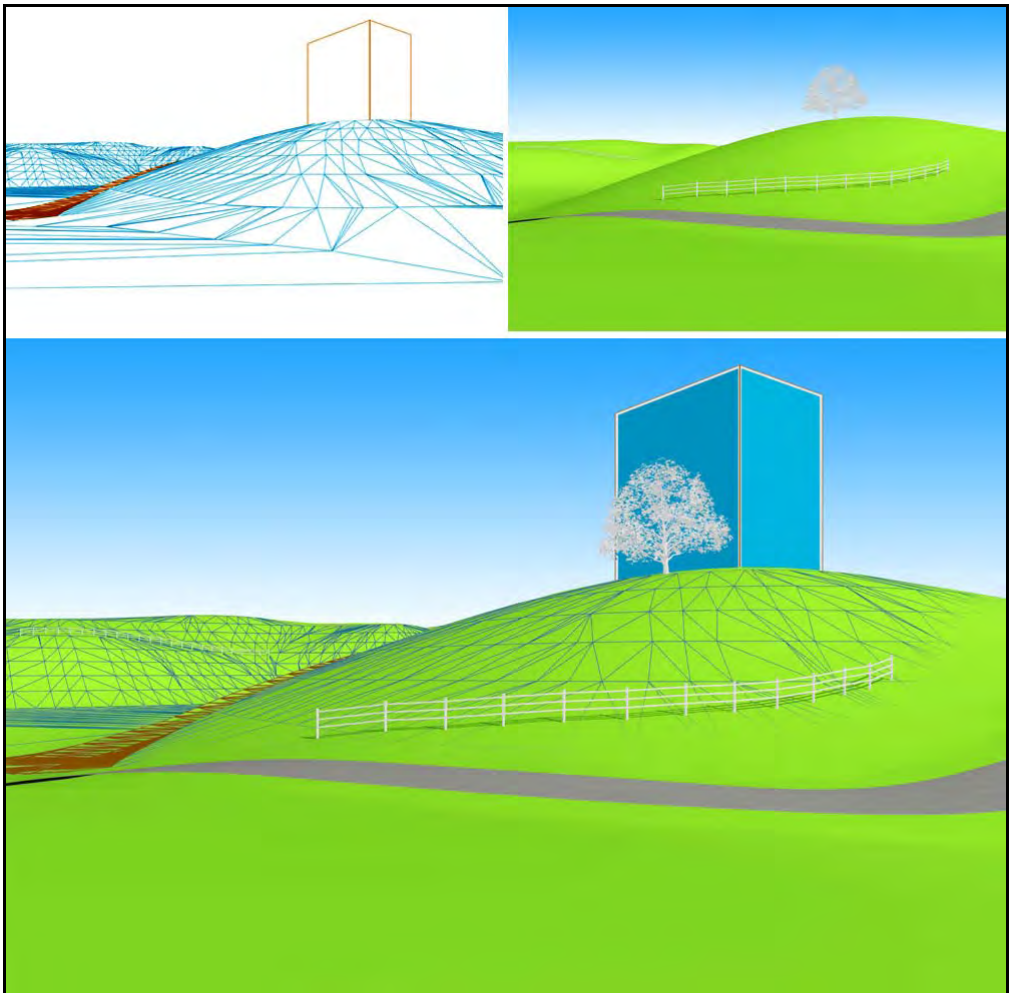


- Elevated view of 3D-model of the solar farm

- All elements of the project are accurately modelled to design drawings



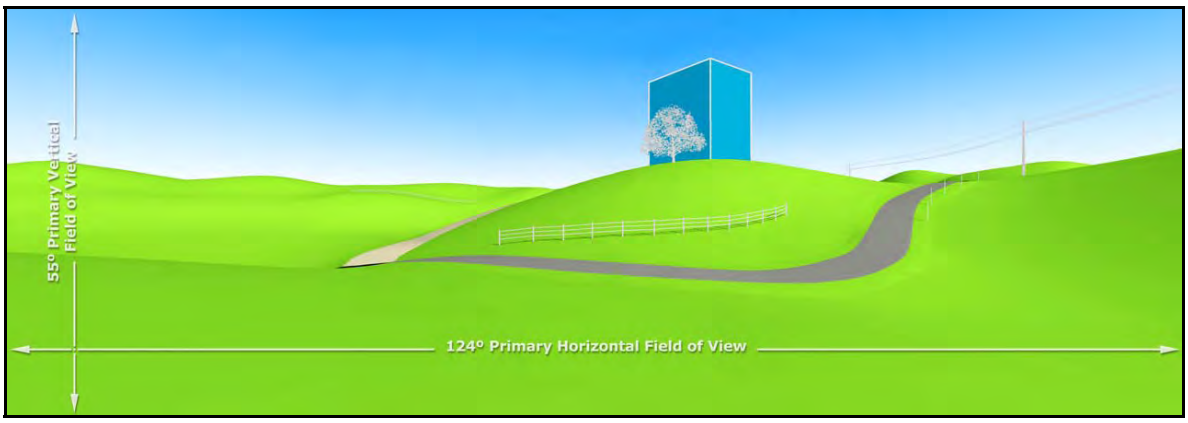
BUILDING THE PROPOSED PROJECT IN 3D



- The 3D terrain model of the site has been generated using the land contour data. The proposed solar plant has now been modelled in 3D and is now imported and positioned accurately into the scene.

- The simulation software allows the sun to be simulated for the precise period of time the original photography was captured for. This ensures the lighting of the solar plant panels as well as the shadows they cast are an accurate depiction of how the proposed solar farm would appear in the photograph at the same time of day and reflecting the same climatic conditions as those experienced at the time the photograph was taken.

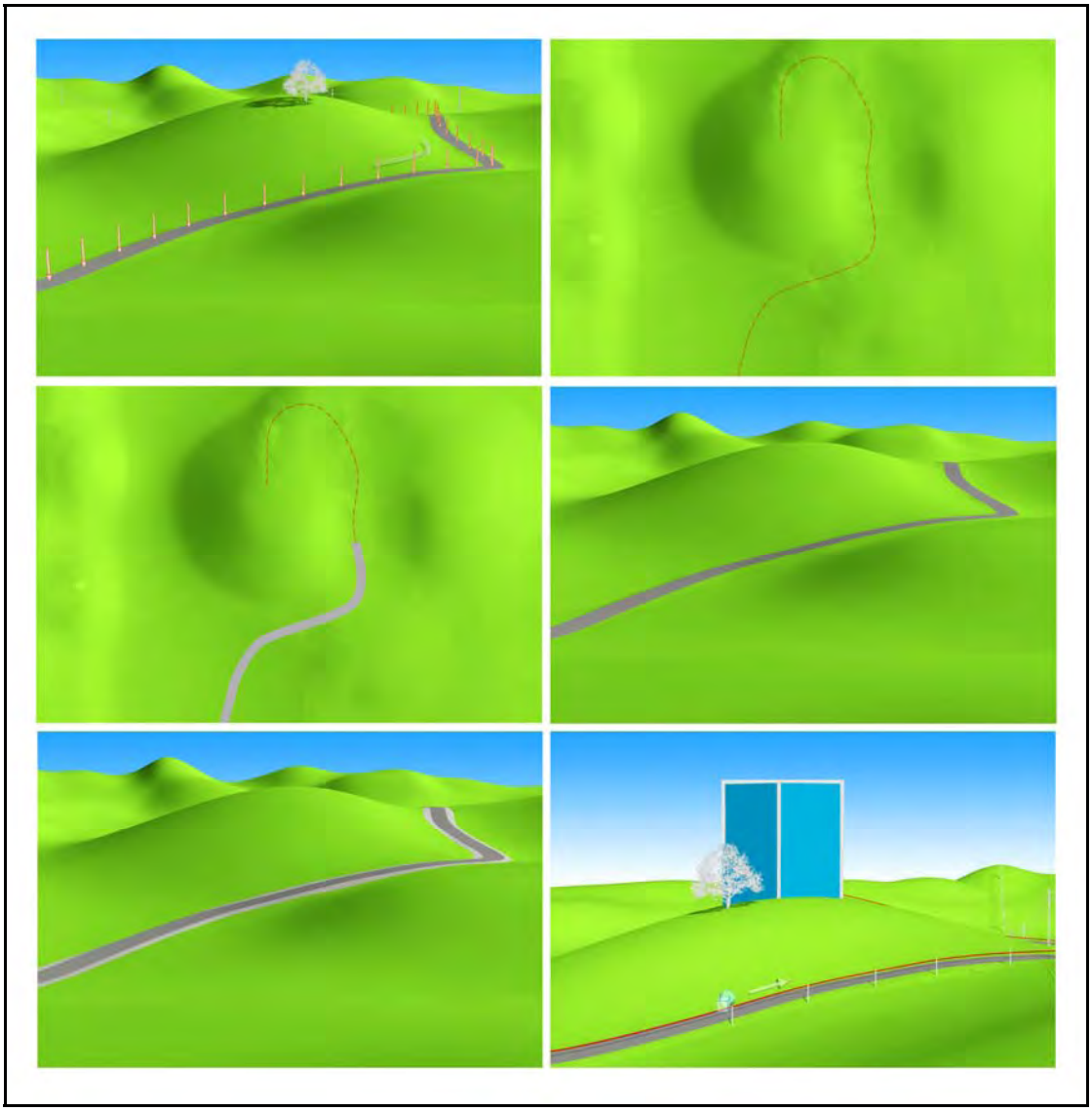
THE FINAL TrueView™ SIMULATION



- In order to correctly place existing objects that are in front of the 3D model of the development, these foreground objects are overlaid, from the original photograph, onto the computer generated image using photo shop software.

- Our extensive experience in researching how to accurately simulate the "Primary Human Field of View" has determined that the lens type is irrelevant when generating such simulations. The key factors are the aligning of the raw photographs in 3D, the size that the simulations are output at, and the viewing distance.

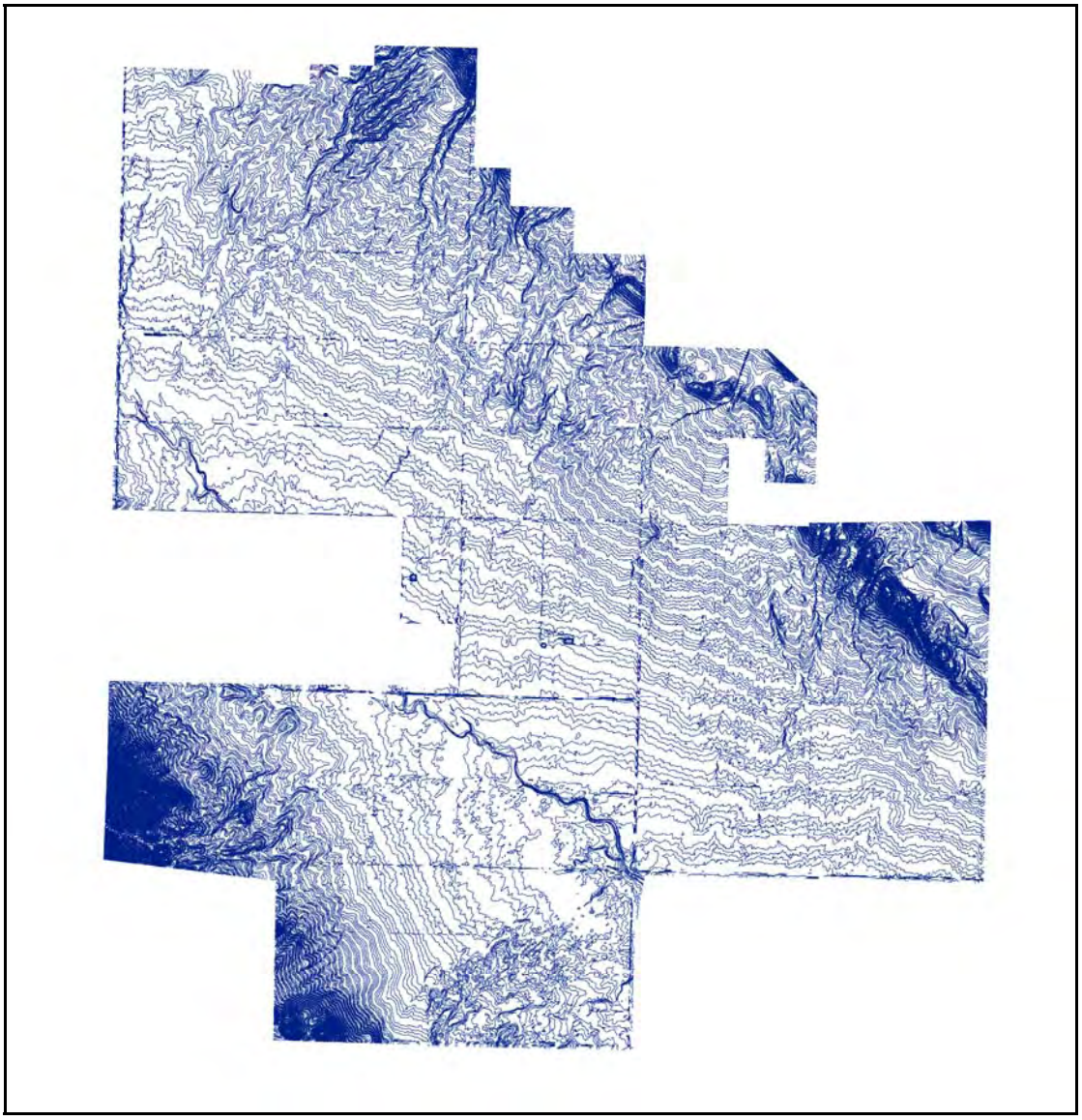
- The full size TrueView™ simulations are printed at a size that represents the "Primary Human Field of View", being 124º horizontal field of view and 55º vertical field of view when standing 19.7 inches from the centre of the image



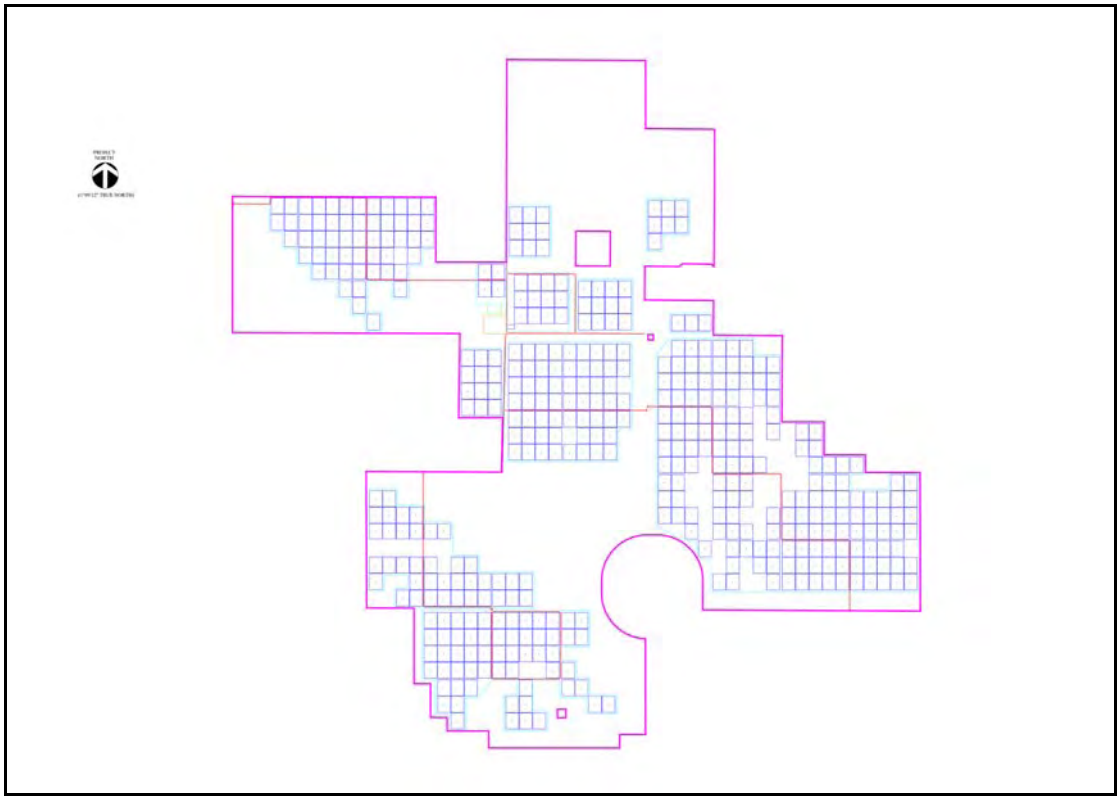
- The existing road is aligned from aerial photography and terrain data to position the surface and camera for the simulation.
- This road surface and the solar farm components are then combined into one digital terrain model. The contour data has accuracy as stated on page 19 of this document (+/- 1.5 ft for the site and +/- 15 ft for outer terrain).
- Reference video and photography is captured on site and then used to visually place objects such as buildings, fences, power poles and roadside vegetation.
- Aerial maps are used to locate buildings, more major vegetation and models of trees are placed into the scene at the correct location.

MODEL INPUT DATA

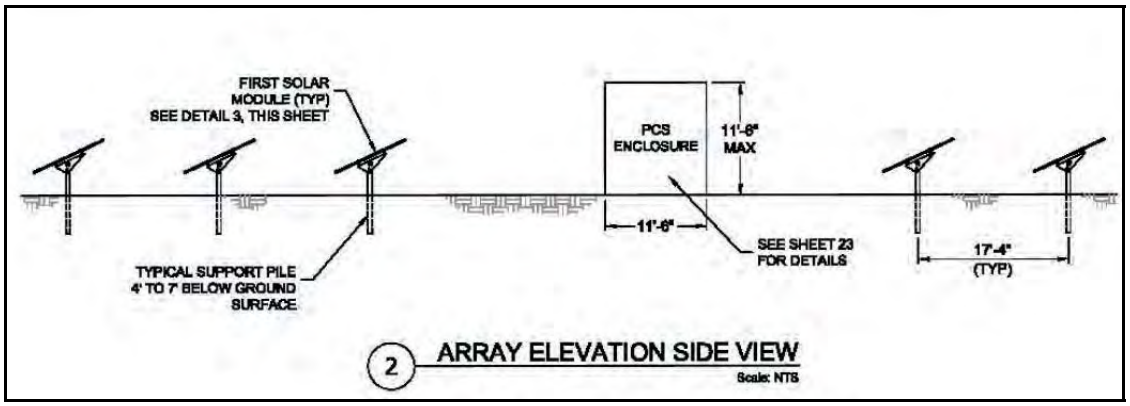
- All data including panel layout, dimensions, array placement, transmission line structure type and placement, substation structures and terrain data at 3 ft contours for the core of the site were provided by First Solar Inc.



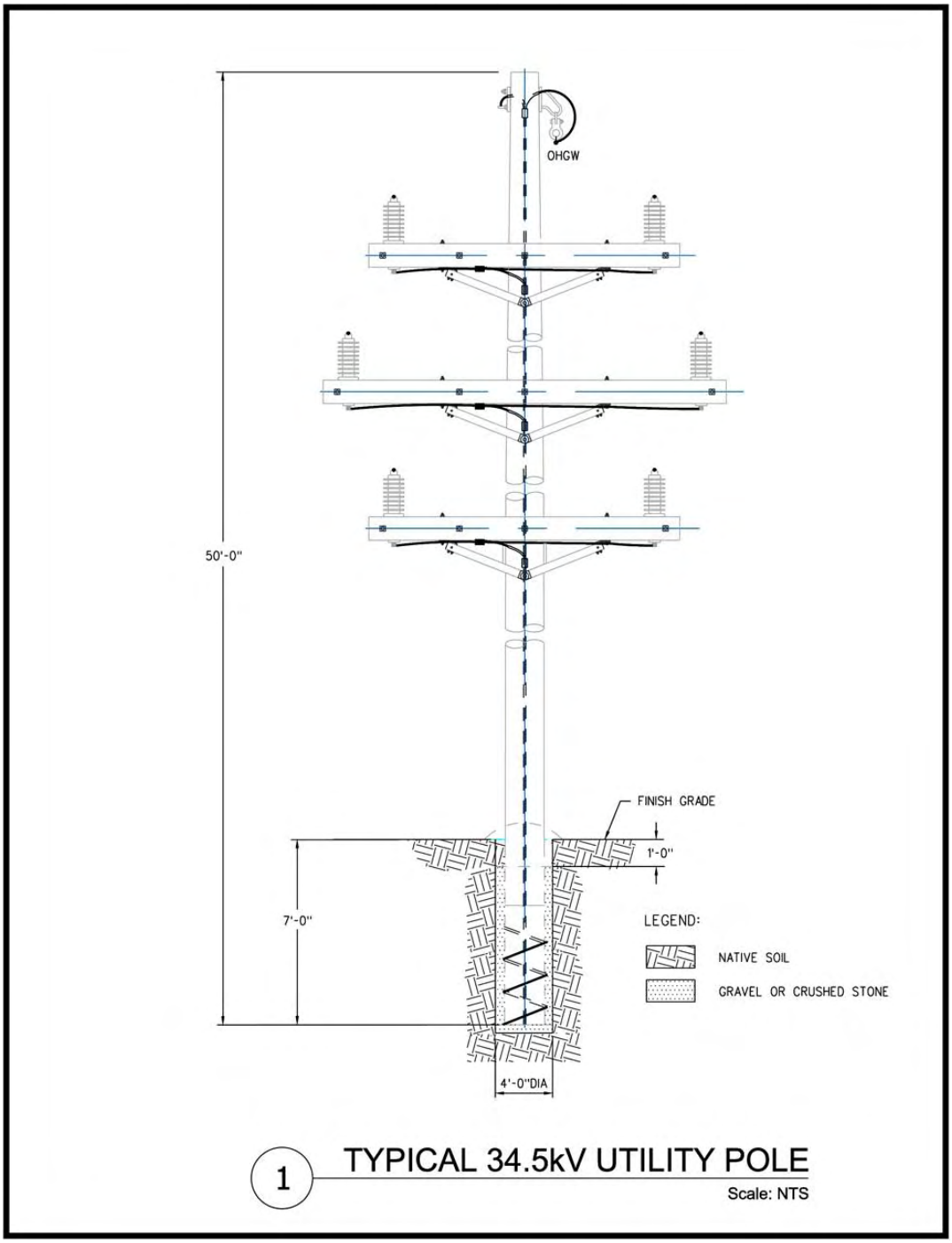
- Above CAD screenshot depicts terrain data supplied at 3 ft contour intervals for the site



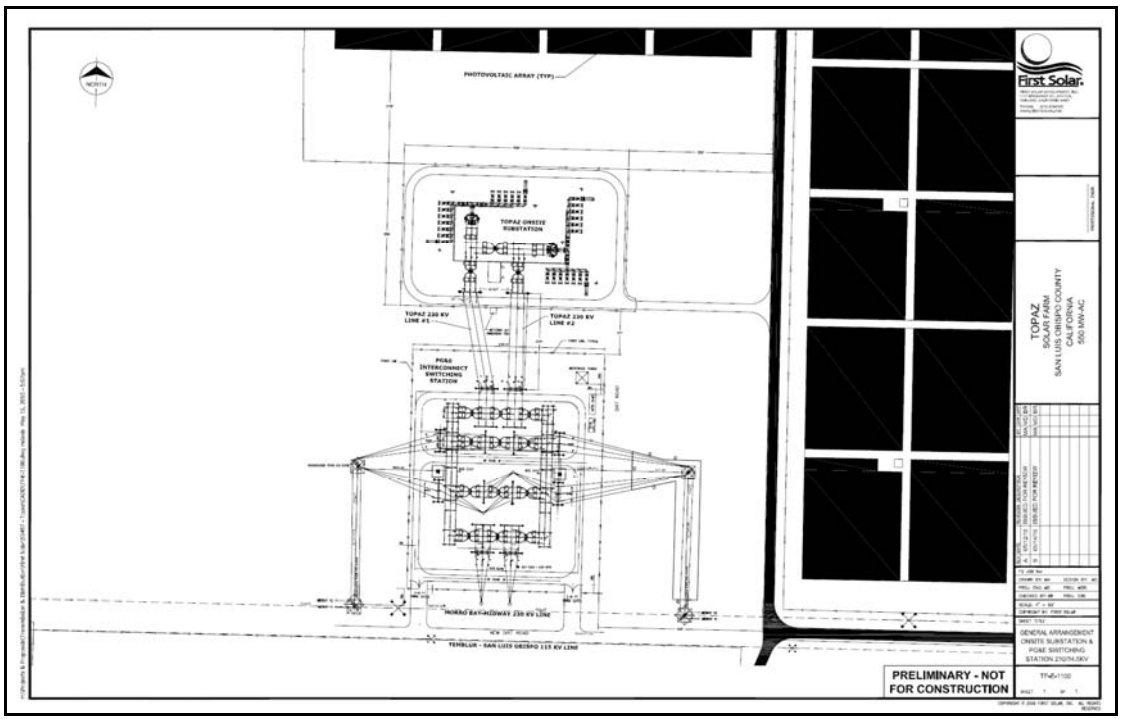
- Above CAD screenshot depicts Solar Plant layout including individual PV array placement, internal substation and interconnection substation placement



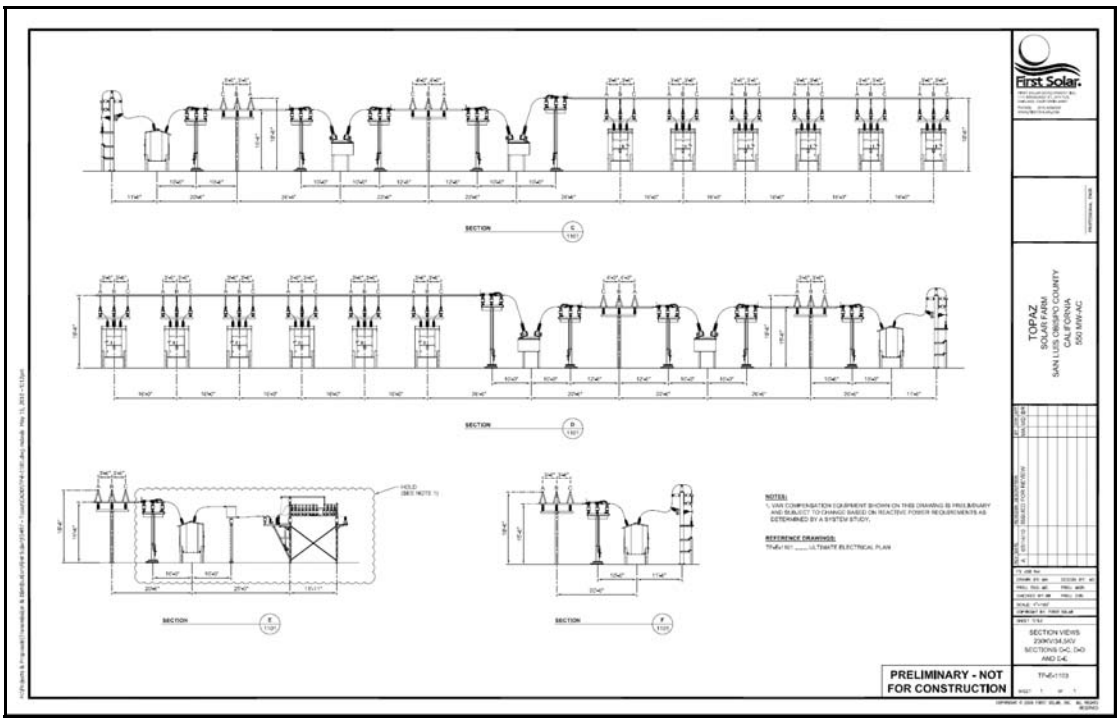
- Above CAD drawing depicting dimensions of solar panels and PCS enclosures.



- CAD drawing depicting 34.5 kV transmission towers, provided by First Solar Inc.



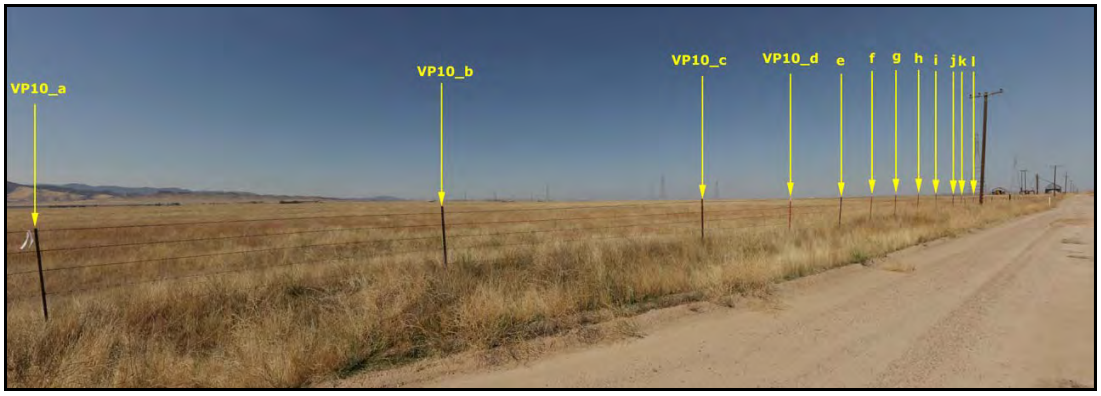
- CAD drawing depicting onsite substation and interconnect switching station layout as well as placement in relation to solar arrays and existing road



- CAD drawing depicting cross section of substation structures

MODEL INPUT DATA

- The images below represent alignment of the digital terrain - depicted by coloured overlay - and 3D model to the real world photography. Camera locations including individual reference points where precision surveyed by: Wallace Group; 612 Clarion Court; San Luis Obispo, CA 93401



- Using key observation point 04 as an example the images above show reference points depicted by coloured lines which have been requested, survey fixed and were used to accurately position 3D model of proposed Solar Farm and substations into the photograph.

Appendix E
Biological Resources, Including Section 7 Consultation

TOPAZ BEST MANAGEMENT PRACTICES

Best Management Practices

BMPs were derived from the Draft EIR for the Topaz Solar Farm (San Luis Obispo County 2010a). BMPs will be implemented as standard operating procedures during all ground disturbance and construction-related activities to avoid or minimize project impacts on biological resources. These BMPs, which would be enforced by the County, may include but are not limited to the following:

a. Compliance with BMPs will be documented and provided to the County in a written report on an annual basis. The report shall include a summary of the construction activities completed, a review of the sensitive plants and wildlife encountered, a list of compliance actions and any remedial actions taken to correct the actions, and the status of ongoing mitigation efforts.

b. Prior to ground disturbance of any kind the project work areas shall be clearly delineated by stakes, flags, or other clearly identifiable system.

c. Vehicles and equipment shall be parked on pavement, existing roads, and previously disturbed areas to the extent practicable.

d. Speed limit signs, imposing a speed limit of 15 miles per hour, will be installed throughout the project site prior to initiation of site disturbance and/or construction. To minimize disturbance of areas outside of the construction zone, all project-related vehicle traffic shall be restricted to established roads, construction areas, and other designated areas. These areas will be included in preconstruction surveys and to the extent possible, should be established in locations disturbed by previous activities to prevent further impacts. Off-road traffic outside of designated project areas will be prohibited.

e. No vehicles or equipment shall be refueled within 100 feet of an ephemeral drainage or wetland unless a bermed and lined refueling area is constructed. Spill kits shall be maintained on site in sufficient quantity to accommodate at least three complete vehicle tank failures of 50 gallons each. Any vehicles driven and/or operated within or adjacent to drainages or wetlands shall be checked and maintained daily to prevent leaks of materials.

f. All general trash, food-related trash items (e.g., wrappers, cans, bottles, food scraps, cigarettes, etc.) and other human-generated debris will be stored in animal proof containers and/or removed from the site each day. No deliberate feeding of wildlife will be allowed.

g. Development on the main Project site will maintain existing hydrologic patterns with respect to runoff supporting seasonal wetlands, vernal pools and ephemeral drainages.

h. All pipes and culverts with a diameter of greater than 4 inches shall be capped or taped closed. Prior to capping or taping the pipe/culvert shall be inspected for the presence of wildlife. If encountered the wildlife shall be allowed to escape unimpeded.

i. No firearms will be allowed on the project site, unless otherwise approved for security personnel.

j. To prevent harassment or mortality of listed, special-status species and common wildlife, or destruction of their habitats, no domesticated animals of any kind shall be permitted within the fenced project area with the exception of sheep grazing for weed management. Dogs associated with sheep grazing shall not be authorized.

k. Use of chemicals, fuels, lubricants, or biocides will be in compliance with all local, state and federal regulations. All uses of such compounds shall observe label and other restrictions mandated by the U.S. Environmental Protection Agency, California Department of Food and Agriculture, and other state and federal legislation, as well as additional project-related restrictions deemed necessary by the USFWS and CDFG. Use of rodenticides is restricted.

l. Any contractor or employee that inadvertently kills or injures a special-status animal, or finds one either dead, injured, or entrapped, will immediately report the incident to the on-site representative identified in the Worker Environmental Awareness Program. The representative will contact the USFWS, CDFG, and County by telephone by the end of the day, or at the beginning of the next working day if the agency office is closed. In addition, formal notification shall be provided in writing within three working days of the incident or finding. Notification will include the date, time, location and circumstances of the incident. Any threatened or endangered species found dead or injured will be turned over immediately to CDFG for care, analysis, or disposition.

m. During the site disturbance and/or construction phase, grading and construction activities before dawn and after dusk are prohibited.

n. Avoidance and minimization of vegetation removal within active construction areas will include flagging of sensitive vegetative communities or plants.

o. Avoid and minimize construction activities resulting in impacts to wetlands, streambeds, and banks of any ephemeral drainage.

p. All excavation, steep-walled holes or trenches in excess of 6 inches in depth shall will be covered at the close of each working day by plywood or similar materials, or provided with one or more escape ramps constructed of earth dirt fill or wooden planks. Trenches will also be inspected for entrapped wildlife each morning prior to onset of construction activities and immediately prior to covering with plywood at the end of each working day. Before such holes or trenches are filled, they will be thoroughly inspected for entrapped wildlife. Any wildlife discovered will be allowed to escape before construction activities are allowed to resume, or removed from the trench or hole by a qualified biologist holding the appropriate permits (if required).

q. Project personnel will monitor all areas within 1/4-mi around the solar arrays on a regular basis (i.e., several times per week) for any dead animals, including wild animals or grazing animals such as cattle, goats, or sheep that are being used for vegetation management on the site. Any animals found dead will be removed immediately to avoid attracting condors to the vicinity of the arrays.

r. New light sources will be minimized, and lighting will be designed (e.g., using downcast lights) to limit the lighted area to the minimum necessary.

TOPAZ DRAFT VEGETATION MANAGEMENT PLAN

DRAFT

Vegetation Management Plan
(Includes Weed Management and Grazing Management)

Topaz Solar Farm

San Luis Obispo County
California

Prepared for

Topaz Solar Farms, LLC
1111 Broadway, 4th Floor
Oakland, CA 94607

by

ALTHOUSE AND MEADE, INC.
BIOLOGICAL AND ENVIRONMENTAL SERVICES
1875 Wellsona Road
Paso Robles, CA 93446
(805) 467-1041

January 2010

654.32

Table of Contents

Definitions 1
1.0 Introduction 3
1.1 Vegetation Management Plan Treatment Area: Proposed TSF Project 3
1.2 Existing Vegetation Conditions and Results of Preliminary Vegetation Tests ... 3
1.3 Expected Change in Vegetation Conditions Due to Project Construction 4
1.4 Vegetation Management Goals 4
1.5 Fire Risk and Fuel Management 5
1.6 Protection of San Joaquin Kit Fox and Nesting Birds and Their Habitat 5
2.0 Weed Management Plan 6
2.1 Definitions and Regulatory Background 6
2.1.1 Federal Noxious Weeds List 6
2.1.2 California Department of Food and Agriculture Noxious Weeds List 6
2.1.3 California Invasive Plant Council (Cal-IPC) Invasive Plant Inventory 7
2.1.4 San Luis Obispo County Weed Management Area 7
2.1.5 Unlisted Project-specific Weeds 8
2.2 Weedy Species that Occur at Topaz Solar Farm 8
2.2.1 Species on the Federal Noxious Weeds List 13
2.2.2 Species on the CDFA and/or Cal-IPC Lists 13
A. Barbed Goatgrass (*Aegilops triuncialis*) 14
B. Tree of Heaven (*Ailanthus altissima*) 14
C. Yellow Starthistle (*Centaurea solstitialis*), Tocalote (*Centaurea melitensis*) 14
D. Rush Skeletonweed (*Chondrilla juncea*) 15
E. Field Bindweed (*Convolvulus arvensis*) 15
F. Tansy Mustard (*Descurainia sophia*) 15
G. Perennial Mustard (*Hirschfeldia incana*) 16
H. Perennial Peppercress (*Lepidium latifolium*) 16
I. White Horsenettle (*Solanum elaeagnifolium*) 16
J. Russian Thistle (*Salsola tragus*) 17
K. Tamarisk (*Tamarix parviflora*) 17
L. Puncture Vine (*Tribulus terrestris*) 17
2.2.3 Species of management concern for the Project site 18
A. Tumbleweed Amaranth (*Amaranthus albus*) 18
B. Oriental Mustard (*Sisymbrium orientale*) 18
2.3 Weedy Species that Occur in the Carrizo Plain Region but not at the Project .. 18
A. Damascus Saltwort (*Salsola damascena*) 19

2.4 Weed Management Objectives 19
2.5 Management Methods by Species 21
2.6 Management Methods by Location 23
2.6.1 Fenced areas (PV arrays and wildlife buffers) 23
2.6.2 Roadsides 23
2.6.3 Buildings and switching station structures 24
2.7 Preventing New Infestations 24
2.7.1 Minimize soil disturbance 24
2.7.2 Equipment and materials sanitation 24
2.7.3 Revegetation 25
2.8 Herbicide Use 25
2.8.1 Legal framework for herbicide application 25
2.8.2 Pest control advisor recommendations for persistent weeds 25
2.8.3 Safe handling and storage 26
2.8.4 Spill cleanup of herbicides 26
2.9 Weed Control Monitoring 26
2.9.1 Construction phase 26
2.9.2 Operation phase 26
2.10 Adaptive Management 27
2.11 Resources for More Information 27
3.0 Grazing Plan 28
3.1 Grazing Objectives 28
3.2 Literature Review: Effects of Short Duration Grazing 28
3.2.1 Sheep versus cattle grazing 28
3.2.2 Soil properties 28
3.2.3 Plant and wildlife diversity 29
3.2.4 Habitat quality 29
3.3 Locations for Use of Sheep versus Cattle 30
3.4 Timing 30
3.5 Grazing Intensity and Management 30
3.6 Target Weed Species for Grazing Control 30
3.7 Water for Livestock 31
3.8 Grazing Monitoring Plan 31
3.8.1 Additional grazing study proposed 31

3.9 Adaptive Management 31
4.0 Conclusion 31
5.0 Vegetation Management Plan Figures 32
6.0 Weed Identification Photographs 34
7.0 References 40
Appendix A. SLO County WMA Weeds List A-1
Appendix B. Preliminary Grazing Trial Report B-1

List of Tables

TABLE 1. WEEDY SPECIES 9
TABLE 2. MANAGEMENT GOALS FOR WEEDY SPECIES 20
TABLE 3. MANAGEMENT METHODS FOR WEEDY SPECIES 21

Definitions

Project Areas

TSF: **Topaz Solar Farm**; name of the proposed project.

TSF Project: **Topaz Solar Farm Project**; used generically to describe the project, without distinction between the project layout options.

Regulatory and Organization Abbreviations

APN: Assessor's Parcel Number
EIR: Environmental Impact Report
CEQA: California Environmental Quality Act
USGS: United Stated Geologic Survey
MDBM: Mount Diablo Base Meridian
NRCS: Natural Resrouce Conservation Service
USDA: United States Department of Agriculture
CDFA: California Department of Food and Agriculture
Cal-IPC: California Invasive Plant Council
CPNM: Carrizo Plain National Monument
BLM: Bureau of Land Management

Technical Abbreviations

PV: Photovoltaic
MW: Megawatts
kV: Kilovolts; 1000 volts
PV Array: A block of photovoltaic modules
PV Module: An individual solar panel
GIS: Geographic Information Systems
GPS: Global Positioning System
DVM: Doctor of Veterinary Medicine

Species Abbreviations

SJKF: San Joaquin Kit Fox

1.0 Introduction

This plan provides information regarding vegetation resources and invasive weeds that occur on lands associated with the Topaz Solar Farm (TSF) photovoltaic (PV) power facility (Project) in San Luis Obispo County. Vegetation management goals are identified and strategies to support those goals over the life of the project are recommended. Vegetation within the TSF must be managed to maintain cover for habitat and erosion control goals, while minimizing risk of fire and maintaining optimum function of solar PV arrays. Monitoring and adaptive management details are included. These tasks share many goals and together constitute Vegetation Management during construction and operation of the Project.

Results of the Final Biological Report for TSF (Althouse and Meade, Inc. 2010b) informed the development of this Vegetation Management Plan. We provide habitat objectives for vegetation resources, and lists of target species for weed control on the Project site. The Vegetation Management Plan is an integrated plan, incorporating weed management and grazing management strategies and methodologies to encourage desirable plant species, plant densities, and plant heights while minimizing fire risk and controlling weeds.

1.1 Vegetation Management Plan Treatment Area: Proposed TSF Project

The Vegetation Management Plan covers the entire TSF Project (Treatment Area) (Figure 1, Section 5.0). Exact location and extent of the treatment area is dependent upon approval of a final Project option.

The Project is located in the northern Carrizo Plain area of San Luis Obispo County, California. The Project is within the La Panza NE and California Valley United States Geological Survey (USGS) 7.5 minute quadrangles. Elevation varies from approximately 2,010 to 2,200 feet above mean sea level.

1.2 Existing Vegetation Conditions and Results of Preliminary Vegetation Tests

Vegetation tests are in process at the TSF Project site to study the effects of PV arrays on regeneration and growth of vegetation within arrays.

The tallest and densest vegetation at the Project site grows on the recently farmed grain fields prepared for seeding just after the first rains. The shortest vegetation occurs in fields that have not been plowed for over 20 years. The proportion of bare ground showing was highest in the field prepared for seeding during the winter (when temperatures were low), and lowest in the fields that have not been plowed for over 20 years.

Based on preliminary vegetation test data, unplowed fields within the PV fenced arrays can produce sufficient biomass to protect the soil from erosion. There is sufficient light under modules to support ample biomass that can protect the soil from sheet flow and wind erosion. In addition, vegetation is likely to experience a longer growing season under the modules than out in the open due to lower soil and air temperatures. Shading may benefit perennial bunchgrass species, such as nodding needlegrass (*Nassella cernua*). Nodding needlegrass is a native bunchgrass that occurs along the edge of Highway 58 between Bitterwater Road and Simmler-Soda Lake Road. Roadsides

accumulate moisture that drains off the roadway, creating more mesic, or moderate, microsite conditions than adjacent fields in the Carrizo Plain. PV modules ameliorate extreme soil temperatures and allow grasses to grow longer due to an improved moisture regime under the PV arrays compared to open fields.

Site preparation methods for construction of the Project on actively farmed ground may include mowing or grazing, harrowing, and seeding prior to surface compaction. Topaz Solar Farms, LLC is currently investigating natural compaction levels in stable fields that have not been plowed in many years in order to determine appropriate, minimal site preparation operations while maintaining worker safety and limiting dust during construction. Topaz Solar Farms, LLC plans to prepare for construction with traditional farming methods plus minimal surface compaction (to 80 percent), as needed. The proposed methods will provide for worker safety while maintaining habitat for kit fox and their prey.

The vegetation test site will continue to be monitored to identify the appropriate ground treatment and seed mix that should be implemented during Project site preparation.

1.3 Expected Change in Vegetation Conditions Due to Project Construction

Examination of current habitat types within the Project site and associated land use history provides important insight regarding habitat recovery post-farming. The vegetative condition of certain areas indicate that within approximately five years after farming is eliminated, the land reverts to a low-diversity annual grassland habitat. Areas of the Project that have been untilled for 20 or more years show a significant increase in plant species diversity, and abundance of native wildflowers. We expect that conversion of croplands within the Project to passive solar facilities would initiate land conversion to annual grassland habitat, and that by the time the solar facility is decommissioned the land would support higher diversity and abundance of native plants than the present baseline.

Project installation on existing croplands may result in an increase in California annual grassland habitat through elimination of seasonal tilling and subsequent long-term management for grassland species. Vegetation between and beneath PV arrays is likely to recover after installation and be dominated by annual grasses In addition, existing cropland outside the TSF Facility perimeter fencing has been proposed for be removal from production and management as annual grassland habitat and protected in perpetuity as part of the TSF Project's San Joaquin Kit Fox Mitigation Plan (Althouse and Meade, 2010- insert correct citation).

The TSF Project would purchase and permanently conserve land surrounding the fenced array areas, resulting in a net increase of grassland habitat. Vegetation between and beneath PV arrays is likely to recover after installation and be dominated by California annual grasses. Management strategies that maintain appropriate grass height and residual dry matter could result in usable habitat for a variety of species.

1.4 Vegetation Management Goals

- Vegetate the ground within the Project to promote a natural habitat capable of supporting kit fox prey, in addition to a variety of birds, reptiles and amphibians

- Enable continued agricultural use of the site concurrent with solar power use via managed grazing, as feasible.
- Minimize use of power equipment and herbicide application for vegetation management.
- Provide adequate ground cover to prevent wind and water erosion of soils in the Project. Promote improved soil aggregate stability through increased soil organic matter, roots, and fungal associations. [Improved soil stability is correlated with reduced problems with dust and erosion.]
- Provide adequate cover to stabilize former croplands. Promote recovery of former croplands to annual grasslands.
- Promote recruitment of native plant species, especially perennial grasses and wildflowers, to Treatment Area.
- Manage fuel load to minimize risk of fire.
- Manage vegetation height to maintain optimum function of solar PV arrays.

1.5 Fire Risk and Fuel Management

A separate Wildfire Management Plan is under preparation which outlines goals specific to prevention of fire and management of potential fire hazards. Management of onsite vegetation through weed control and prescribed grazing will assist in meeting fire safety goals by reducing fuel loads.

1.6 Protection of San Joaquin Kit Fox and Nesting Birds and Their Habitat

Detailed information on the protection of nesting birds and San Joaquin kit fox (SJKF), will be provided in an Avian and Bat Protection Plan and a San Joaquin Kit Fox Mitigation and Monitoring Plan. Additional information on protection of natural resources, including wildlife, will be provided in a Worker Environmental Education Program.

Herding dogs associated with sheep grazing herds will not be used within fenced areas.

Herbicides used on the Project site shall be labeled safe for use around wildlife.

2.0 Weed Management Plan

2.1 Definitions and Regulatory Background

In general terms, a "weed" is a plant that is growing where it is not wanted, often tending towards overgrowth and choking out desired plants by its presence. Because the term "weed" can mean different things to different people, we have provided a summary of regulations governing noxious weeds and invasive plants in California. We then list the species addressed by this plan. Non-native species that occur at the Project site but are not listed by a regulating agency, invading the site or causing management problems are not considered weeds for the purposes of this document.

2.1.1 Federal Noxious Weeds List

The Federal Noxious Weed Act (7CFR 360) defines a "noxious weed" as "any living stage (including seeds and reproductive parts) of a parasitic or other plant of a kind which is of foreign origin, is new to or not widely prevalent in the U.S., and can directly or indirectly injure crops, other useful plants, livestock, poultry or other interests of agriculture, including irrigation, navigation, fish and wildlife resources, or the public health." This Act also defines "undesirable plants" as "species classified as undesirable, noxious, harmful, exotic, injurious, or poisonous under state or federal law, but not including species listed as endangered by the Endangered Species Act, or species indigenous to the area where control measures are to be taken." The Federal Noxious Weed List designates plant species that meet the definition of a noxious weed. None of the species on this List occur on the Project site, although the Carrizo Plain National Monument Plan reports *Salsola damascena* in the Monument. The Federal noxious weeds list considers *Salsola damascena* a part of *S. vermiculata* (sensu lato[1]), and thus incorporates this separate but closely related species into the Federal list.

2.1.2 California Department of Food and Agriculture Noxious Weeds List

The California Deparment of Food and Agriculture (CDFA) focuses on plants that potentially threaten the success of agricultural operations. The California Food and Agriculture Code Ca defines a "noxious weed" as "any species of plant that is, or is liable to become, troublesome, aggressive, intrusive, detrimental, or destructive to agriculture, silviculture, or important native species, and difficult to control or eradicate, which the director, by regulation, designates to be a noxious weed. In determining whether or not a species shall be designated a noxious weed for the purposes of protecting silviculture or important native plant species, the director shall not make that designation if the designation will be detrimental to agriculture."

[1] A botanical term (Latin, approximately, "in the broad sense"). This term is used to note when a scientific name is used to encompass a broader group of closely related organisms than other interpretations of the same scientific name would include. In this case, "*S. vermiculata*, sensu lato" includes plants that in California are thought to belong to the separate but closely related species *S. damascena*, a taxon not recognized by the USDA Plants Database.

The CDFA maintains a list of those species designated as noxious weeds and their pest rating.

- A rating of "A" indicates a species that is either not known in California or present in a limited distribution that allows for possible eradication. A-rated species are prohibited from entering the State, and if found, the State can require eradication, quarantine, containment or other actions to prevent establishment and/or spread of the species.
- A rating of "B" indicates a pest of limited distribution in California. State enforcement is limited to actions for containment, such as in nurseries. County agricultural commissioners can require eradication, containment, suppression or other control of the species.
- A rating of "C" indicates a pest species of widespread distribution in California. If found, these species may be subject to efforts to slow spread or suppress growth, at the discretion of the County agricultural commissioner (CDFA 2010).

2.1.3 California Invasive Plant Council (Cal-IPC) Invasive Plant Inventory

The California Invasive Plant Council (Cal-IPC) focuses on non-native species that threaten natural areas and wildlands. Cal-IPC defines an "invasive non-native plant that threatens wildlands" as species that "1) are not native to, yet can spread into, wildland ecosystems, and that also 2) displace native species, hybridize with native species, alter biological communities, or alter ecosystem processes." Cal-IPC ranks invasive plants as follows:

- "High" risk species have "severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically."
- "Moderate" risk species have "substantial and apparent—but generally not severe—ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance. Ecological amplitude and distribution may range from limited to widespread."
- "Limited" risk species are "invasive but their ecological impacts are minor on a statewide level... Their reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic."

2.1.4 San Luis Obispo County Weed Management Area

The local San Luis Obispo County Weed Management Area (SLO WMA), through the County Department of Agriculture, identifies weed control priorities for San Luis Obispo County. The SLO WMA identifies 6 species of top priority for control on its Weed Alert list, and an additional 29 species rated as "Worst Invaders" or "Other Invasive Species" that are recognized problems in the County. These species are listed in Appendix A.

Note that some species can be invasive and problematic in coastal and riparian environments, yet pose little threat in semi-arid inland locations.

2.1.5 Unlisted Project-specific Weeds

In addition to species listed as noxious by CDFA or rated as invasive to wildlands by Cal-IPC, this plan also considers non-native species that present challenges to ongoing operations of the TSF Project without careful management. These species require management due to their widespread presence on the site and potential to interfere with operation of the facility (PV array operation and vehicular access).

2.2 Weedy Species that Occur at Topaz Solar Farm

Botanical surveys conducted at the Project site from 2008 through 2010 identified a number of weedy species that occur in the region. Species that occur at the Project site that are on the CDFA Noxious Weeds List, the Cal-IPC Invasive Plant Inventory, or both, are identified in Table 1. Current extent at the site, potential to increase after module installation, and recommendations regarding the need to control each species are also provided in Table 1. Those species that require management are discussed in more detail in the subsections below. Species that are naturalized and widespread in the region that do not present habitat or management concerns are not discussed further in this document. Methods and timing for control of each species are provided in Section 2.5.

Weeds that occur in only one or a few locations are plotted on Figure 2 in Section 5.0. Weeds with widespread distribution are described but not mapped here.

TABLE 1. WEEDY SPECIES. Scientific name, common name, plant family, weed rating from CDFA, Cal-IPC, or project specific management concerns, and pre-project distribution of each weed in this management plan is presented in order of scientific name. Species that are naturalized and widespread in the region that do not present habitat or management concerns, are not discussed further in this document. These species are highlighted in light grey below.

Scientific Name Common Name Plant Family	**Weed Rating**	**Pre-Project Distribution & Discussion**	**Level of Management**
Aegilops triuncialis Barbed oatgrass Poaceae	CDFA B Cal-IPC High SLO WMA "Alert"	One infestation in Section 16 observed in 2009. Not seen in 2010. Agricultural pest.	Eradicate
Ailanthus altissima Tree of heaven Simaroubaceae	CDFA C Cal-IPC Moderate SLO WMA "Worst Invader"	Limited to the vicinity of two abandoned homesteads, in Sections 33 and 28. Plants are in moderate to poor condition and appear to be water-stressed. Unlikely to spread but could resprout and shade PVarrays.	Eradicate
Amaranthus albus Tumbleweed amaranth Amaranthaceae	*No rating. Included for management goals only.*	Common to abundant in plowed fields and croplands. Could cause fuel buildup along fencelines.	Control
Centaurea melitensis Tocalote Asteraceae	CDFA C Cal-IPC Moderate SLO WMA "Other"	Common along roadsides and disturbed sites. Can invade disturbed grasslands and crowd out native species.	Control
Centaurea solstitialis Yellow-star thistle Asteraceae	CDFA C Cal-IPC High SLO WMA "Worst Invader"	Occasional along roadsides and disturbed sites. Can invade disturbed grasslands and crowd out native species.	Control
Chondrilla juncea Skeleton weed Asteraceae	CDFA A Cal-IPC Moderate SLO WMA "Other"	One infestation in Section 5 in a barley field, mapped in 2010. Agricultural pest.	Eradicate
Convolvulus arvensis Field bindweed Convolvulaceae	CDFA C (Cal-IPC Evaluated and Not Listed)	Widely distributed, abundant in croplands. Has been promoted as feed for tule elk.	Control

Scientific Name Common Name Plant Family	**Weed Rating**	**Pre-Project Distribution & Discussion**	**Level of Management**
Cotoneaster lacteus Cotoneaster Rosaceae	Cal-IPC Moderate	Associated with an abandoned homestead. Unlikely to spread onsite without irrigation.	No Control Effort
Descurainia sophia Tansy mustard Brassicaceae	Cal-IPC Limited	Widely distributed, abundant in fallow croplands. Could create shading problems for PV arrays.	Control
Hirschfeldia incana Perennial mustard Brassicaceae	Cal-IPC Moderate	Occasional throughout site. Could create shading problems for PV arrays.	Control
Lepidium latifolium Perennial peppercress Brassicaceae	CDFA B Cal-IPC High SLO WMA "Worst Invader"	Few individuals in Section 33 in the main drainage. A large infestation offsite, west of Section 29, could invade site.	Eradicate
Salsola tragus Russian thistle Chenopodiaceae	CDFA C Cal-IPC Limited SLO WMA "Other"	Common along roadsides and disturbed sites. Could cause fuel buildup along fencelines.	Control
Sisymbrium orientale Oriental mustard Brassicaceae	*No rating. Included for management goals only.*	Widely distributed, abundant in fallow croplands. Could create shading problems for PV arrays.	Control
Solanum eleagnifolium White horsenettle Solanaceae	CDFA B SLO WMA "Other"	One infestation along Highway 58 near the boundary of Sections 34 and 35. Agricultural pest.	Eradicate
Tamarix parviflora Salt-cedar Tamaricaceae	CDFA B Cal-IPC High SLO WMA "Other"	Limited to the vicinity of two abandoned homesteads, in Sections 33 and 28. Plants are in moderate to poor condition and appear to be water-stressed. Unlikely to spread but could resprout and shade modules.	Eradicate

Scientific Name Common Name Plant Family	**Weed Rating**	**Pre-Project Distribution & Discussion**	**Level of Management**
Tribulus terrestris Puncture Vine Zygophyllaceae	CDFA C SLO WMA "Other"	Occasional along roadsides, particularly along sections 18 through 21. Can cause punctures in equipment tires and shoes.	Control
Avena fatua Wild oat Poaceae	Cal-IPC Moderate	Widespread naturalized species. Eradication efforts are unlikely to succeed due to widespread presence in the region. Not interfering with habitat goals.	No Control Effort
Brassica nigra Black mustard Brassicaceae	Cal-IPC Moderate	Occurs occasionally in croplands with grain crops. Unlikely to spread when plowing has ceased.	No Control Effort
Bromus diandrus Ripgut brome Poaceae	Cal-IPC Moderate	Widespread naturalized species. Eradication efforts are unlikely to succeed due to widespread presence in the region. Not interfering with habitat goals.	No Control Effort
Bromus hordeaceus Soft chess brome Poaceae	Cal-IPC Limited	Widespread naturalized species. Eradication efforts are unlikely to succeed due to widespread presence in the region. Not interfering with habitat goals.	No Control Effort
Bromus madritensis* ssp. *rubens Red brome Poaceae	Cal-IPC High	Widespread naturalized species. Eradication efforts are unlikely to succeed due to widespread presence in the region. Not interfering with habitat goals.	No Control Effort
Bromus tectorum Cheat grass Poaceae	Cal-IPC High	Occasional component of annual grasslands through the site. Eradication efforts are unlikely to succeed due to widespread presence in the region.	No Control Effort
Cynodon dactylon Bermuda grass Poaceae	Cal-IPC Moderate	Occasional along fencelines and roadsides. Not interfering with habitat goals.	No Control Effort

Scientific Name Common Name Plant Family	**Weed Rating**	**Pre-Project Distribution & Discussion**	**Level of Management**
Erodium cicutarium Redstem filaree Geraniaceae	Cal-IPC Limited	Dominant to common in annual grasslands on site. Eradication efforts are unlikely to succeed due to widespread presence in the region. Not interfering with habitat goals.	No Control Effort
Hordeum marinum Mediterranean barley Poaceae	Cal-IPC Moderate	Occasional naturalized species in wetlands on site. Eradication efforts are unlikely to succeed due to widespread presence in the region. Not interfering with habitat goals.	No Control Effort
Hordeum murinum Foxtail barley Poaceae	Cal-IPC Moderate	Common in annual grasslands on site, especially fencelines and roadsides. Eradication efforts are unlikely to succeed due to widespread presence in the region. Not interfering with habitat goals.	No Control Effort
Hypochaeris glabra Smooth catsear Asteraceae	Cal-IPC Limited	Uncommon component of annual grasslands on site. Eradication efforts are unlikely to succeed due to widespread presence in the region. Not interfering with habitat goals.	No Control Effort
Lolium multiflorum Italian ryegrass Poaceae	Cal-IPC Moderate	Limited to one vernal pool in Section 19. Species thrives in mesic conditions and is unlikely to spread in the dry Carrizo Plain.	No Control Effort
Marrubium vulgare White horehound Lamiaceae	Cal-IPC Limited	Uncommon in anthropogenic areas. Not interfering with habitat goals.	No Control Effort
Medicago polymorpha Burclover Fabaceae	Cal-IPC Limited	Occasional component of annual grasslands onsite. Eradication efforts are unlikely to succeed due to widespread presence in the region. Not interfering with habitat goals.	No Control Effort

Scientific Name Common Name Plant Family	**Weed Rating**	**Pre-Project Distribution & Discussion**	**Level of Management**
Polypogon monspeliensis Rabbitsfoot grass Poaceae	Cal-IPC Limited	Occasional component of wetlands onsite. Eradication efforts are unlikely to succeed due to widespread presence in the region. Not interfering with habitat goals.	No Control Effort
Robinia pseudoacacia Black locust Fabaceae	Cal-IPC Limited	Associated with abandoned homestead. Unlikely to spread onsite without irrigation.	No Control Effort
Rumex crispus Curly dock Polygonaceae	Cal-IPC Limited	Limited occurrence near roadside in Section 28. Unlikely to spread onsite without irrigation	No Control Effort
Schismus arabicus Mediterranean grass Poaceae	Cal-IPC Limited	Common component of annual grasslands on site. Eradication efforts are unlikely to succeed due to widespread presence in the region. Not interfering with habitat goals.	No Control Effort
Trifolium hirtum Rose clover Fabaceae	Cal-IPC Limited	Occasional component of annual grassland onsite. Eradication efforts are unlikely to succeed due to widespread presence in the region. Not interfering with habitat goals.	No Control Effort
Vulpia myuros Rat-tail fescue Poaceae	Cal-IPC Moderate	Dominant to common component of annual grasslands onsite. Eradication efforts are unlikely to succeed due to widespread presence in the region. Not interfering with habitat goals.	No Control Effort

Species for which control or eradication efforts will be made are described in more detail below.

2.2.1 Species on the Federal Noxious Weeds List

No species on the federal noxious weeds list occur on the Project site.

2.2.2 Species on the CDFA and/or Cal-IPC Lists

Weeds that are widespread naturalized species in the Carrizo region are unlikely to be successfully eradicated because the seed bank in the region is well established. Many of

these species are functional parts of annual grassland habitat that supports San Joaquin Kit Fox and other wildlife species. Eradicating widespread naturalized species could be more detrimental than beneficial. These species are noted in Table 2 above, and are not discussed further here.

Fifteen species listed in Table 2 occur at the Project site and pose concerns for Project operation, site management, safety, wildlife habitat, or adjacent agricultural operations. The following subsections discuss identifying features and management recommendations for each weed species that will be controlled or eradicated at the site.

A. Barbed Goatgrass (*Aegilops triuncialis*)

Barbed goatgrass is a CDFA B-List noxious weed, rated High by Cal-IPC, and on the priority list for eradication in the SLO WMA. This annual grass typically occurs in dry disturbed sites, particularly fields, pastures, and roadsides. Its long awns make it unpalatable for livestock. The species was observed in a single stand in Section 16.

Management: Due to its small extent onsite and high priority rating for control in the county, we recommend eradication of barbed goatgrass from the site. Grazing timed to limit seed production is recommended for large infestations. For small infestations, individuals may be mechanically removed and bagged. Individuals may also be treated with herbicide, with followup monitoring and treatment for 5 years (See Section 2.8).

B. Tree of Heaven (*Ailanthus altissima*)

Tree of heaven is a CDFA C-list species, rated Moderate by Cal-IPC, and on the SLO WMA list of invasive species. This deciduous tree occurs on the TSF Project around two abandoned homesteads. Tree of heaven has pinnate leaves that are reddish when young and have a musky odor when crushed. In ideal habitat, this species spreads rapidly from seed and root suckers.

Management: Tree of heaven regenerates from suckers when it is cut down. We recommend monitoring to determine if tree of heaven resprouts. An herbicide treatment may be required to control resprouts and prevent spread of this species (see Section 2.8, Herbicide Use).

C. Yellow Starthistle (*Centaurea solstitialis*), **Tocalote** (*Centaurea melitensis*)

Yellow starthistle is a CDFA C-list species, rated High by Cal-IPC, that occurs in disturbed patches within the PSA. Tocalote is a CDFA C-list species, rated Moderate by Cal-IPC. Both species are typically annual plants, occasionally persisting into a second year. Yellow starthistle is toxic to horses when consumed in large quantities. Both species have yellow flowered heads surrounded by spine-tipped bracts. Yellow starthistle and tocalote spread via seed.

Management: Methods such as properly timed mowing and grazing that reduce seed production can control spread of these starthistles. Starthistles are adversely affected by shade and unlikely to increase under PV arrays, but are likely to

colonize disturbed roadsides. Management for these species will consist of controlling spread.

D. Rush Skeletonweed (*Chondrilla juncea*)

Rush skeletonweed is a California List-A noxious weed that grows in disturbed areas, and are unlikely to increase in undisturbed soils under PV modules. This herbaceous perennial reproduces from seeds and broken plant parts. It has a long tap-root and can grow four feet tall.

Management: The known occurrence of this species on the Property should be eradicated to prevent spread and further reduce risk of infestation on the TSF Project. Individual plants may be pulled and bagged for small infestations, with followup monitoring for five years. If necessary, herbicide may be used (See Section 2.8).

E. Field Bindweed (*Convolvulus arvensis*)

Field bindweed is a CDFA C-List noxious weed that is abundant on the Project. Field bindweed is a deep-rooted perennial that thrives in open disturbed farmland, and is also is a common component of annual grasslands in the vicinity. It has not achieved dominance onsite except where grasslands are recently disturbed via plowing or other mechanical means of ground disturbance. It may grow under PV arrays but is generally found in disturbed areas.

Management: Field bindweed is considered a desirable species in terms of forage for tule elk in the vicinity of the Treatment Area, although control of bindweed within the fenced areas would not affect its availability in adjacent wildlife corridors. Field bindweed could climb up supports and interfere with module function. To prevent this, Topaz Solar Farms LLC has proposed to grazing to maintain a height less than 18 inches. This proposal is subject to validation by additional testing in Spring 2011. If grazing is found not to be suitable to the application based on further testing, an alternate methodology, such as mowing, will be utilized.

F. Tansy Mustard (*Descurainia sophia*)

Tansy mustard is not listed by CDFA but is rated Limited by Cal-IPC. Tansy mustard is an annual, branched herb with divided leaves that grows up to three feet tall. When consumed in large quantities tansy mustard is toxic to cattle. Like many mustards, tansy mustard fruits are elongated pods containing abundant seeds. Tansy mustard typically grows along roadsides, in fields, and in cropland. Tansy mustard is common on the Project site, particularly in fallow cropland.

Management: Since tansy mustard is widespread, and has relatively low threat ratings, management on the TSF Project will consist of controlling spread of the weed, preventing fuel buildup risks associated with tall mustards, and preventing shading of PV arrays. Cultivation can be used to control seedlings but is impractical on this site. Grazing and mowing can be used to control height, reducing fuel and preventing shade impacts. Tansy mustard populations should

be monitored for spread, and if significant increases in population or distribution are observed on site, a Pest Control Advisor should be consulted for control options (see Section 2.8).

G. Perennial Mustard (*Hirschfeldia incana*)

Perennial mustard is not listed by CDFA but is rated Moderate by Cal-IPC. Perennial mustard is a biennial to short-lived perennial herb that reaches up to three feet in height. Like many mustards, perennial mustard fruits are elongated pods with abundant seeds. It can be distinguished from other mustards on site by looking for pods appressed to stems. Perennial mustard is common on site, particularly along roads, margins of crop lands, and occasionally in grasslands. Mustard is a desirable forage for sheep, particularly during fruit production.

Management: Because perennial mustard is widespread onsite and has relatively low threat ratings, in addition to being good forage, management efforts will focus on controlling spread, preventing fuel buildup, and preventing shading of PV arrays. Perennial mustard seedlings can be controlled by manual removal or cultivation, which are not feasible on this site. Grazing and mowing can keep this species at acceptable height and limit production of seed. Perennial mustard populations should be monitored for spread, and if significant increases in population or distribution are observed on site, a Pest Control Advisor (PCA) should be consulted for control options (see Section 2.8).

H. Perennial Peppercress (*Lepidium latifolium*)

Perennial peppercress is a CDFA B-List noxious weed, rated High by Cal-IPC. This perennial grows up to six feet tall. Perennial peppercress has tough gray-green leaves, white flowers, and oval, flat pods for fruit. Peppercress is suitable forage for sheep, goats, and cattle in moderate proportions. A few individuals were observed in Section 33 in the main drainage, and the species is abundant in fields west of Topaz. This species prefers moist habitats, such as drainage edges, wet meadows, irrigation ditches, levy banks, and ponds. It could invade the banks of proposed dust management ponds.

Management: Existing individuals of perennial peppercress on Topaz will be removed by manual removal of the plant and its entire root. The site will be monitored for invasion of this species, particularly along Section 29, the closest to a neighboring infestation. If additional peppercress become established, a PCA should be consulted regarding treatment options.

I. White Horsenettle (*Solanum elaeagnifolium*)

White horsenettle is a CDFA B-list noxious weed, rated “Limited” by Cal-IPC, and on the SLO WMA list of noxious weeds. White horsenettle occurs uncommonly along Highway 58 near Section 34. This perennial sub-shrub grows best on disturbed sandy well-drained soils that have summer irrigation, such as cotton fields (DiTomaso and Healy 2007). It reproduces via seed and creeping roots.

Management: Because it occurs in only one small infestation on site, we recommend eradication of white horsenettle. Weekly mowing can weaken horsenettle and limit seed production but does not eliminate it. Herbicide treatment may be required for this species (see Section 2.8).

J. Russian Thistle (*Salsola tragus*)

Russian thistle is a CDFA C-list noxious weed, rated "Limited" by Cal-IPC, and on the SLO WMA invasive species list. Russian thistle, also known as tumbleweed, is a summer annual with prickly leaves and stiff stems reaching three feet in height that reproduces by seed. Seeds are dispersed when the dead plant tears loose and tumbles with the wind.

Management: Seedlings are most successful on loose soil. Cutting or mowing seedlings can control infestations if done when seedlings are very young. Russian thistle can be grazed when young so long as it is part of varied forage and not the only available forage. Tumbleweed can also be treated with herbicide if necessary although this species can be resistant to many herbicides (see Section 2.8).

It may be necessary to collect dry tumbleweeds that accumulate against fence structures along roadsides to reduce fire risk. Collected weed materials can be composted onsite or hauled to a landfill. Care must be taken not to disperse seeds—use non-rippable closed containers such as trash cans or bins to haul to landfill.

K. Tamarisk (*Tamarix parviflora*)

Tamarisk is a CDFA B-list species, rated High by Cal-IPC, and on the SLO WMA list of invasive species. This deciduous shrubby tree extracts salt from soils and excretes it from leaves, causing a salt build-up under its canopy. Tamarisk occurs on the TSF Project around two abandoned homesteads. Tamarisk has green to grey-green twigs with tiny leaves and pink flowers. It spreads via seed and occasionally, suckers.

Management: Tamarisk regenerates from suckers when it is cut down unless roots are destroyed or removed. We recommend monitoring to determine if tamarisk resprouts. An herbicide treatment may be required to control resprouts and prevent spread of this species (see Section 2.8, Herbicide Use).

L. Puncture Vine (*Tribulus terrestris*)

Puncture vine is a CDFA C-List noxious weed. This summer annual herb grows prostrate along the ground in disturbed places, and was observed along roadsides on the TSF Project. Puncture vine produces obnoxious spiny burs that are strong enough to puncture lightweight tires.

Management: This species is unlikely to increase under PV arrays but could be a pest along roadsides. Because of its prostrate habit, mowing is ineffective for controlling this species. Puncture vine can be manually removed before it

produces seeds via hoeing or tilling, and can be sprayed with herbicide for problem areas (see Section 2.8).

2.2.3 Species of management concern for the Project site

The following species are not listed as noxious weeds on state or federal lists, but present concerns for operation of the solar farm if they are not managed.

A. Tumbleweed Amaranth (*Amaranthus albus*)

Tumbleweed amaranth is not listed by CDFA or Cal-IPC, but does present some management concerns in the first few years of Topaz operation. This bushy summer annual reaches two to three feet in height, and at maturity, the drying plant breaks off at the ground level and tumbles around the site, spreading seed. This species is common in plowed fields and could present fire fuel risks during construction if not managed.

Management: Tumbleweed amaranth can be controlled via cultivation, use of herbicide, and manual removal of plants before they produce seed. Because the species is widespread on croplands at Topaz, we recommend management directed toward control of spread and management of fuel. Grazing and mowing can keep tumbleweeds from reaching their maximum height and if repeated during the flowering and fruiting season, can reduce the number of seeds produced.

It may be necessary to collect dry tumbleweed amaranth that accumulate against fence structures along roadsides to reduce fire risk. Collected weed materials can be composted onsite or hauled to a landfill. Care must be taken not to disperse seeds—use non-rippable closed containers such as trash cans or bins to haul to compost site or landfill.

B. Oriental Mustard (*Sisymbrium orientale*)

Tumble mustard is not listed by CDFA or Cal-IPC but does present some management concerns due to its height at maturity. Tumble mustard is an annual herb that can reach more than 18 inches height when mature. Tumble mustard is occasional on the Topaz site and could present shading problems if not maintained.

Management: To control potential fuel buildup and shading problems, this species can be managed via planned grazing and mowing. This species does not pose a high risk of invading other areas or spreading at Topaz.

2.3 Weedy Species that Occur in the Carrizo Plain Region but not at the Project

The Carrizo Plain National Monument Resource Management Plan lists *Salsola damascena* as synonymous with *Salsola vermiculata*, a species on the Federal Noxious Weeds list. This species does not occur at the Project site. *Salsola damascena* has been erroneously reported as *S. vermiculata*, a closely related species, in past accounts of the Flora of California, but is now thought not to occur in California. However, the Federal noxious weeds list considers *Salsola damascena* a part of *S. vermiculata*, sensu lato, and

thus incorporates this separate but closely related species into the Federal noxious weed list.

A. Damascus Saltwort (*Salsola damascena*)

Damascus saltwort does not occur on site but has been reported from the Carrizo Plain National Monument. This shrubby perennial is somewhat similar to Russian thistle (an annual plant). Damascus saltwort has stiff branches, small leaves, and small inconspicuous flowers.

The Jepson Herbarium Index of California Plant Names considers *S. vermiculata* a valid taxon that does not occur in California, with plants that occur in California actually belonging to *S. damascena*. *S. vermiculata* is a host plant for curly-top virus, which affects tomatoes, melons, and sugarbeets, thus its listing as a Federal Noxious Weed. The CDFA considers *Salsola damascena* to be essentially a synonym of *S. vermiculata* and lists it as an alternate host for curly top virus. Therefore, for purposes of this plan, we consider *S. damascena* a noxious weed that should be eradicated if it occurs on site in the future.

Management: Damascus saltwort has not been observed at Topaz. Careful monitoring is required to distinguish this species from Russian thistle, which does occur on site. If Damascus saltwort is observed, a specimen shall be collected by a qualified botanist for verification. The infestation shall be eradicated. Burning or cutting plants to ground level can reduce survival. Resprouts can be treated with herbicide. Ongoing monitoring of an infestation site would be required to identify and treat seedlings until eradicated.

2.4 Weed Management Objectives

Weed management objectives are listed below, and summarized in Table 2:

- Eradicate CDFA List A weeds from the site (skeleton weed)
- Eradicate small infestations of CDFA List B weeds from the site (barbed goat grass, silver horsenettle, tamarisk)
- Eradicate small infestations of CDFA List C weeds (tree of heaven)
- Control widespread CDFA List C and Cal-IPC Moderate and Limited rated species to prevent spread into uninfested areas and prevent interference with Project operation (yellow starthistle, tocalote, bindweed, tansy mustard, perennial mustard, alkali mallow, Russian thistle, puncture vine)
- Manage other non-native species with potential to interfere with Project operations (tumbleweed amaranth, tumble mustard)
- Prevent introduction of new weedy species

TABLE 2. MANAGEMENT GOALS FOR WEEDY SPECIES . Scientific name, common name, and management goals are presented in order of scientific name. Weeds are sorted by those proposed for eradication and those planned for control. In addition, a noxious weed within Carrizo Plain that needs to be eradicated, if observed in the treatment area, is listed under the category titled Prevent Infestation.

Scientific Name	Common Name	Management Goals
Eradicate		
Aegilops triuncialis	Barbed goatgrass	Eradicate from Section 16 and prevent new infestations.
Ailanthus altissima	Tree of heaven	Eradicate from Sections 28 and 33, and prevent new infestations.
Chondrilla juncea	Skeleton weed	Eradicate from Section 5 and prevent new infestations.
Lepidium latifolium	Perennial peppercress	Eradicate from Sections 29 and 33, and prevent new infestations.
Solanum eleagnifolium	White Horsenettle	Eradicate from Section 34, and prevent new infestations.
Tamarix parviflora	Salt-cedar	Eradicate from Sections 29 and 33, and prevent new infestations.
Control		
Amaranthus albus	Tumbleweed amaranth	Control spread, and manage fuel load.
Centaurea solstitialis	Yellow-star thistle	Control spread, and manage fuel load.
Centaurea melitensis	Tocalote	Control spread, and manage fuel load.
Convolvulus arvensis	Field bindweed	Control height. Desirable food for wildlife.
Descurainia sophia	Tansy mustard	Control potential fuel and shading impacts via planned grazing and mowing.
Hirschfeldia incana	Perennial mustard	Control potential fuel and shading impacts via planned grazing and mowing.
Salsola tragus	Russian thistle	Control spread, and manage fuel load.
Sisymbrium orientale	Oriental mustard	Control potential fuel and shading impacts via planned grazing and mowing.
Tribulus terrestris	Puncture Vine	Control spread (seeds in tires and shoes)
Prevent Infestation		
Salsola damascena	Damascus saltwort	Monitor for infestations. This species does not currently occur at Topaz.

2.5 Management Methods by Species

Management methods to control each species known to occur at the Project site are listed in Table 3. If new noxious weeds are found, similar descriptive information and control methods will be prepared by the project biologist, site manager, or project Pest Control Advisor (PCA) and appended to this plan.

Management measures that mention herbicide herein are not intended to constitute "Recommendations" pursuant to Section 11411 of California Food and Agricultural Code, but are provided as general information only. Recommendations for pesticide use to achieve control on specific properties can only be provided by a licensed Pest Control Advisor.

TABLE 3. MANAGEMENT METHODS FOR WEEDY SPECIES. Scientific name, common name, typical method of control, flowering period, and timing for optimal control are presented by species. Weeds are sorted by those proposed for eradication and those planned for control.

Scientific Name Common Name	Typical Methods for Control	Flowering Period	Timing for Optimum Control
Eradicate			
Aegilops triuncialis Barbed goatgrass	Cut and bag flowering heads for small infestations. Monitor and treat with herbicide if reinfestation occurs.	May through August	April – May
Ailanthus altissima Tree of heaven	Mechanical removal; treat stumps with herbicide. Treat resprouts with herbicide. Monitor for 3 years.	May – July	Start of project. Most effective during active growing season.
Chondrilla juncea Skeleton weed	Pull up and bag individuals for small infestations. Monitor site for seedlings, pull and bag or treat with herbicide, as necessary..	May – first frost	April – May
Lepidium latifolium Perennial peppercress	Mechanical removal of individuals for small infestations. Bag removed seed heads if seed has set, and any root fragments[2]. Consult a PCA for large infestations.	May – September	As soon as plants are identifiable in spring.
Solanum eleagnifolium White Horsenettle	Mechanical removal or herbicide treatment. Bag removed fruits and roots.	May – September	April – May

[2] Perennial peppercress regenerates from root fragments.

Scientific Name Common Name	Typical Methods for Control	Flowering Period	Timing for Optimum Control
Tamarix parviflora Salt-cedar	Mechanical removal; treat stumps with herbicide. Treat resprouts and monitor for 3 years.	March – May	Start of project. Most effective during active growing season.
Control			
Amaranthus albus Tumbleweed amaranth	Graze/ mow to control height and reduce abundance; collect and compost tumbleweeds to reduce fuel load along fences.	June – October	May – September
Centaurea melitensis Tocalote	Graze/ mow to control height. Limit soil disturbance to control infestation of new areas.	June – December	April – May
Centaurea solstitialis Yellow-star thistle	Graze/ mow to control height. Limit soil disturbance to control infestation of new areas.	April – July	April – May
Convolvulus arvensis Field bindweed	Graze to prevent bindweed from climbing up supports.	April – October	April – October
Descurainia sophia Tansy mustard	Graze/mow to control height.	March – August	April – May
Hirschfeldia incana Perennial mustard	Graze/mow to control height.	May – October	May – October
Salsola tragus Russian thistle	Graze and mow to control existing populations. Early grazing that affects young leaves is most effective. Collect and compost tumbleweeds as necessary to reduce fuel load. Herbicide can be applied in areas requiring additional control.	July – October	April – May
Sisymbrium orientale Oriental mustard	Graze/mow to control height.	April – August	April – August
Tribulus terrestris Puncture vine	Mechanical removal where foot and tire traffic would disperse seeds; herbicide if necessary	March – October	March – October

Scientific Name Common Name	Typical Methods for Control	Flowering Period	Timing for Optimum Control
Prevent Infestation			
Salsola damascena [= S. vermiculata] Damascus saltwort	Monitor for new infestation. Consult PCA immediately if new infestations are discovered. This species can be distinguished from Russian thistle because it is perennial, not annual.	June-October	As soon as plants are observed on site; April-May

2.6 Management Methods by Location

Methods used to control weeds, other than those species targeted for eradication, will vary by location within the Project. Not all methods are feasible in all locations. The site consists of croplands – already heavily disturbed – and annual grasslands, which are tolerant of mowing and grazing. They are adapted to periodic grazing, and mowing mimics some aspects of grazing. When used with fenced areas, care will be taken to time grazing and mowing to minimize seed production of weedy species, but enable native plants to successfully produce fruit.

2.6.1 Fenced areas (*PV arrays and wildlife buffers*)

The primary method of controlling weeds and preventing spread of invasive species within fenced areas will be planned grazing, subject to validation by additional testing. Properly managed grazing of annual grasslands has been shown to increase productivity, decrease abundance of noxious weeds, reduce fuel loads, and encourage recovery of native grasses. Planned grazing would occur twice yearly to target both early and late season plants. Perimeters around PV arrays would be grazed more aggressively to allow vehicular access as needed with reduced risk of fire. For weedy species that are widespread on the Project site, grazing will be used to control spread, reduce competition with natives, and encourage wildflowers that could otherwise be choked out by weed overgrowth. The choice of grazing animal will depend on the area to be grazed. Sheep are planned for use within the Project's PV array fenced areas due to their smaller stature and ability to interact with PV arrays without causing damage. Cattle will be used for grazing needs outside PV arrays fenced areas where coyote predation risk is too high to use sheep. If grazing is found not to be suitable to the application based on further testing, an alternate mowing methodology mowing will be utilized.

2.6.2 Roadsides

Where Project access roads traverse outside fenced areas, grazing may be impractical as a vegetation management option. Control of weeds already widespread at Topaz will consist of mowing along roadsides. Mowing would be necessary along roadsides located outside fenced PV arrays, as a normal maintenance operation. Mowing would reduce vegetation height to no less than 2 inches. Pre-construction surveys shall be used to

identify canid or badger dens. If conducted during the nesting season (March 1 – August 15), pre-construction surveys shall include identification of active bird nests. Dens and active nests shall be flagged. Nests of common native species shall be given a 10-foot buffer. Nests of special status species and canid or badger dens shall be given a 25-foot buffer. Roadsides that are mowed regularly are less likely to invite nesting birds to take up residence.

If new invasive species are observed along roadsides, consider immediate containment and control measures as appropriate for the species. A licensed PCA can provide guidance on controlling species not discussed in this plan. PCAs can also provide guidance on the use of herbicides for controlling persistent weeds that are increasing in extent or population size on site (See Section 2.8).

2.6.3 Buildings and switching station structures

Weed control around buildings and switching stations will be primarily directed toward maintaining fire-safe zones as prescribed by the Topaz Wildfire Management Plan. Use of rock or wood chip mulches around structures discourages weed growth. Weeds that grow through mulch can be mowed or weed whipped. Pre-emergent herbicides and post-emergent herbicides can also be used to achieve control of weeds adjacent to structures.

2.7 Preventing New Infestations

2.7.1 Minimize soil disturbance

Many of the weedy species known from the site and the vicinity of the Project are opportunists that readily colonize recently disturbed soil. By minimizing the acreage of grading, plowing, and other surface disturbance, the potential for new weed infestations can be minimized with the following techniques:

- Minimize the areal extent of plowing and grading used for Project construction.
- Minimize vehicular access to roads and established access routes. Avoid off-road use of vehicles unless necessary for Project operation.

2.7.2 Equipment and materials sanitation during construction

One key element in preventing new weed infestations is to avoid transporting seeds to or from the site with equipment, vehicles, or materials. During construction, equipment may be brought to the site from outside the County or outside the Carrizo Plain and the following Best Management Practices will be implemented:

- Equipment transported from outside the Carrizo Plain shall be free of mud and vegetation before transport to the site.
- If construction equipment arrives with mud or vegetation, it will be cleaned in a designated staging area. Emphasis shall be placed on tires, feet and treads; undercarriage; steps; and any buckets, blades, or scoop attachments.
- A log shall be kept documenting inspections and cleaning efforts. Written logs will be provided to the environmental monitor and included in monitoring reports for the Construction Phase of the Project.

- Following work in areas identified as having CDFA List A or B weeds, equipment shall be cleaned prior to work in non-infested areas of the Project site.
- Materials used for erosion control, including straw/hay, fiber rolls, and geotextiles, shall be free of weed seeds.

2.7.3 Revegetation

Disturbed areas of the Project site will be revegetated as soon as possible using seed of native and naturalized species. For details on revegetation, refer to the Habitat Revegetation and Restoration Plan prepared for the Project.

2.8 Herbicide Use

Topaz Solar Farms, LLC intends to limit herbicide use to the minimum necessary to achieve control of noxious weeds on the site. The following sections provide additional information on herbicide use.

2.8.1 Legal framework for herbicide application

Herbicides are pesticides that treat undesired plant species or plant species growing in undesirable locations. Pesticide use is regulated by the U.S. Environmental Protection Agency as described in 40 CFR 150-189. Pesticide use in the State of California is also regulated by the California Department of Pesticide Regulation (CDPR). Use of herbicides on the Project site must comply with state and local regulations and herbicide product labels. Disposal of herbicide containers must comply with federal, state, and local law and regulation.

The CDPR regulates qualified applicator certificates and licenses as defined in California Code Title 3, Section 6000:

- **"Qualified applicator certificate holder"** means a person who has qualified by examination in one or more pest control categories to supervise pesticide applications. However, such qualification shall not entitle the holder to supervise the operations of a pest control business licensed pursuant to section 11701 of the Food and Agricultural Code, except as provided in section 11704.
- **"Qualified applicator licensee"** means a person who has qualified by examination in one or more pest control categories to supervise the pesticide applications made by a pest control business licensed pursuant to sections 11701 to 11709, inclusive, of the Food and Agricultural Code, and who is responsible for safe and legal operations under such license.

Herbicide application shall be conducted by personnel with appropriate permits, certifications, and/or licenses pursuant to state and federal law.

2.8.2 Pest control advisor recommendations for persistent weeds

Agricultural Pest Control Advisors (PCAs) are licensed by the State Department of Pesticide Regulation to provide recommendations on any agricultural use of pesticides. While Topaz is not strictly an agricultural operation, PCAs are very knowledgeable in the

variety of herbicides available and the legal restrictions on their use. For difficult to control weeds and for sites that may require regular use of herbicides, the applicant could consult a PCA for site-specific and species-specific advice on controlling weeds, as well as information on registration and reporting requirements for pesticide use.

The current list of licensed PCAs in San Luis Obispo County can be found at http://www.cdpr.ca.gov/docs/license/pdf/Valid_Licenses_San_Luis_Obispo_County-Individual.pdf.

2.8.3 Safe handling and storage

Pesticides must be handled and stored according to safety warning provided on the pesticide label. Safe storage of pesticides is dependent on which chemical is used and how long it will be stored. All pesticides at the Project site will be stored in their original containers. Dilutions of concentrated pesticides (e.g., sprayers and tanks) must be labeled with contents and concentration during use. Only the minimum amount of pesticide required to accomplish a specified task shall be purchased at any one time. Stockpiles of pesticides are not recommended.

Only trained personnel with the appropriate licenses or permits should handle pesticides. State Licensed Applicators are trained in appropriate storage and safe handling of pesticides.

2.8.4 Spill cleanup of herbicides

Precautions shall be taken to minimize risk of an herbicide spill. Should a spill occur, the spill site shall be cleaned up immediately, according to herbicide label instructions. Spill kits shall be on hand whenever herbicides are in use, and shall be stored with herbicides if herbicides are kept at the Project site with maintenance equipment.

Spill kits typically contain gloves, protective clothes, absorbent materials, and a large container (e.g. blue 50-gallon barrel).

2.9 Weed Control Monitoring

2.9.1 Construction phase

During the construction phase of the Project, eradication efforts shall begin for the target species. Eradication efforts shall be monitored throughout the construction phase. In addition, areas graded for the project shall be monitored annually to assess weed recruitment and identify additional problem areas that need weed management. Problem areas shall be plotted on a site plan and identified by species. Treatment and monitoring shall be coordinated with the project biologist. Results of monitoring shall be reported to the County.

2.9.2 Operation phase

During the operation phase of the TSF Project, monitoring shall consist of evaluating representative study plots on an annual basis. Three plot types shall be monitored, consisting of PV arrays over converted cropland, PV arrays over annual grassland, and Project-specific roadside (e.g, on-site roads newly constructed for the Project). Three replicates of each type of plot shall be established immediately following construction

under consultation with the project biologist. The Project biologist will monitor species diversity and weed density annually during spring and summer blooming periods, as appropriate by species, for five years to evaluate change and identify weed problems, if any, in each plot type. Based on results of this five-year monitoring study, the weed management plan shall be adjusted to control those weeds posing management, habitat, or safety concerns. If necessary, an ongoing monitoring program shall be prescribed at the end of the five-year study.

2.10 Adaptive Management

If monitoring events determine that weed management prescribed in this plan is not successfully meeting objectives, seek advice from the project biologist and/or a PCA. Modify vegetation management plan accordingly. Ecologically based invasive-plant management should reduce the need for herbicide application, and increase revegetation and restoration success (Sheley et al. 2010).

2.11 Resources for More Information

San Luis Obispo County Weed Management Area San Luis Obispo County Department of Agriculture Marc Lea, WMA Coordinator (805) 781-5910
California Noxious Weed Program Southern California Regional District: Daud Senzai (619) 607-1458 http://www.cdfa.ca.gov/phpps/ipc/district_map.htm
California Department of Food and Agriculture Encycloweedia www.cdfa.ca.gov/phpps/ipc/encycloweedia/encycloweedia_hp.htm
Cal-IPC Weed Inventory www.cal-ipc.org/ip/inventory/weedlist.php
California Department of Pesticide Regulation http://www.cdpr.ca.gov/

3.0 Grazing Plan

This Draft Grazing Plan has been prepared for management of vegetation resources within the TSF Project. The TSF Project has proposed sheep pulse grazing as a part of the site vegetation management plan, subject to validation by additional testing in Spring 2011. If grazing is found not to be suitable to the application based on further testing, an alternate methodology, such as mowing, will be utilized.

3.1 Grazing Objectives

The Project will be grazed to accomplish the following objectives:

- Manage vegetation height to prevent shading of PV Arrays.
- Reduce fuel load as a fire-prevention measure.
- Maintain annual grassland as San Joaquin Kit Fox habitat.
- Aide in conversion of croplands to annual grassland by reducing weed infestations.
- Manage weed height and control spread of existing weeds.

3.2 Literature Review: Effects of Short Duration Grazing

The preliminary grazing proposal would allow sheep grazing in fenced areas such that each day the flock grazes a new patch of ground until the whole Project has been grazed. This grazing pattern would occur up to four times annually, such that any fenced area of the Project experiences grazing two to four days per year.

3.2.1 Sheep versus cattle grazing

Cattle and sheep diets overlap to a certain extent. Cattle prefer grass, while sheep prefer forbs over grasses, but will readily go after grasses if that is what is available (Heitschmidt and Stuth, 1991). Sheep graze by pinching the forage between their incisors and dental pad so the length of plant left is subject to lip thickness. If the sheep are only on a site for a short time period, they tend not to graze too close to the ground. Cattle tend to eat by wrapping their tongues around the forage and pulling back, therefore, they will typically leave more stubble height. Cattle can most effectively eat forage that is between 4 and 8 inches tall. As far as impact, cattle do a better job of breaking soil crust, their manure tends to be softer and more readily decomposed, and they produce a lot more saliva (Rutherford, 2010 pers. com.).

3.2.2 Soil properties

Grazing animals compact soils via trampling, and redistribute nutrients (Jackson and Bartolome 2007, p. 198). Native grazers, including tule elk and pronghorn antelope, have similar soil compaction effects as sheep and cattle via trampling the soil surface. The degree of compaction due to grazing varies with specific soil conditions and moisture content at the time of grazing. Wet soils with higher clay content are more easily compacted than soils with lower moisture content and higher sand fraction (Van Havern 1983). Compaction is partially alleviated via regrowth of plant roots, and action of burrowing animals. Furthermore, grassland soils typically have notable accumulations of

organic matter relative to soils in other habitat types in the same locale. This increased organic matter content lowers bulk density of a soil.

The low number of grazing days at Topaz mean that the total hours of trampling on the site will be low during operation of TSF. Grazing will be timed for spring and summer such that soils are not saturated and thus less susceptible to severe compaction during grazing events.

3.2.3 Plant and wildlife diversity

Grassland species have evolved in the presence of grazing animals and have been influenced by grazing. Selective grazing of different functional groups (perennial versus annual grasses, for instance) can influence composition of a plant community. Grazing can be utilized as a tool for native grass enhancement for species such as *Nassella* spp., which can benefit from reduced competition from non-native annuals when grazed (Jackson and Bartolome 2007).

However, Jackson and Bartolome note that while management of grazing intensity can influence the productivity of California annual grasslands for livestock production, species composition is "more or less entrained by intra and interannual weather (p. 197)" rather than grazing practices. When only one functional group is abundant, annual species in the case of annual grassland, abiotic factors are thought to have greater influence on plant community structure in annual grasslands in California than biotic factors, including grazing. The variability of California climate and soils are important factors in year to year variation in California grasslands regardless of their grazing status.

Several studies cited in Jackson and Bartolome (2007) found that grazing is linked with increased cover of native forbs, a class which includes annual wildflower species, although one study cited did not observe this phenomenon. Several studies cited by Huntsinger et al. (2007) found that complete exclusion of grazing animals reduces herbaceous species diversity of both native and introduced species. Huntsinger also notes that where grasslands have both exotic and native annual species composition, grazing can be used to promote native annual wildflowers (p. 245).

3.2.4 Habitat quality

As noted above, sheep graze differently than cattle, and prefer forbs over grasses but will eat both. Bartolome (1993) notes that grazing intensity rather than selective grazing drives changes in plant community structure. By controlling grazing intensity during periods of active growth, grazing managers can limit negative effects on plant community structure. A grazing regime in which sheep graze the beneath PV arrays for two to four days per year is unlikely to result in a shift of species composition.

Grazing can also be used as a tool for managing invasive species. Jackson and Bartolome comment that properly timed late spring to early summer grazing can be used to reduce cover and reproduction of yellow star thistle, a weed that occurs at Topaz (p. 203). Further, barbed goatgrass spreads more readily in plots that have not been grazed or otherwise managed to reduce residual dry matter (RDM). This species also occurs at Topaz.

A study by Marty (2005) found that carefully managed grazing of annual grassland/vernal pool complexes can be beneficial for native flora and duration of pool

inundation compared to ungrazed pool/grassland complexes. Vernal pool/annual grassland complexes occur at Topaz and could benefit from occasional grazing.

3.3 Locations for Use of Sheep versus Cattle

Both sheep and cattle may be used on site, though not in the same locations.

Sheep are smaller in stature, and can more easily reach plants underneath and adjacent to PV arrays. Sheep are also unlikely to damage modules or wiring within PV Arrays and can easily be moved via portable fencing. A grazing study was conducted in August 2010 using non-functioning PV arrays similar in layout to the Project. This study found that sheep effectively reduce vegetation height under and around PV arrays without causing damage to modules or wiring. Sheep would be used in fenced areas with PV arrays where larger animals would be likely to damage the installation or be unable to reach vegetation. See Appendix B for a complete report on the Preliminary Grazing Study.

Cattle are larger animals and are likely to damage PV arrays and wiring. However, due to their larger size they are not likely to invite predation by coyotes. In areas within the Project Site but outside fenced PV arrays areas, such as drainage buffers and wildlife corridors, cattle may be used to control weeds and maintain appropriate short grass conditions used by San Joaquin Kit Fox.

3.4 Timing

Appropriate timing for grazing varies annually with weather and forage conditions. Topaz Solar Farms, LLC proposes two rounds of grazing each year timed to target early season forage and late season weeds. Typically, early season grazing could begin in April, and late season grazing could be conducted anywhere between June and September depending on weather and forage conditions. Experienced livestock managers will be consulted regarding appropriate forage conditions to determine timing annually.

3.5 Grazing Intensity and Management

As with timing, appropriate numbers of animals per acre and duration of grazing will vary from year to year to achieve optimum grazing intensity. Targets for vegetation removal are reduction to less than 8 inches average height and no less than 750 pounds per acre residual dry matter (unless during period of extreme drought).

Grazing would be managed by an experienced livestock manager in conjunction with the project biologist. If two separate flocks are used to graze the site, they will be separated such that one flock starts at an edge and the other flock starts in the center of the project, with flocks consistently separated by moving in the same direction across the landscape.

Temporary fencing will be used to constrain sheep into small enough areas to encourage even foraging across the target area. Sheep will be moved every 24 to 48 hours into a new area.

3.6 Target Weed Species for Grazing Control

At least eight weed species may be controlled by appropriately timed grazing practices. Table 3 lists weeds such as tumbleweed amaranth *(Amaranthus albus),* tocalote

(Centaurea melitensis), yellow starthistle *(Centaurea solstitialis)*, tansy mustard *(Descurainia sophia)*, perennial mustard *(Hirschfeldia incana)*, Russian thistle *(Salsola tragus)*, and oriental mustard *(Sisymbrium orientale)* that are best grazed in mid spring for optimal control. Bindweed *(Convolvulus arvensis)* is a deep-rooted perennial that can be controlled by grazing during spring and summer to keep its twining stems from growing up PV array posts.

3.7 Water for Livestock

Water for sheep grazing within PV arrays would be provided via a portable water tank that would be refilled from onsite wells. PV arrays are divided into approximately seven-acre patches, each surrounded by a 20-foot wide access path where a water tank may be temporarily stationed during grazing operations.

3.8 Grazing Monitoring Plan

Residual dry matter before and after grazing will be measured at 10 locations within the PV arrays for each grazing event. A grazed site and an ungrazed control will be compared at each site. A grazing report will be prepared for each of the first six events (first three years) to confirm that residual dry matter targets and vegetation height are met, document any problems encountered, and propose revisions to the plan as needed. Subsequent monitoring will consist of annual monitoring at three locations within a half mile of active kit fox dens to determine if kit fox habitat is maintained through the fall.

3.8.1 Additional grazing study proposed

A spring grazing trial will be implemented at the PV array test site during 2011. Prior to the trail, PV array and control sites will be sampled for biomass production, vegetation height, percent vegetative cover, and forage quality. Following grazing treatment, the PV array and control sites will be resampled for biomass, vegetation height, and percent cover. Results will be used to inform grazing intensity recommendations for actual installations.

3.9 Adaptive Management

During the first three years, the livestock managers, Topaz Solar Farms, LLC representatives, and the project biologist will communicate annually on the success of grazing to meet Grazing Plan objectives. Adjustments will be made to the plan during that time. Grazing intensity and duration will respond to seasonal climate conditions (e.g. precipitation and temperatures) that affect forage production, quality, and habitat value for kit fox. After the first three years' data analysis, the plan will be refined to incorporate input from project biologist, kit fox specialists, sheep herd managers, and solar farm managers.

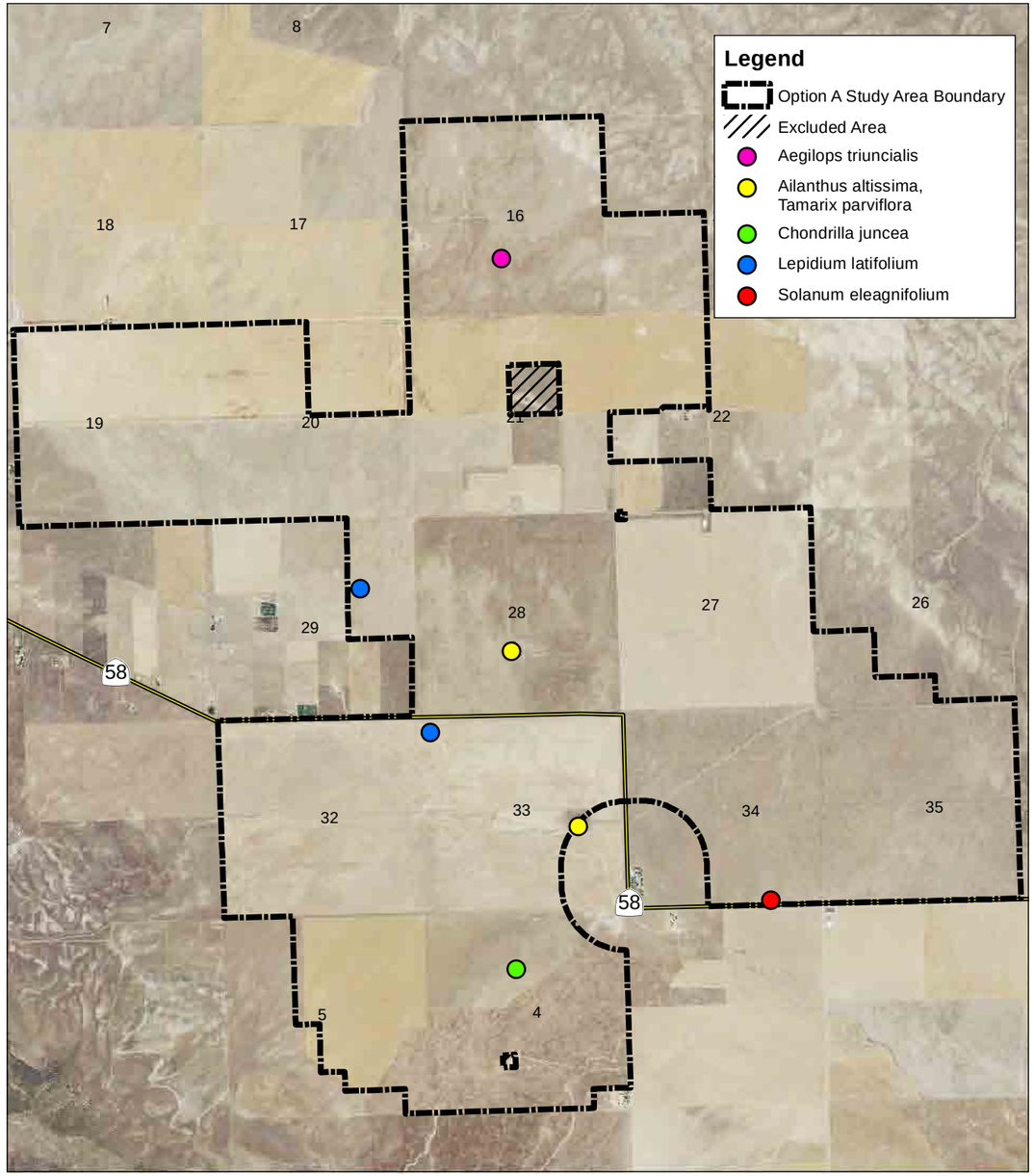
4.0 Conclusion

The Topaz Vegetation Management Plan will remain a dynamic document that reflects a growing understanding of weed control factors and kit fox habitat quality. The plan will continue to support the basic objectives of running a safe PV facility that also provides habitat for San Joaquin kit fox.

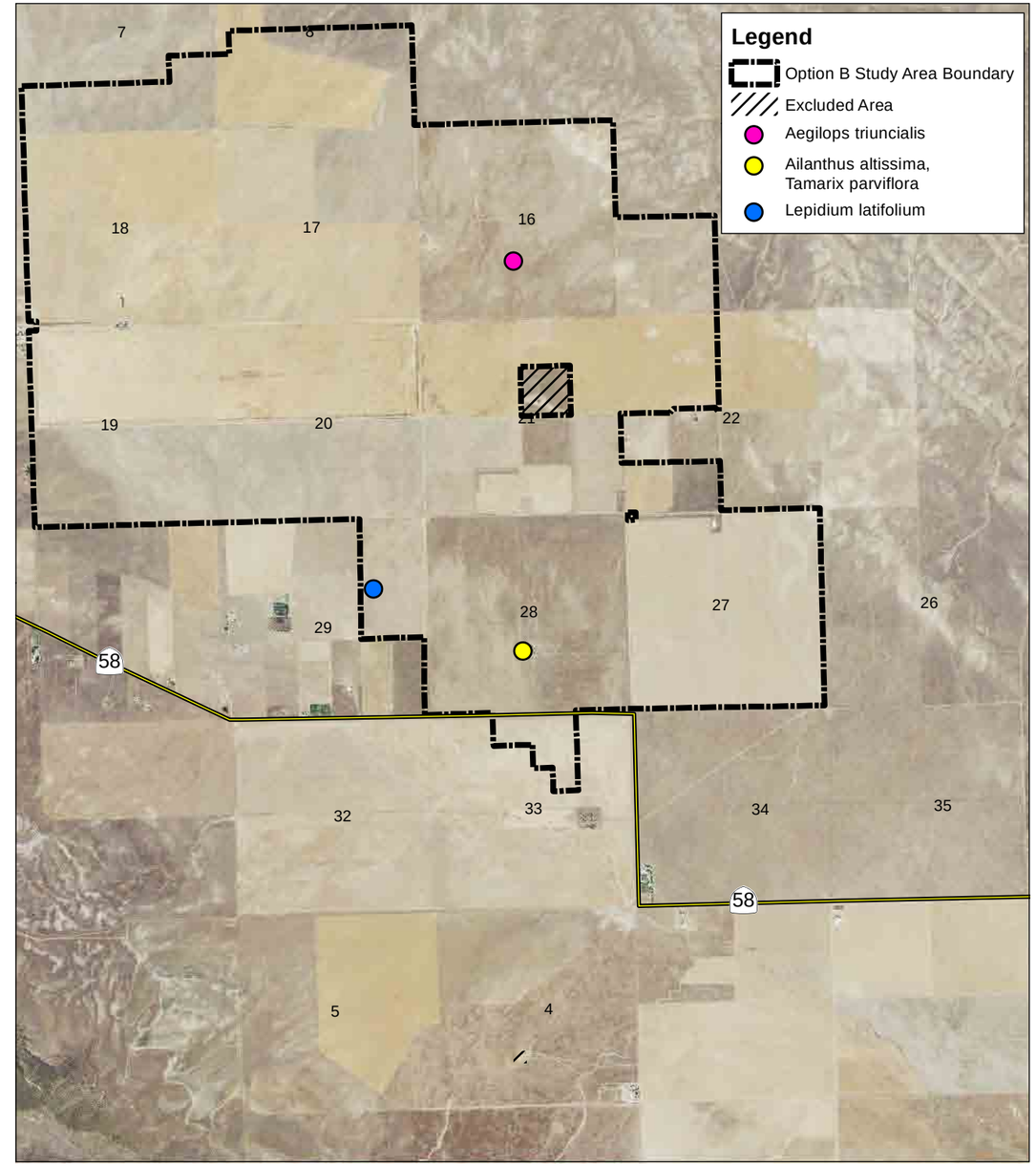
5.0 Vegetation Management Plan Figures

- **Figure 1: Locations of Weed Species Targeted for Eradication:** Weed species targeted for eradication at the Project site occur in limited distribution such that eradication is a reasonable goal. Locations at which these species were observed during 2008 through 2010 biological surveys are noted.

Figure 1. Pre Construction Weed Distributions



Option A



Option B

N
W E
S

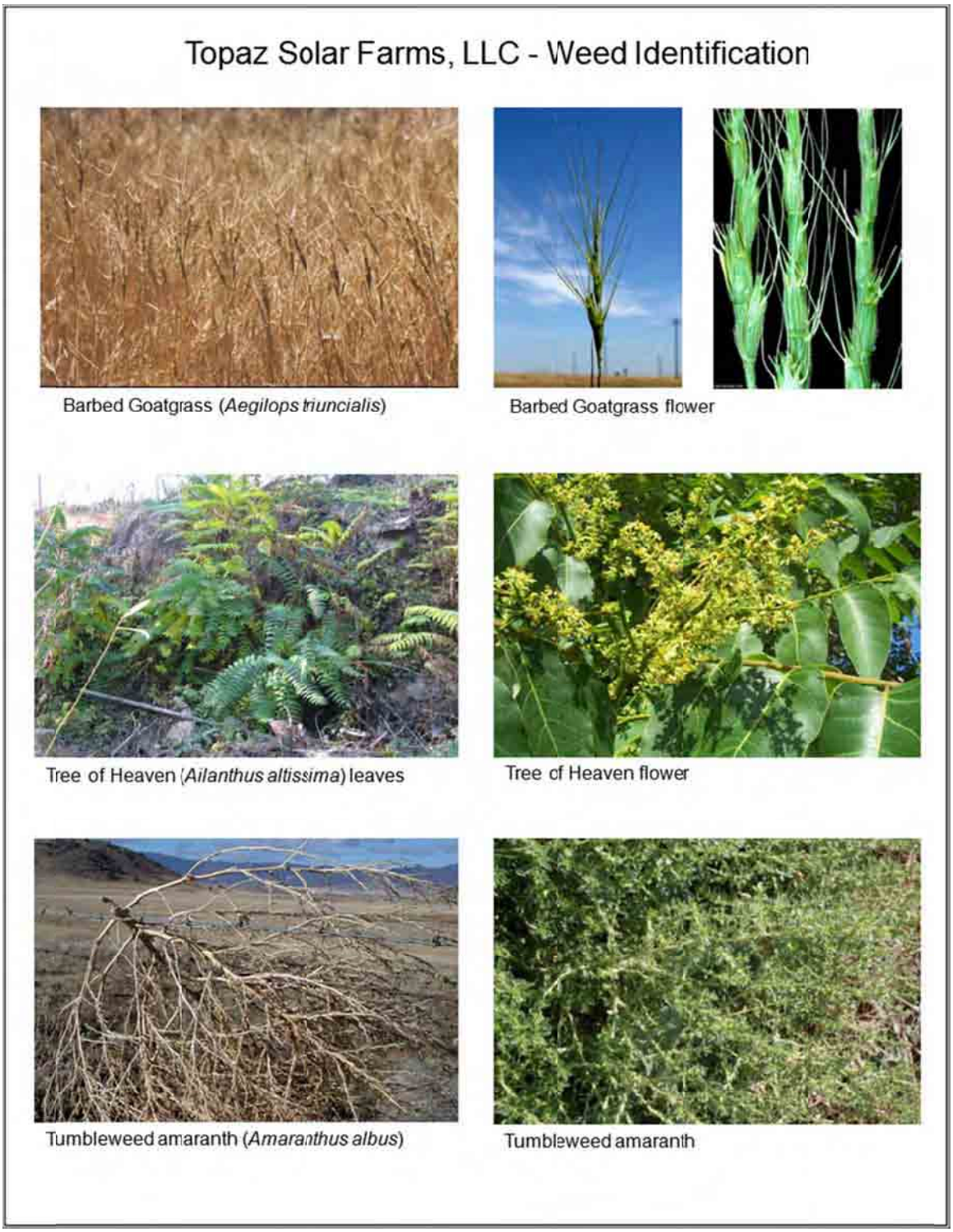
0 0.5 1 2 3 Miles

Topaz Solar Farms LLC
1111 Broadway, 4th Floor
Oakland, CA 94607

2009 San Luis Obispo County
NAIP Aerial Photography
Map Updated December 10, 2010

Althouse and Meade, Inc.
1875 Wellsona Road
Paso Robles, CA 93446

6.0 Weed Identification Photographs



Topaz Solar Farms, LLC - Weed Identification

Yellow-star thistle (*Centaurea solstitialis*)

Yellow-star thistle flower

Tocalote (*Centaurea melitensis*)

Tocalote flower

Skeleton weed (*Chondrilla juncea*)

Skeleton weed fruits

Topaz Solar Farms, LLC - Weed Identification

Field Bindweed (*Convolvulus arvensis*)

Field bindweed flower

(*Descurainia sophia*) leaves

Descurainia sophia flower and fruits

Perennial mustard (*Hirschfeldia incana*)

Perennial mustard flower and fruits

Topaz Solar Farms, LLC - Weed Identification

Broad-leaved Pepper-grass (*Lepidium latifolium*)

Broad-leaved Pepper-grass in flower

Russian thistle (*Salsola tragus*)

Russian thistle flower

Tumble mustard (*Sisymbrium orientale*)

Tumble mustard flower and fruit

Topaz Solar Farms, LLC - Weed Identification

White Horsenettle (*Solanum elaeagnifolium*)

White Horsenettle flower

Salt-cedar (*Tamarix parviflora*)

Salt-cedar flower

Puncture Vine (*Tribulus terrestris*)

Puncture Vine flower

Weed Identification Photo Credits. Photos used with permission from:

Scientific Name	Common Name	Photo 1 Credit	Photo 2 Credit	Photo 3 Credit
Aegilops triuncialis	Barbed goatgrass	© 2001 Joe DiTomaso Cal Photos 0102 0350	© 2004 Carol W. Witham Cal Photos 1104 0368	© 2009 Barry Rice Cal Photos 0509 1629
Ailanthus altissima	Tree of heaven	Althouse and Meade, Inc.	© 2007 Luigi Rignanese Cal Photos 0507 1363	
Amaranthus albus	Tumbleweed amaranth	© 2004 Penn Martin II Cal Photos 1104 0545	© 2009 Luigi Rignanese Cal Photos 0909 0463	
Centaurea solstitialis	Yellow-star thistle	Althouse and Meade, Inc	© 2008 Thomas Stoughton Cal Photos 0708 2233	
Centaurea melitensis	Tocalote	© 2007 Thomas Stoughton Cal Photos 0807 0972	© 2009 Thomas Stoughton Cal Photos 0709 0299	
Chondrilla juncea	Skeleton weed	© 2006 Luigi Rignanese Cal Photos 0806 1170	© 2001 California Department of Food and Agriculture Cal Photos 0175 3301 3809 0035	
Convolvulus arvensis	Field bindweed	© 1995 Saint Mary's College Cal Photos 5207 1611 1136 0081	© 2004 Carol W. Witham Cal Photos 0404 1112	
Descurainia sophia		© 2009 Thomas Stoughton Cal Photos 0709 0332	© 2007 Thomas Stoughton Cal Photos 0807 0950	
Hirschfeldia incana	Perennial mustard	Althouse and Meade, Inc	Althouse and Meade, Inc	
Lepidium latifolium	Broad-leaved Pepper-grass	Althouse and Meade, Inc	Althouse and Meade, Inc	
Salsola tragus	Russian thistle	© 2006 Heath McAllister Cal Photos 0406 1609	© 2007 Thomas Stoughton Cal Photos 0807 0942	
Sisymbrium orientale	Tumble mustard	© 1995 Prof. R. P. Olowin Saint Mary's College Cal Photos 6249 3022 3538 0046	© 2009 Phil Pullen Cal Photos 0509 2576	
Solanum elaeagnifolium	White Horsenettle	© 2009 Neal Kramer Cal Photos 1009 1844	© 2009 Neal Kramer Cal Photos 1009 1842	
Tamarix parviflora	Salt-cedar	© 2010 Neal Kramer Cal Photos 0110 0387	© 2010 Neal Kramer Cal Photos 0110 0388	
Tribulus terrestris	Puncture Vine	© 2001 Steven Thorsted Cal Photos 0801 0392	© 2010 Neal Kramer Cal Photos 0110 0378	

7.0 References

Althouse and Meade, Inc. 2010a. 2010 Biological Report Technical Appendix, Volumes 1 through 3, Topaz Solar Farm, California Valley, San Luis Obispo County, California. June.

Althouse and Meade, Inc. 2010b. Final Biological Report for the Topaz Solar Farm, California Valley, San Luis Obispo County, California. July.

Althouse and Meade, Inc. 2010b. Preliminary Grazing Study Report. October.

Arjo, Wendy M., Tim J. Bennett, and Adam Kozlowski. Characteristics of Current and Historical Kit Fox (*Vulpes macrotis*) dens in the Great Basin Desert. Published on the NRC Research Press Web site at http://cjz.nrc.ca on 20 February 2003.

Bartolome, James W. 1993. Application of Herbivore Optimization Theory to Rangelands of the Western United States. Ecological Applications. 3:27-29.

Bassard, Carla C., John M. Randall, and Marc C. Hoshovksy. 2000. Invasive Plants of California Wildlands.

Bureau of Land Management. 2010. Carrizo Plain National Monument Resource Management Plan.

California Department of Food and Agriculture (CDFA). 2010. Encycloweedia. Available online at http://www.cdfa.ca.gov/phpps/ipc/encycloweedia/encycloweedia_hp.htm.

California Invasive Plant Council (Cal-IPC). 2010. California Invasive Plant Inventory. Available online at http://www.cal-ipc.org/ip/inventory/index.php.

Dart, Jason D. 2010. Field notes for the Topaz Solar Farm LLC, Biological Resources report.

DiTomaso, Joseph and Evelyn Healy. 2007. Weeds of California and Other Western States. Publication 3488. University of California Agriculture and Natural Resources

DiTomaso, Joe M., Stephen F. Enloe, and Michael J. Pitcairn. 2007. Exotic Plant Management in California Annual Grasslands. *In* California Grasslands: Ecology and Management. University of California Press. Berkeley. Pp. 281-296.

Earth Systems Southwest. 2009. Prescriptive Criteria for Developing Compacted Test Strips, Topaz Solar Farm, Highway 58 at Bitterwater Road, Carrizo Plain Area of San Luis Obispo County, California, File No.: 11682-01, Doc No.: 09-10-732, dated October 7, 2009.

Flora of North America. March 23, 2010. Alphabetical List of Pteridophyte, Gymnosperm, and Angiosperm Families with Volume Numbers. Available at www.fna.org/families

Heitschmidt, R.K. and J.W. Stuth. 1991. Grazing Management, An Ecological Perspective. Timber Press. Portland, OR.

Hickman, James C. 1993. The Jepson Manual. University of California Press, Berkeley and Los Angeles, California.

Holland, V.L. and David J. Keil. 1995. California Vegetation. Kendall/Hunt Publishing Company, Dubuque, Iowa.

Hoover, Robert F. 1970. The Vascular Plants of San Luis Obispo County, California. University of California Press. Berkeley, Los Angeles, and London.

Huntsinger, Lynn, James W. Bartolome, and Carla M. D'Antonio. 2007. Grazing Management on California's Mediterranean Grasslands. *In* California Grasslands: Ecology and Management. University of California Press. Berkeley. Pp. 233-253.

Jackson, Randall D. and James Bartolome. 2007. Grazing Ecology of California Grasslands. *In* California Grasslands: Ecology and Management. University of California Press. Berkeley. Pp. 197-206.

Lyon, Michael S., DVM. 2010. Personal communications with LynneDee Althouse regarding anthrax vaccination for livestock in the Carrizo.

Marty. Jaymee T. 2005. Effects of Cattle Grazing on Diversity in Ephemeral Wetlands. Conservation Biology. Pp. 1626-1632.

Oregon State University. 2010. National Pesticide Information Center. Available online at http://npic.orst.edu/

Purdue University Cooperative Extension. 2001. Pesticides and the Law: A Guide to the Legal System. PPP-36. Purdue Pesticide Programs. Available online at http://www.ppp.purdue.edu/Pubs/PPP-36.pdf.

San Luis Obispo County, Planning and Development Department. 2006. Draft County of San Luis Obispo Guidelines For Revegetation/Restoration Plans. Revised June 20, 2006.

Sawyer, John O. and Todd Keeler-Wolf. 1995. A Manual of California Vegetation. California Native Plant Society, Sacramento, California.

Schiffman, Paula M. 2007. Ecology of Native Animals in California Annual Grasslands. *In* California Grasslands: Ecology and Management. University of California Press. Berkeley. Pp. 180-190.

Sheley, Roger, J. James, B. Smith, and E. Vasquez. 2010. Applying ecologically based invasive-plante management. Rangeland Ecology and Management 63:615-613.

Stromberg, Mark J., Jeffry D. Corbin, and Carla M. D'Antonio, eds. 2007. California Grasslands: Ecology and Management. University of California Press. Berkeley.

Thomsen, C. D., W. A. Williams, M. P. Vayssieres, C. E. Turner and W. T. Lanini. 1996. Yellow starthistle biology and control. University of California. Publication 21541.

United States Department of Agriculture, National Cooperative Soil Survey. 2003. Soil Survey of San Luis Obispo County, California, Carrizo Plain Area.

U.S. Department of Agriculture, Natural Resources Conservation Service. 2010. Plants Database. Website: http://plants.usda.gov.

U.S. Environmental Protection Agency. 2010. Pesticides: Regulating Pesticides. Available online at http://www.epa.gov/pesticides/regulating/index.htm

Van Havern, Bruce P. 1983. Soil Bulk Density as Influenced by Grazing Intensity and Soil Type on a Shortgrass Prairie Site. Journal of Range Management. September.

Appendix A. SLO County WMA Weeds List

San Luis Obispo County's Weed Management Area lists six species with limited distribution in the County on their Weed Alert List. Most of these species do not occur at Topaz.

Scientific Name Common Name	Reported Distribution (Summarized from WMA website)
Aegilops triuncialis Barb Goatgrass	First found in SLO County in 2000, there are only two known infestations and both are currently under eradication. Both infestations are in the hills east of Harmony, one along Highway 46 and one on private property off of Old Creek Road. **This species has been reported from Topaz.**
Euphorbia oblongata Oblong Spurge	Currently, oblong spurge is only known to occur in a few roadside and urban areas, one near Pismo Beach, one on Camp San Luis Obispo, and one in the city of Atascadero. All of the plants in these areas are being eradicated.
Ononis alopecuroides Restharrow	The only recorded observation of this plant in North America is right here in San Luis Obispo County. Restharrow is a weedy annual plant that originates from Southern Europe. The small infestation, which occurs in the Suey Creek area, is being controlled by the County Department of Agriculture.
Salvinia molesta Giant Salvinia	Salvinia is an aquatic weed that reproduces rapidly, and is capable of completely covering freshwater sources. Giant salvinia has been detected in one small pond south of San Luis Obispo, where it is under eradication by the California Department of Food & Agriculture.
Taeniatherum caput-medusae Medusahead	This annual grass has caused problems in southern Monterey County, near Parkfield. Recently, it has been discovered in a few areas near the city of SLO, and a couple of small infestations have turned up outside of Paso Robles. We are trying to determine the full extent of medusahead in SLO County in order to develop an appropriate control strategy.

The SLO WMA also lists an additional 14 species they consider the "Worst Invaders of San Luis Obispo County":

Scientific Name	Common Name	Occurs at Topaz?
Ailanthus altissima	Tree of Heaven	✓
Arundo donax	Arundo or Giant Reed	
Cardaria spp.	Hoary Cress	
Carthamus lanatus	Wooly Distaff Thistle	
Centaurea calcitrapa	Purple Starthistle	
Centaurea solstitialis	Yellow Starthistle	✓
Cortaderia jubata	Jubatagrass	
Cortaderia selloana	Pampasgrass	
Cynara cardunculus	Artichoke Thistle	
Delairea odorata	Cape Ivy	
Ehrharta calycina	Veldt Grass	
Genista monspessulana	French Broom	
Lepidium latifolium	Perennial Pepperweed	✓
Spartium junceum	Spanish Broom	

Finally, the SLO WMA lists 15 species as "Other Invasive Plants of San Luis Obispo County":

Scientific Name	Common Name	Occurs at Topaz?
Acroptilon repens	Russian Knapweed	
Ammophila arenaria	European Beachgrass	
Carduus pycnocephalus	Italian Thistle	
Carpobrotus edulis	Ice Plant	
Centaurea melitensis	Tocalote	✓
Chondrilla juncea	Skeleton Weed	✓
Cirsium vulgare	Bull Thistle	
Conium maculatum	Poison Hemlock	
Foeniculum vulgare	Wild Fennel	
Ricinis communis	Castor Bean	
Salsola tragus	Russian Thistle	✓
Solanum elaeagnifolium	White Horsenettle	✓
Tamarix spp.	Saltcedar/Tamarisk	✓
Tribulus terrestris	Puncture Vine	✓
Vinca major	Periwinkle	✓

Appendix B. Preliminary Grazing Trial Report

Topaz Solar Farm Grazing Test

Section 29 of TSF Project Study Area
California Valley, San Luis Obispo County, California

Prepared for
Topaz Solar Farms, LLC
1111 Broadway, 4th Floor
Oakland, CA 94607

by

Marc Horney, Ph.D., and Rob Rutherford, M.S.

California Polytechnic State University, Animal Sciences Department

and

Royce Larsen, Ph.D.

University of California Cooperative Extension Service

with

LynneDee Althouse, M.S. and Meg Perry

Althouse and Meade, Inc.

October 2010

654.18

Table of Contents

Table of Contents ii
1 Introduction 1
2 Existing Conditions 1
3 Grazing Trial Objectives 3
4 Characteristics Observed/Measured 3
4.1 Qualitative observations 3
4.2 Measured characteristics 3
5 Methods 3
5.1 Site layout 3
5.2 Grazing herd 4
5.3 Measured characteristics: 4
5.3.1 Clip plots 4
5.3.2 Vegetation height 4
5.3.3 Sheep fecal pellet count 5
5.4 Observations 5
5.4.1 Panel inspection 5
5.4.2 Behavior observations 5
6 Results 6
6.1 Clip plot data – forage consumed 6
6.2 Vegetation height and fuel reduction 7
6.3 Sheep fecal pellet count 7
6.4 Panel inspection 8
6.5 Behavior observations 8
7 Discussion 9
7.1 Forage consumed 9
7.2 Vegetation height and fuel reduction 10
7.3 Panel inspection 10
7.4 Sheep fecal pellet count 10
7.5 Behavior observations 11
8 Conclusion 11
9 Photographs and Figures 13
10 References 16

1 Introduction

As described in the Final Biological Report for Topaz Solar Farm dated July 2010, First Solar commenced two vegetation tests on Topaz during Fall 2009 and Winter 2010. One test investigated site preparation methods for construction, and the second is an on-going test of vegetation response to solar arrays and sheep grazing. The second vegetation test site was grazed in August 2010 as a preliminary trial of grazing as a site management strategy, and is documented in this report.

Goals of this second vegetation test are to identify ground treatments that will provide the appropriate vegetative ground cover within the project site, and identify strategies to manage vegetation over the life of the project. Grazing is one potential tool to manage vegetation long-term. Appropriate ground cover on the project site will provide habitat for kit fox and their small mammal prey, will protect the soil from wind and water erosion, and will encourage stormwater infiltration while not shading the PV modules or creating a fire hazard.

Researchers included the following participants: Marc Horney, Ph.D, Assistant Professor, Rangeland Resource Management, with Rob Rutherford, M.S., Sheep Specialist, and interns Gretchen Wulff and Erika Hucal, Animal Sciences Department, California Polytechnic State University; Royce Larsen, Ph.D., Natural Resources Watershed Advisor, University of California Cooperative Extension Service; LynneDee Althouse, M.S., Biologist/Range Conservation Specialist, Daniel E. Meade, Ph.D., Biologist/Statistician, and Meg Perry, B.S., Biologist/Soil Scientist from Althouse and Meade, Inc. Additional field assistance was provided by Cassie Murphy, Naomi Oyler, and Russell Stack.

2 Existing Conditions

A vegetation test commenced January 2010, prior to heavy winter rains, in the northeast corner of Section 29, Township 29 South, Range 18 East, Mount Diablo Base Meridian, approximately one mile north of Highway 58 in eastern San Luis Obispo County.

Vegetative cover was evaluated for height, species, and percent cover/percent bare ground (Photo 1). By May 2010 most annual species had gone to seed and dried up. Rat-tail fescue (*Vulpia myuros*), soft-chess brome (*Bromus hordeaceus*), rip-gut brome (*B. diandrus*), wild oats *(Avena fatua)*, and Mediterranean grass (*Schismus arabicus*) dominated the site along with pineapple weed (*Chamomilla suaveolens*), mustard (*Hirschfeldia incana*), and fireweed (*Amsinckia menziesii*). Patches of native annual fescue *(Vulpia microstachys)* occurred throughout the test site. Late-blooming annual plants included mustard, turkey mullein *(Eremocarpus setigerus)*, vinegar weed *(Trichostema lanceolatum)*, and tumble mustard *(Sisymbrium altissimum)*. Vegetation height was 10 to 18 inches tall with about 50 percent bare ground, and about 1500 pounds per acre above-ground biomass measured in August 2010.

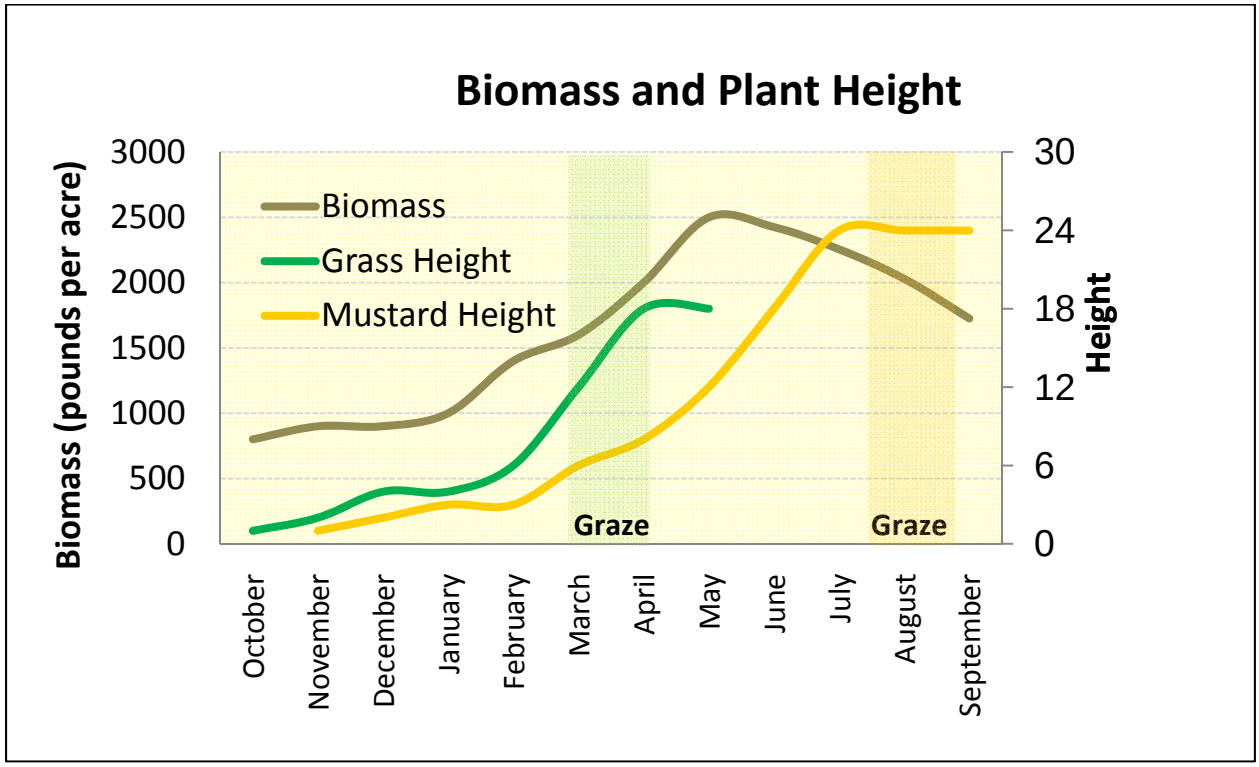
First Solar installed PV modules (not electrically connected) over two replicate vegetation test sites in June 2010. Each test site contains 6 module tables within an area 80 feet by 80 feet (Photo 2 and Figure 1). The low end of the modules averaged 25 inches above the existing ground surface (range 17 to 32 inches due to slight variation in ground surface elevation).

The module installation process was conducted with minimal ground disturbance. Equipment rolled over some of the standing dried vegetation, reducing its height and potentially reducing its

quality as forage in a few months immediately following module installation (Photo 3). This approximates the expected condition of the ground and vegetation condition at the Topaz Solar Farm immediately following panel installation. Vegetation is expected to fully recover the following growing season, because annual plants reproduce the following rainy season from seeds produced during previous spring and summer months.

Grass production at Topaz typically peaks in April, near the end of the rainy season (October to April). In the vegetation test sites, annual grass height varied from 12 to over 30 inches tall in 2010. Late-blooming herbaceous plants such as native milkweed, vinegarweed, and non-native mustards grow into August and September. Grasses dry in the late spring and begin to deteriorate, while late-blooming annual plants reach their peak biomass in mid to late summer. In 2010, annual mustards were the tallest weeds in the test sites, with some over 30 inches tall.

The grazing trial was scheduled to mimic late-season grazing to reduce vegetation height and potential fire hazards from the PV solar farm. The figure below illustrates optimal periods for sheep grazing in the spring, when grass productivity is near its peak, and again in the late summer, when late-season annuals have reached their maximum height. Annual grasslands lose approximately seven percent of their mass each month after peak maturity, due to deterioration (decomposition), seed loss, and insect herbivory (Royce Larsen, unpublished data on San Luis Obispo County forage production). Grass production peaks between March and April, depending on seasonal rainfall and temperature patterns. Late-season annuals generally peak in July or August; thus, the peak of standing biomass occurs in late spring or early summer. In the graphic below, lines depicting biomass, grass height, and mustard height represent an ungrazed scenario. The standing biomass curve would flatten out with prescribed grazing.



3 Grazing Trial Objectives

The grazing trial conducted in August 2010 was part of an effort by Topaz Solar Farm LLC to determine if grazing can be used to manage vegetation for habitat improvement and fire prevention. The grazing test conducted in August 2010 was a preliminary trial to determine if grazing sheep under solar modules is feasible before dedicating resources to develop a management plan for grazing. This preliminary trial investigated

(1) whether sheep are likely to damage solar modules, wiring, or support structures when confined to solar arrays for grazing; and

(2) how effectively sheep remove vegetation, especially in front of and underneath the array structures.

4 Characteristics Observed/Measured

Observations and measurements are directed toward the following characteristics:

4.1 Qualitative observations

Investigators specifically watched for instances of sheep...

- grazing beneath solar panels.
- chewing on panel wiring.
- climbing on solar panels.
- rubbing on or butting solar panels.

These observations were to determine whether interaction of sheep with solar module components would be likely to cause damage to them, and whether sheep would graze beneath the panels.

4.2 Measured characteristics

The following criteria were documented via measurements or tallies of the number of incidents.

- Change in vegetation height following grazing.
- Compare pounds of forage removed beneath panels with pounds of forage removed in alleys between panel rows.
- Estimate number of manure pellets per square foot post-grazing.
- Frequency of itching and rubbing against panel corners and low edges.
- Frequency of itching and rubbing against steel supports and piles.

5 Methods

Grazing occurred from August 16 to 19, 2010. Two PV module treatments and one control plot were grazed for 24 hours. A second control plot was grazed for only 8 hours, because of student intern availability.

5.1 Site layout

Grazing was conducted over a period of four days, with one enclosure grazed per day. Each enclosure was approximately 6400 square feet (0.15 acre) in size using 320 feet of electric net fencing. One Stafix x6 battery and a 40 Watt solar Panel (BP Solar) were connected to 42-inch

tall Quick Ground Netting (nine horizontal hot wires and one grounded bottom wire). Materials were purchased from Livewire Professional Fencing. Water was provided in one trough at the east edge of each enclosure, filled by the Kuhnle's water truck (from a local well). Animals were moved between enclosures using additional fence panels.

Two enclosures, PV1 and PV2, contained the photovoltaic (PV) arrays installed in June 2010. PV1 and PV2 enclosures each consisted of five rows of panel tables and five alleys, with approximately 10 feet of clear space to walk around the edge of each row of PV panels. The other two enclosures, Control 1 (C1) and Control 2 (C2), consisted of annual grassland vegetation planted for the vegetation test adjacent to but outside the panel table installations. These control enclosures are within the vegetation test site and were treated with the same seed mixes as the area beneath the panel table. A diagram of enclosure layout (Figure 1) and photos are provided in Section 9.

5.2 Grazing herd

Each enclosure was grazed by a herd of 30 crossbred ewes (Targhee, Finnsheep, and Dorper breeds in varying amounts). These ewes weighed an estimated 140 pounds during the grazing trial and stood approximately 28 inches tall. Each enclosure was grazed for 24 hours, except C2 which was grazed for only 8 hours due to limitations with herd availability on the final day of the trial. The ewes were last sheared in March and had five months of wool regrowth during the Preliminary Grazing Trial. Sheep with more wool are typically more prone to itching and rubbing than recently shorn sheep.

5.3 Measured characteristics:

Plant height and biomass were measured before and after grazing each enclosure to investigate changes caused by grazing. Measurements were also taken in control enclosures for comparison with panel sites.

5.3.1 Clip plots

Clip plots were taken to estimate plant biomass, also known as "dry matter" (DM), present before and after grazing, which provides an estimate of forage available and consumed. Vegetation collected from each plot is weighed, and forage biomass before and after grazing is estimated from these measurements. Clippings were taken from forage growing beneath panel tables and from forage growing in alley ways. Clip plots were used to test whether sheep grazed the open alleys more or less than they did under the panels. The difference in pounds of plant material present before grazing and after grazing was used to estimate how much the sheep ate. The estimated net loss of forage was divided by the number of sheep (30) to estimate average intake per ewe. This result was compared with documented intake values for sheep published in the National Research Council's *Nutrient Requirements of Sheep* (1985).

5.3.2 Vegetation height

Maximum vegetation height was measured at 10 points along the lower panel edge for each row of panels in each PV enclosure. At each point the tallest standing vegetation within six inches of the point was measured. Measurements were repeated following 24 hours of grazing. Vegetation height measurements were also made along transects in the Control enclosures (Photos 3-6).

5.3.3 Sheep fecal pellet count

Following grazing, technicians counted the number of fecal pellets in one-square foot quadrats from five locations under the PV modules and five locations within alleys. Placement of the quadrat frames was randomized by dropping the frame without looking where it would fall. The purpose of this measurement was to give First Solar an estimate and visual of how much manure could be generated during high intensity short duration grazing. Pellet counts also document animal use intensity.

5.4 Observations

5.4.1 Panel inspection

Panels were inspected before grazing to document any preexisting irregularities, damage, or flaws (panels installed on the site are non-functioning panels). Wires were checked for preexisting damage. Panels and wires were inspected a second time following grazing to check for changes in panel condition.

5.4.2 Behavior observations

Two technicians observed sheep behavior for a 15-minute period every hour from 0915 to 1630 on August 16 and 0930 to 1615 on August 17, when PV2 and PV1 were grazed. The number of sheep engaged in specific behaviors (grazing, resting, rubbing on panels or supports) were recorded. Technicians were instructed to record observations of the following behaviors if they occurred.

- Frequency of itching and rubbing against panel corners and low edges.
- Frequency of itching and rubbing against steel supports and piles.
- Number of sheep grazing beneath panels.
- Number of sheep resting/ruminating.
- Instances of sheep investigating (smelling, licking, nosing) panels.
- Instances of sheep chewing on wires.
- Instances of sheep climbing on solar panels.
- Instances of sheep butting solar panels.
- Any interactions that cause or appear to cause damage to panels.

6 Results

6.1 Clip plot data – forage consumed

Average pounds of forage per acre are presented in two ways. First, average biomass as dry matter under panels, in alleys, and in control plots is presented with percent change after grazing. In this table, alley and under-table measurements are presented separately (Table 1). Second, average biomass as dry matter is presented for each enclosure, along with average consumption per sheep and hours of grazing (Table 2); alley and under-table measurements are combined by PV enclosure.

TABLE 1. Pounds of forage per acre (mean ± SE) calculated from clip plots of residual dry matter before and after grazing combined for two replicates. Grazing enclosures were approximately 0.15 acre.

Location	Average pounds of forage/acre (n = 40)				Average Forage Consumed	Percent change
	Pre-graze	Post-graze	F	P		
Alleys	1618±160	972±114	10.78	0.0022	645	40
Under Panels	1392±111	1089±118	3.51	0.0688	303	22
Controls	1486±97	874±132	14.03	0.0006	612	41

Analysis of Variation[1] (ANOVA) found significant differences between pre- and post-grazing values for the Control enclosures (P = 0.0006, F = 14.026, n = 40) and the alley portions of the PV enclosures (P = 0.0022, F = 10.780, n = 40). However, pre- and post-grazing values for beneath the panels within the PV enclosures were not significantly different (P = 0.0688, F = 3.507, n = 40).

Sheep consumed between 2.1 and 3.8 pounds of feed over a 24 hour period when grazing in the panel treatment and control (Table 2). The second control was only grazed 8 hours, because sheep were moved back to Cal Poly the fourth day of the test. Twenty clip plots were sampled before and after grazing. Before grazing, available biomass ranged from 1340 to 1632 pounds per acre. After grazing, biomass ranged from 864 to 1046 pounds per acre.

[1] ANOVA means Analysis of Variance, a statistical test to make simultaneous comparisons between two or more means. P is the probability of two groups being the same (the lower the p-value, the more significant the result); F statistic is a test of variance; n is the number of samples.

TABLE 2. Pounds of biomass per acre, per plot, and per sheep (mean) for PV arrays and control plots. Clip plots were used to estimate biomass as dry matter before and after grazing. Total forage removed was divided by the number of sheep grazing (30) to estimate feed per sheep.

Plot	**Pre-grazing Biomass** lb/ac (n = 20)	**Post-grazing Biomass** lb/ac (n = 20)	**Amount Feed Consumed Total** lb/ac	lbs/plot	lbs/sheep	**Time Grazed** (hours)
PV- 1	1555	1046	509	75	2.5	24
PV-2	1454	1016	439	64	2.1	24
C1	1632	864	768	113	3.8	24
C2	1340	883	457	67	2.2	8

6.2 Vegetation height and fuel reduction

Maximum vegetation height along the low panel edge of each panel row in both PV enclosures and along two transects in one control enclosure were measured before and after grazing (Photos 3-6). Vegetation height varied from 7 to 15 inches before grazing (Table 3). Vegetation in the panel treatment area was affected by equipment on the ground during the June installation of the panels and was therefore shorter than vegetation in the control area. Grazing resulted in a significant difference in vegetation height within treatment and control areas (ANOVA, $P < 0.0001$, F-value 69.3 for PV, $P = 0.005$, F-value 13.00 for Control).

TABLE 3. Maximum height of vegetation at panel edge (PV enclosures) or along designated transects (Control) before and after grazing. Values reported as means ± SE.

Location	**Pre-graze Height (Inches)**	**Post-graze height (Inches)**	***F***	***P***	**Average change (Inches)**
PV	7.3±0.6 (n=100)	1.8±0.4 (n=100)	69.3	<0.0001	-5.4
Control	14.2±1.0 (n=68)	9.7±0.6 (n=20)	13.00	0.0005	-4.5

6.3 Sheep fecal pellet count

The number of sheep fecal pellets on the ground provide a measure of the amount of time sheep are at a location. By counting sheep pellets we can approximate their use of different locations. Table 4 presents a summary of pellet counts. No difference was noted in number of pellets under PV panels versus in alleys on the same day, suggesting movement of sheep is evenly distributed over the PV enclosures. In PV2, which was grazed first, on August 16, 2010, pellets per square foot averaged 15. In PV1, which was grazed second, on August 17, 2010, technicians found 6 pellets per square foot. The combined overall average is 10 pellets per square foot (See Photo 10).

TABLE 4. Pellet count average, range, and number of samples.

Location	Average Pellets per Square Foot	Range	*n*
PV1 – Alley	6	0-14	5
PV1 – Under Panels	6	0-17	5
PV1 Combined Average	**6**	**0-17**	**10**
PV2 – Alley	15	1-51	5
PV2 Under Panels	15	4-29	5
PV2 Combined Average	**15**	**1-51**	**10**

6.4 Panel inspection

Technicians did not note any changes in panel condition or wiring after PV enclosures were grazed for 24 hours. The only indication of sheep investigating panels were marks in dust on the panels where ears, noses, lips, and tails had brushed against the panel surface (Photo 11). Brush marks from investigating panels do not damage the PV modules or impair their function.

6.5 Behavior observations

Behavior observations include both tallies of certain behaviors, particularly rubbing/itching against panels and supports, and grazing beneath panels, as well as yes/no observations (behavior was observed or not). Table 5 presents yes/no observations; Table 6 and Table 7 present tallies.

TABLE 5. Results of behavior observations (Yes/no or Presence/absence of behavior).

Parameter	Observed?
Sheep grazing beneath panels	Yes
Sheep resting/ruminating under panels	Yes
Sheep itching and rubbing against panel corners and low edges.	Yes
Sheep itching and rubbing against steel supports and piles	Yes
Sheep investigating panels (licking, smelling, nosing, brushing against panels)	Yes
Sheep chewing on wires	No
Sheep entangled in wires	No
Sheep climbing on solar panels	No
Sheep butting solar panels	No
Interactions that damage or appear to damage panels	No

TABLE 6. The average number of sheep grazing under panels per hour is estimated from observations during 15-minute observation periods.

Date	Average Number of Sheep Grazing under Modules (Sheep per hour)	Range	Hours of Observation
8/16/2010	17.0	0-29	3.75
8/17/2010	22.8	1-28	4

TABLE 7. Each incident of sheep rubbing or itching on steel support piles and low edges or corners of PV modules was documented. Total incidents are reported, along with total hours of observation.

Date	Incidents of rubbing/itching on steel piles	Incidents of rubbing/itching on corners and low edges of modules	Hours of Observation
8/16/2010	25	19	3.75
8/17/2010	20	6	4.00
Total	45	25	7.75

7 Discussion

7.1 Forage consumed

Intake estimates from the forage clip plots agree with National Research Council nutrition guidelines for sheep. These estimate a dry matter intake of 1.7% of body weight for 150-pound ewes, or 2.6 pounds dry matter, at maintenance/early gestation. At the Grazing Trial Site, sheep consumed an average 2.6 pounds dry matter per day (compare to "Amount Feed Consumed - Total" columns in Table 2). According to the National Research Council nutrition guidelines (NRC 1985), sheep that are in late gestation or lactating (nursing lambs) require additional feed, typically needing dry matter equaling 2.6 to 3.7 percent of body weight (4.0 to 5.5 pounds for a 150-pound ewe). Clip plot data shows that additional forage was available, even in the unusually disturbed condition of the PV grazing trial enclosures.

This preliminary grazing trial was conducted very late in the season. Grazing at this time could be feasible for management of late-season weeds, such as annual mustard species which can grow very tall and present a fire risk. However the preliminary grazing trial did not provide data on potential spring grazing. Spring grazing would be a key component of grazing for fuel and habitat management. Forage was also crushed/disturbed by panel installation in June, a condition that could be replicated in the installation year of the Project but would not be repeated in subsequent years.

The sheep used to graze the trial site were crossbreeds including Targhee, Finnsheep, and Dorper breeding of varying amounts. These ewes weighed an estimated 140 pounds during the grazing trial and stood approximately 28 inches tall. Note that weight of ewes can vary by 80 pounds

during a year-long production cycle. Herds of sufficient size to graze a site the acreage of the proposed Topaz Solar Farm are likely to be Rambouillet/Merino ewes and lambs of those ewes bred to blackface rams of Suffolk and Hampshire blood. These sheep would be slightly larger than those used to graze the Trial site.

Subsequent grazing trials aimed at developing management standards should consider forage requirements of lactating ewes. Future study should be timed to reflect forage conditions in all season(s) proposed for vegetation management via grazing, most likely late spring in addition to midsummer.

7.2 Vegetation height and fuel reduction

Installation of PV panels in June 2010 disturbed vegetation and reduced vegetation height prior to the grazing trial in August 2010. This is expected to mimic conditions in the installation year of the solar farm. In subsequent years vegetation is expected to recover, and would likely be taller than the average height of disturbed vegetation along panel rows in the 2010 Trial. The difference in pregrazed vegetation height in the Control versus PV enclosures reflects the disturbance due to panel installation. Depending on the preferred vegetation density for onsite habitat, grazing may not be required in the first year after panel installation.

Despite the disturbed condition of vegetation in PV enclosures, the grazing trial still demonstrated that grazing sheep will reduce average height of vegetation and remove vegetation along low edges of panels. Low edge of the panels in the trial enclosures averaged 25.24 inches above the existing ground surface (range 17 to 31.5 inches). Average maximum height of vegetation along the low edge of panels prior to grazing was 7.3 inches (n=100). Post-grazing average maximum height measured at the same sites was approximately 1.8 inches.

Sheep reduced vegetation height in the control enclosures, which approximate the expected condition of vegetation under panels subsequent to the panel installation year. Average maximum height of vegetation along transects in C2 enclosure was 13.3 inches (n=20). Post-grazing average maximum height measured at the same sites was approximately 9.7 inches (n=20). Vegetation average height can be managed by sheep grazing.

During the grazing trial, observers noted sheep moving easily under the low edge of the panels, and reaching for forage beneath the low edge. Sheep were willing to reach for vegetation from their knees in locations where panels were lower than average.

Additional study should consider appropriate timing to balance sheep nutrition requirements with controlling vegetation height for fuel and habitat management. Forage is more palatable and nutritious in early spring when soils are still moist and plants are able to regenerate quickly. However, when sites are grazed in late spring or early summer when soils are drying, plants are less likely to regrow until the following spring, and fire risk is reduced for a longer period.

7.3 Panel inspection

Grazing 30 sheep for 24 hours in just 6400 square feet of pasture qualifies as a high intensity short duration grazing operation. Even at high grazing intensity, technicians did not note any damage to PV panels or wiring.

7.4 Sheep fecal pellet count

No difference was noted in number of pellets under PV panels versus in alleys on the same day, suggesting movement of sheep is evenly distributed over the PV enclosures. The reduction in

pellets on the second day is likely the result of change in diet from their previous pasture at Cal Poly to the drier, lower quality forage at Topaz.

7.5 Behavior observations

Sheep were actively observed for a total of 8 hours, in 15 minute increments spread over two days (Photos 7-12).

In the grazing trial enclosures, the low edge of panels ranged from 17 to 31.5 inches above the ground, with an average height of 25.24 inches. This is similar to expected condition of panels proposed for Topaz Solar Farm, which are proposed to be a minimum of 18 inches above the ground. At this height, the sheep had no trouble reaching under low edges of panels to graze, and were able to move underneath the panels easily.

Itching and rubbing on the panel edges, corners, and low edge and on steel supports occurred during the grazing periods. Incidents of rubbing and itching on panel corners and low edges were much more frequent on the first day than the second. Incidents of rubbing and itching on steel piles were similar the first and second days. Itching and rubbing did not result in damage to panels or supports. Rob Rutherford noted that on the first day, sheep were transported for an hour in a trailer prior to release in the PV2 enclosure, and sheep that have been in a trailer are often restless and itchy when they are released into pasture. Some of the rubbing observed the first day may reflect this.

The ewes were last sheared in March and had five months of wool regrowth during the Preliminary Grazing Trial. Sheep with more wool are typically more prone to itching and rubbing than recently shorn sheep. Sheep can be expected to rub against panels and supports more frequently during late summer grazing than in spring when they are recently sheared. Future study should investigate if grazing earlier in the year results in fewer incidents of rubbing and itching against panel edges and supports.

Technicians did not observe any instances of sheep chewing wires or becoming entangled in wires. No damage to wiring was observed. To maintain a safe grazing environment for sheep, wiring should be kept secured to supports. Arrays should be checked for loose wiring before grazing events to prevent accidental tangling.

The grazing trial was conducted in late summer with a flock of ewes. Spring grazing would likely require use of a flock that includes lambs, and possibly rams. Behavior of ewes may change when lambs and rams are present, and behavior of rams was not investigated in this preliminary trial. Future study should consider use of a mixed flock to determine if rams will interact differently with the panels.

8 Conclusion

The preliminary grazing trial was conducted late in the year in conditions disturbed by panel installation. Typical site conditions in which grazing would be prescribed for habitat and fuel management would have a greater abundance of standing grasses and forbs. Therefore, many of the findings of this study are qualitative rather than quantitative measures necessary to develop a final grazing management plan. Nonetheless, this trial answered many important questions, and demonstrated that sheep will graze under solar panels. Because grazing appears to be a feasible method of managing vegetation on the Solar Farm, additional study is warranted. We recommend spring and summer grazing trials to inform decisions regarding fire risk reduction,

and wildlife habitat management. A grazing management plan should include a flexible response to annual climate variations that affect timing of forage production, total biomass produced, as well as vegetation height.

The preliminary grazing trial demonstrated that sheep will graze beneath solar panel modules similar to those proposed for Topaz Solar Farm when they are set approximately 18 inches to two feet above the ground. Occasional itching and rubbing behaviors did not appear to cause any damage to the panels. Sheep did not climb on or otherwise substantially disturb the panels, and were successful at moving beneath panels to graze and rest. Grazing reduced average maximum vegetation height along the low panel edge, and reduced biomass (fuel). Due to the small size of test plots and logistic constraints during the trial grazing period vegetation experienced more intense grazing than is anticipated in the actual solar farm. Even so, residual dry matter sufficient to provide erosion protection was retained on the site. We recommend maintaining residual dry matter over 750 pounds per acre to maintain adequate kit fox habitat[2] and for permanent erosion control.

Some questions could not be answered during this preliminary trial and additional study is needed to develop a grazing management plan. Future study should examine grazing behaviors during spring months when flock composition varies from solely ewes to include rams, who may occasionally engage in sparring contests with each other in proximity of the tables. Grazing during earlier spring months would investigate if sheep engage in less rubbing and itching behaviors when wool length is shorter. Additionally, future grazing trials should consider ideal enclosure area and duration for grazing, and how many pulses of grazing are required per year for optimal vegetation height. Forage quality should be evaluated for protein content, and the effect of grazing on vegetation height should be re-evaluated on the site when vegetation has had a chance to regrow, since the initial study was conducted on vegetation recently disturbed by panel installation. Future study may also consider dust generated by the grazing herd and its significance, if any, to PV panel function.

[2] This number was recently negotiated with the California Department of Fish and Game for a kit fox conservation bank in Bitterwater Valley.

9 Photographs and Figures

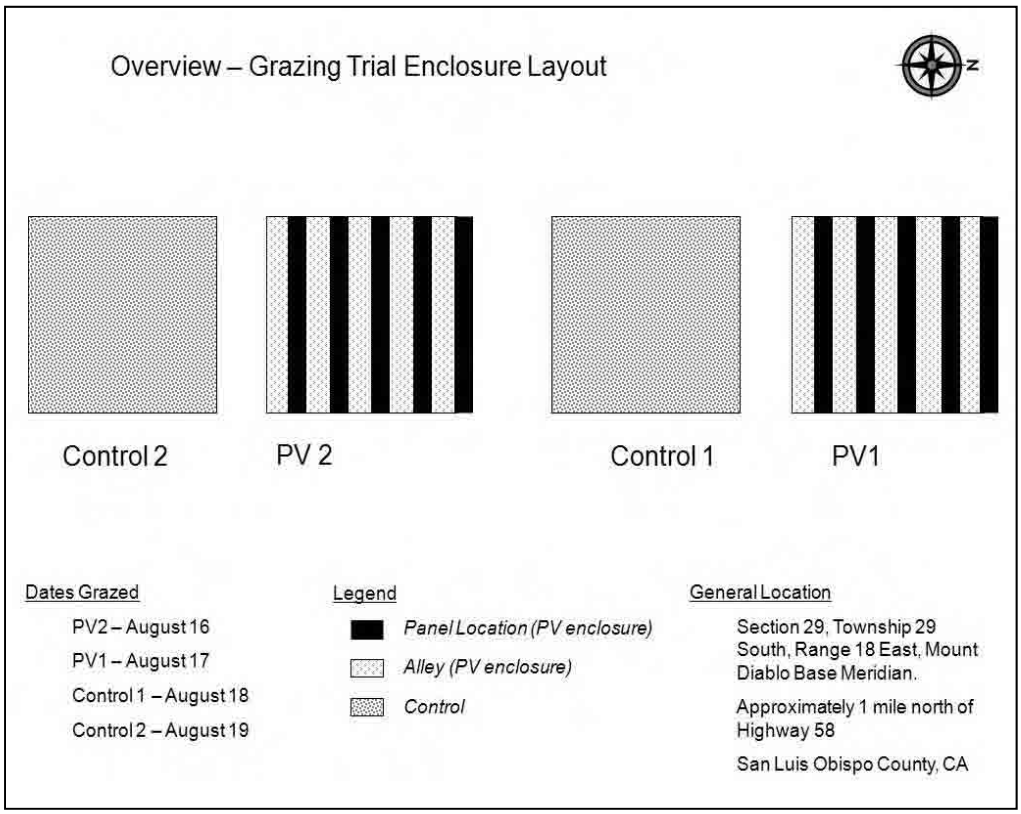


Figure 1. Experimental Layout. In each treatment, an electric fence enclosure circumscribed approximately 6400 square feet: two treatments contained photovoltaic panels, 80-feet long, spaced approximately 12 feet apart, and two controls contained no panels.

Photo Collection: Grazing Trial August 16-19, 2010

1. Vegetation before panel installation and grazing.

2. Panel installation required small, rubbertrack pile driver and construction crew.

3. Vegetation before grazing (PV2 treatment).

4. Vegetation after grazing (PV 2 treatment).

5. Electric netting surrounded panel treatments.

6. Vegetation after grazing. (PV 1 treatment.)

7. Sheep grazing inside PV enclosure.

8. Sheep grazing under the panels and in alley-ways.

9. Ewe reaching under the front edge of the panel to graze.

10. Dry matter and manure pellets in a one square-foot quadrat in PV1 enclosure, post graze.

11. Marks in the dust where ewes investigated panels.

12. Wool snagged on the low edge of a panel.

10 References

Althouse and Meade, Inc. 2010. Final Biological Report for Topaz Solar Farm. Carrizo Plain, San Luis Obispo County, California. 29 July.

Althouse and Meade, Inc. 2010. Vegetation Test Report for Topaz Solar Farm. Carrizo Plain, San Luis Obispo County, California, *unpublished data.*

Horney, Marc. 2010. 2010 Topaz Sheep Grazing Trial Results Summary. September 6.

Larsen, Royce. 2010. Erosion, Soil Protection and Water Quality Regulations. *Presentation in* Preparing for Drought: 2010-11 LaNina? October 28, Paso Robles.

Live Wire Products. 2010. Professional Fencing Solutions. Available online at www.livewireproducts.com.

National Research Council, Board on Agriculture. 1985, Nutrient Requirements of Sheep. Sixth Revised Edition. Subcommittee on Sheep Nutrition, Committee on Animal Nutrition. National Academy Press, Washington DC. Available online at http://www.nap.edu/openbook.php?record_id=614

Rutherford, Rob. 2010. Personal Communication regarding Topaz Grazing Trial. August 16 and 17, 2010.

Striby, Karl. 2010. Forage production in San Luis Obispo County from 2001 to 2010. *Presentation in* Preparing for Drought: 2010-11 LaNina? October 28, Paso Robles.

TOPAZ FINAL BIOLOGICAL REPORT

Final Biological Report

for the

Topaz Solar Farm

California Valley
San Luis Obispo County
California

Prepared for

Topaz Solar Farms LLC
1111 Broadway, 4th Floor
Oakland, CA 94607

by

ALTHOUSE AND MEADE, INC.
BIOLOGICAL AND ENVIRONMENTAL SERVICES
1875 Wellsona Road
Paso Robles, CA 93446
(805) 467-1041

July 2010

654.27

Table of Contents

Synopsis 1
Definitions 2
1.0 Introduction 3
1.1 Biological Resource Project Study Area Location 4
1.2 Project Description 4
1.3 Responsible Parties 6
1.4 Project Study Area Overview 6
2.0 Methods 8
3.0 Topaz Solar Farm Project Study Area 17
3.1 Existing Conditions 17
3.2 Land Use Descriptions 18
3.3 Soils 28
4.0 Special Status Plants and Animals 31
4.1.1 Introduction to CNPS lists 31
4.1.2 Introduction to CNDDB definitions 31
4.1.3 Potential special status plant list 32
4.1.4 Special status plants discussion 38
4.1.5 Potential special status animals list 46
4.1.6 Special status animals discussion 54
4.1.7 Special status species not expected to occur within the PSA 65
4.1.8 Tule elk and pronghorn antelope 65
4.1.9 Sensitive natural communities and special aquatic sites 65
5.0 Habitat Types 66
5.1 Habitat Survey Methods 66
5.2 Habitat Types in the PSA 66
5.2.1 Cropland 67
5.2.2 California annual grassland 68
5.2.3 Vernal pool 69
5.2.4 Ephemeral wetland depression 70
5.2.5 Natural non-wetland pool 71
5.2.6 Anthropogenic non-wetland pool 71
5.2.7 Agricultural reservoir 72
5.2.8 Anthropogenic 72
6.0 Floristic Inventory 73
6.1 Methods 73
6.1.1 Transect survey methods 74
6.1.2 Focused survey methods 75
6.1.3 Botanical reference sites 75
6.2 Previous Botanical Surveys Conducted on the PSA 77
6.3 Final Botanical Survey Results 79
6.3.1 Botanical data 98
6.3.2 Special status plants identified within and adjacent to the PSA 100
7.0 Wildlife Inventory 109

7.1 Specialized Wildlife Surveys Conducted for the Topaz Solar Farm 109
7.1.1 Completed specialized wildlife surveys 109
7.1.2 On-going specialized wildlife surveys 110
7.2 Wildlife Survey Methods 111
7.2.1 San Joaquin kit fox survey methods 111
7.2.2 Kern primrose sphinx moth 112
7.2.3 Small mammal survey methods 112
7.2.4 Fairy shrimp survey methods 113
7.2.5 Special status bird survey methods 113
7.2.6 Golden eagle aerial nest survey methods 114
7.2.7 Reptile and amphibian survey methods 114
7.2.8 Bat roost survey methods 114
7.3 Final Wildlife Survey Results 115
7.3.1 San Joaquin kit fox survey results 122
7.3.2 Kern primrose sphinx moth results 125
7.3.3 Small mammal survey results 125
7.3.4 Fairy shrimp results 132
7.3.5 Special status bird survey results 133
7.3.6 Final golden eagle survey results 138
7.3.7 Reptile and amphibian results 138
7.3.8 Bat roost survey results 139
7.3.9 Tule elk and pronghorn antelope results 139
8.0 Vegetation Tests 140
9.0 Project Overview 144
9.1 General Discussion of PSA Site Conditions 144
9.2 Applicant Proposed Measures to Reduce Environmental Impacts 144
9.3 Regulatory Framework 146
9.3.1 CEQA guidance 146
9.3.2 Federal and state resource protections 146
10.0 Potential Impacts to Biological Resources 148
10.1 Potential Habitat Impacts 148
10.1.1 Cropland 150
10.1.2 California annual grassland 151
10.1.3 Vernal pool 152
10.1.4 Ephemeral wetland depression 152
10.1.5 Natural non-wetland pool 153
10.1.6 Anthropogenic non-wetland pool 153
10.1.7 Agricultural reservoir 154
10.1.8 Anthropogenic 154
10.2 Potential Impacts to Ephemeral Drainages 154
10.3 Potential Impacts to Nesting Birds 155
10.4 Potential Impacts to Special Status Species 155
10.4.1 Special status plants 155
10.4.2 Special status birds 165
10.4.3 Special status small mammals 169

10.4.4 Special status reptiles and amphibians 169
10.4.5 Special status fairy shrimp 170
10.4.6 American badger 170
10.4.7 San Joaquin kit fox 170
10.4.8 Tule elk and pronghorn antelope 170
11.0 Recommendations and Mitigations 173
11.1 Habitats 173
11.1.1 California annual grassland 173
11.1.2 Cropland 173
11.1.3 Vernal pool 174
11.1.4 Ephemeral wetland depression 174
11.1.5 Natural non-wetland pool 174
11.1.6 Anthropogenic non-wetland pool 174
11.1.7 Agricultural reservoir 174
11.1.8 Anthropogenic 175
11.2 Ephemeral Drainages 175
11.3 Nesting Birds 175
11.4 Avoidance, Minimization, and Mitigation for Special Status Species 175
11.4.1 Special status plants 175
11.4.2 Special status birds 176
11.4.3 Special status small mammals 177
11.4.4 Special status reptiles and amphibians 177
11.4.5 Special status fairy shrimp 178
11.4.6 American badger 178
11.4.7 San Joaquin kit fox 179
11.4.8 Tule elk and pronghorn antelope 179
12.0 PSA Figures 180
13.0 Biological Resource Maps 186
14.0 Photographs 201
15.0 References 215
Appendix A 223

List of Tables

TABLE 1. RESPONSIBLE PARTIES 6
TABLE 2. PARCEL DATA 6
TABLE 3. BIOLOGICAL SURVEYS 10
TABLE 4. SPECIAL STATUS PLANT LIST 33
TABLE 5. SPECIAL STATUS ANIMAL LIST 47
TABLE 6. SENSITIVE NATURAL COMMUNITIES 64
TABLE 7. HABITAT ACREAGES 67
TABLE 8. BOTANICAL SURVEYS 74
TABLE 9. PLANTS ERRONEOUSLY REPORTED FROM THE PSA 77
TABLE 10. PRELIMINARY VASCULAR PLANT LIST 80
TABLE 11. SPECIES RICHNESS BY SECTION 98
TABLE 12. SPECIES RICHNESS BY PROJECT OPTION 99
TABLE 13. BOTANICAL DATA PROJECT OPTION COMPARISON 99
TABLE 14. SPECIAL STATUS PLANT OCCURRENCE DATA 103
TABLE 15. FINAL WILDLIFE LIST 116
TABLE 16. KIT FOX SCAT DETECTIONS 123
TABLE 17. SMALL MAMMAL TRAPPING RESULTS 129
TABLE 18. TOPAZ KANGAROO RAT MORPHOMETRIC DATA 130
TABLE 19. WILLIAMS GIKR BURROW AND SCAT MORPHOMETRICS. 131
TABLE 20. NESTING BIRDS 136
TABLE 21. VEGETATION TESTS 142
TABLE 22. HABITAT IMPACTS-OPTION A 149
TABLE 23. HABITAT IMPACTS-OPTION B 150
TABLE 24. SPECIAL STATUS PLANT IMPACTS-OPTION A 157
TABLE 25. SPECIAL STATUS PLANT IMPACTS-OPTION B 160
TABLE 26. POTENTIAL IMPACTS TO BURROWING OWLS 166

Synopsis

- This biological report examines a Biological Resource Project Study Area (PSA) consisting of 42 parcels in the northern end of California Valley in eastern San Luis Obispo County, California. The parcels consist of all or portions of 20 USGS land Sections, comprising approximately 9,700 acres of land.
- The applicant, Topaz Solar Farms LLC, proposes to construct a solar photovoltaic (PV) energy plant on approximately 4,100 acres of land in one of two alternative locations within the PSA. When fully developed, the project would be capable of generating 550 megawatts (MW) of power. The project name is Topaz Solar Farm (TSF).
- Biological resources within the PSA are addressed within this document as they pertain to the Option A study area (7,727 acres) and the Option B study area (6,290 acres).
- Most land within the PSA is or recently was utilized for agricultural production. We characterized habitat types within the PSA to identify potential habitat for special status species, and to assess potential impacts from the proposed project.
- We identified and mapped eight habitat types within the PSA: cropland, California annual grassland, vernal pool, ephemeral wetland depression, natural non-wetland pool, anthropogenic non-wetland pool, agricultural reservoir, and anthropogenic. Ephemeral drainages within the PSA are not described in this report as an independent habitat type. No riparian habitat is present.
- Floristic surveys conducted from March 2008 through July 2010 identified 248 species, subspecies, and varieties of vascular plants within the PSA. Nine special status plant species occur within the PSA; one additional special status plant species was identified and mapped just outside the PSA boundary.
- Documentation of wildlife included numerous highly specialized survey methods that enabled our team to locate, identify, and map rare and endangered species within and near the PSA. In addition, the use of stringent survey protocols provided robust data to support negative findings for certain species.
- We documented 18 special status wildlife species within the PSA in a manner consistent with their listing status (e.g. nesting), including three species listed under the Federal Endangered Species Act: the San Joaquin kit fox, longhorn fairy shrimp, and venal pool fairy shrimp.
- Development of the TSF Project would affect biological resources. We identify potential impacts to biological resources and provide recommendations for avoidance, minimization, and mitigation

Definitions

Project Areas

TSF: **Topaz Solar Farm**; name of the proposed project.

TSF Project: **Topaz Solar Farm Project**; used generically to describe the proposed project, without distinction between the proposed project options.

Option A: The southernmost of two proposed TSF Project options; includes an approximately 7,727-acre study area, with a final fenced project area of approximately 4,104 acres.

Option B: The northernmost of two proposed TSF Project options; includes an approximately 6,290-acre study area, with a final fenced project area of approximately 4,007 acres.

PSA: **Biological Report Project Study Area**; used specifically when discussing the entire 9,700-acre area included in biological resource studies. The PSA is the combined area of the Option A study area and the Option B study area.

Regulatory Abbreviations

CUP: Conditional Use Permit
APN: Assessor's Parcel Number
EIR: Environmental Impact Report
CEQA: California Environmental Quality Act
FESA: Federal Endangered Species Act
CESA: California Endangered Species Act
BGEPA: Bald and Golden Eagle Protection Act
CWA: Clean Water Act
MBTA: Migratory Bird Treaty Act
USFWS: United States Fish and Wildlife Service
CDFG: California Department of Fish and Game
CNDDB: California Natural Diversity Database
CNPS: California Native Plant Society
USACE: United States Army Corps of Engineers
RWQCB: Regional Water Quality Control Board
USGS: United Stated Geologic Survey
MDBM: Mount Diablo Base Meridian
NRCS: Natural Resrouce Conservation Service
CRP: Conservation Reserve Program
USDA: United States Department of Agriculture
CPNM: Carrizo Plain National Monument
BLM: Bureau of Land Management

Technical Abbreviations

PV: Photovoltaic
MW: Megawatts
kV: Kilovolts; 1000 volts
AC: Alternative Current
PCS: Power Conversion Stations
PVCS: Photovoltaic Combining Switchgear houses
M&M: Maintenance and Monitoring Facility
PV Array: A block of photovoltaic panels
PV Module: An individual solar panel
GIS: Geographic Information Systems
GPS: Global Positioning System

Species Abbreviations

BNLL: Blunt-nosed Leopard Lizard
NEAS: Nelson's Antelope Squirrel
GIKR: Giant Kangaroo Rat

1.0 Introduction

This report provides information regarding biological resources that occur on lands associated with the proposed Topaz Solar Farm (TSF) photovoltaic power facility in San Luis Obispo County. The applicant, Topaz Solar Farms LLC, conducted research and feasibility studies on various potential project lands since early 2008. All biological surveys are complete except the 2010 blunt-nosed leopard lizard (BNLL) protocol survey, which will be completed in September[1].

The Biological Report Project Study Area (PSA), includes approximately 9,700 acres of land. Potential project layouts are currently focused on two proposed project options within the PSA, Option A and Option B. Each TSF Project Option includes a study area that is significantly larger than the ultimate fenced area of the Project. The Option A study area is approximately 7,727 acres in size, with a proposed fenced area of 4,104 acres. The Option B study area is approximately 6,290 acres in size, with a proposed fenced area of 4,007.

Baseline biological studies reported herein provide data on the entire 9,700 acre PSA. To support the preparation of the Environmental Impact Report (EIR) by the County of San Luis Obispo and Aspen Environmental Group, we present the data, maps, and our impact analyses according to the Option A Study Area and the Option B Study Area.

Numerous specialized wildlife studies were conducted in support of this Biological Report. All supporting research and survey reports completed by June 2010 were bound and distributed to the County, Aspen Environmental Group, and other regulatory agencies in a three volume 2010 Biological Report Technical Appendix (Althouse and Meade, Inc. 2010b). The 2010 blunt-nosed leopard lizard report and the San Joaquin kit fox genetic analysis report will be distributed as Volume 4 of the Biological Report Technical Appendix immediately upon completion.

Results reported in the final biological report are for floristic and wildlife surveys conducted from March 2008 through July 2010. We provide lists of plant and animal species found within the entire PSA. We summarize protocol and specialized wildlife studies conducted for the project in this document. In addition, we provide lists, maps, and discussions of special status species that could occur on or near the PSA or that could be affected by the proposed TSF Project.

We evaluate the effect of the proposed project on biological resources and propose avoidance, minimization and mitigation measures based on potential impacts. In some cases, recommendations are included for resource protection measures that could avoid or lessen potential adverse effects of the TSF Project.

[1] As of July 15, 2010 twelve full transect passes were completed for the 2010 adult BNLL survey period. The survey results for the adult period were negative for BNLL. This suggests greater than 95% certainty that BNLL do not occur within the survey area (Germano 2009).

1.1 Biological Resource Project Study Area Location

The PSA is located in the northern Carrizo Plain area of San Luis Obispo County, California (Section 12.0, Figure 1). The PSA is located northwest of California Valley, east of Bitterwater Road, and on either side of State Highway 58. The PSA is located within the La Panza NE and California Valley United States Geological Survey (USGS) 7.5 minute quadrangles. Elevation varies from approximately 2,010 to 2,200 feet above mean sea level.

The PSA includes all or portions of Sections 7, 8, 15, 16, 17, 18, 19, 20, 21, 22, 26, 27, 28, 29, 32, 33, 34, and 35 of Township 29 South, Range 18 East, and Sections 4 and 5 of Township 30 South, Range 18 East, of the Mount Diablo Base and Meridian (MDBM) (Section 12.0, Figure 2). Table 2 in Section 1.4 provides an overview of the PSA parcel data.

1.2 Project Description

The TSF Project would consist of the installation of approximately 437 photovoltaic (PV) arrays for solar power generation, each of which is capable of generating approximately 1.3 megawatts (MW) of Alternating Current (AC) power during peak sunlight conditions. Each PV array encompasses approximately 7.6 acres. The total area of PV arrays within the TSF Project would be 3,339 acres. Each PV array would consist of groups of PV modules mounted on an angle to steel racking supported by vertical steel columns driven into the ground. The total area of PV modules within the TSF Project would be 1,353 acres. The tallest part of the PV array and mounting structure is typically 5.5 feet above grade. The TSF project would ultimately generate approximately 550 megawatts of power for transmission along the existing Morro Bay/Midway 230 kV power line that passes through the PSA. Vehicular access to the facility would be from Bitterwater Road and Highway 58.

The TSF Project would be installed over an approximate 6.4 square mile site that would be located within one of two study areas. The study areas are larger than needed to accommodate the proposed project and allow flexibility in the final project design. Both study area options are considered as project variants in the EIR.

- **Option A** is comprised of approximately 7,727 acres. If the TSF Project is located within Option A, the fenced area would be approximately 4,104 acres.
- **Option B** is comprised of approximately 6,290 acres. If the TSF Project is located within Option B, the fenced area would be approximately 4,007 acres.

The applicant has applied to the County of San Luis Obispo (County) for a Conditional Use Permit (CUP) to allow a solar power plant as a permitted use on the site. Because of its responsibility for issuing this permit, the County is the lead agency under the California Environmental Quality Act (CEQA) and is responsible for preparation of the EIR. Key components of the TSF Project include:

- Installation of over seven million PV solar modules within approximately 437 arrays, and associated electrical equipment (e.g. Power Conversion Stations [PCS], PV Combining Switchgear [PVCS] houses);

- Direct conversion of sunlight to electricity without the use of water for power generation;
- PV arrays that are approximately five and a half feet in height (the distance from the ground to the top of the PV module table may vary depending on the topography);
- Each array would be approximately 1.3 $MW_{AC,}$ would occupy approximately seven acres, and would be equipped with a PCS, which includes two inverters and one transformer;
- Restoration of portions of the main on-site drainage to Soda Lake to help control off-site sediment flow;
- Electrical substation and switching station;
- Monitoring and Maintenance (M&M) facility (11,250 square feet);
- Solar Energy Learning Center (900 square feet);
- Placement of most medium-voltage feeder lines underground;
- Approximately 8 to 12 miles (depending on the option selected) of above-ground medium-voltage (34.5 kV) collector lines;
- Construction of approximately 14 to 22 miles (depending on the Option selected) of on-site access roads utilizing existing agricultural roads to the extent feasible;
- Minimal demand for water usage during plant operation, with no water necessary for module washing and water use only for sanitary purposes;
- A leach field and septic system located adjacent to the M&M facility to support the domestic sanitary needs of employees and visitors during operation;
- Four temporary construction staging areas of approximately 10 acres each that would accommodate temporary construction offices, parking, material laydown, and storage area; and
- Perimeter fencing consisting of six-foot-high chain link with three strands of barbed wire on top and small openings approximately every 100 yards to allow for kit fox passage.

The solar arrays have no moving parts for sunlight tracking and utilize no water during project operation. The proposed project is near existing electrical transmission lines.

1.3 Responsible Parties

TABLE 1. RESPONSIBLE PARTIES. Applicant, biological consultant, EIR consultant, and lead agency are provided.

Applicant	Biological Consultant
Topaz Solar Farms LLC 1111 Broadway 4th Floor Oakland, CA 94607 (510) 625-7408 Contact: Ashley Frush	Althouse and Meade, Inc. 1875 Wellsona Road Paso Robles, CA 93446 (805) 467-1041 Contact: Daniel E. Meade, Ph.D.
EIR Consultant	**Lead Agency**
Aspen Environmental Group 30423 Canwood Street, Suite 215 Agoura Hills, CA 91301 562-947-5259 Contact: Sandra Alarcon-Lopez	County of San Luis Obispo Department of Planning and Building 976 Osos Street, Room 300 San Luis Obispo, CA 93408 (805) 781-1431 Contacts: Steve McMasters Trevor Keith

1.4 Project Study Area Overview

Land included in the PSA includes 42 parcels in private ownership (Table 2). None of the land is public. All of the parcels included in the PSA are within the Agriculture Land Use category, as designated by the County of San Luis Obispo. The total size of the PSA is approximately 9,700 acres.

TABLE 2. PARCEL DATA. For each parcel the Section, Township, and Range, Assessor's Parcel Number (APN), size (acres), and general land use are provided. All acreage calculations are approximate.

Section Township Range	Project Option	APN	Approx. PSA Size (acres)	Land Use
Section 4 T. 30 S., R. 18 E.	A	072-131-001	621	Rangeland Dry-farmed grain
Section 5 T. 30 S., R. 18 E.	A	072-131-002	360	Rangeland Dry-farmed grain
Section 7 T. 29 S., R. 18 E.	B	072-011-005	178	Dry-farmed grain

Section Township Range	Project Option	APN	Approx. PSA Size (acres)	Land Use
Section 8 T. 29 S., R. 18 E.	B	072-011-006	323	Dry-farmed grain Rangeland
Section 15 T. 29 S., R. 18 E.	A/B	072-061-027, -039, -041, -037, -040, -038, -036	162	Rangeland Residential
Section 16 T. 29 S., R. 18 E.	A/B	072-051-003	652	Rangeland Residential
Section 17 T. 29 S., R. 18 E.	B	072-051-007, -027, -028	654	Dry-farmed grain
Section 18 T. 29 S., R. 18 E.	B	072-051-027, -028	640	Residential Dry-farmed grain
Section 19 T. 29 S., R. 18 E.	A/B	072-051-004	639	Dry-farmed grain
Section 20 T. 29 S., R. 18 E.	A/B	072-051-005	659	Dry-farmed grain
Section 21 T. 29 S., R. 18 E.	A/B	072-051-008, -013, -017, -018, -019, -020, -021, -023, -024, -025, -029	618	Dry-farmed grain
Section 22 T. 29 S., R. 18 E.	A/B	072-061-031, -033, -054,	246	Dry-farmed grain Residential
Section 26 T. 29 S., R. 18 E.	A	072-101-030	176	Rangeland
Section 27 T. 29 S., R. 18 E.	A/B	072-101-010, -023	655	Dry-farmed grain
Section 28 T. 29 S., R. 18 E.	A/B	072-091-001	660	Dry-farmed grain Residential
Section 29 T. 29 S., R. 18 E.	A/B	072-301-005	134	Dry-farmed grain Access easement
Section 32 T. 29 S., R. 18 E.	A	072-091-005, -007, -009	650	Rangeland
Section 33 T. 29 S., R. 18 E.	A/B	072-091-010	567	Rangeland Residential
Section 34 T. 29 S., R. 18 E.	A	072-101-031	518	Rangeland
Section 35 T. 29 S., R. 18 E.	A	072-101-031	651	Rangeland
Totals		**42 Parcels**	**~9,700**	

2.0 Methods

Althouse and Meade, Inc. (A&M) conducted biological resource surveys from March 2008 through July 2010 (Table 3). Daniel E. Meade, Ph.D. and LynneDee Althouse, M.S. are the Principal Scientists for biological resource surveys within the PSA. Staff biologists Jason Dart, Meg Perry, Audrey Weichert and Cassie Murphy conducted wildlife and botanical surveys. Independent biologist Peter Gaede assisted with burrowing owl surveys. Russ Stack and Kerri Johnson conducted mapping field work and produced GIS based maps. Survey dates listed in Table 3 do not include protocol and other specialized surveys conducted for San Joaquin kit fox, blunt-nosed leopard lizard (BNLL), Nelson's antelope squirrel (NEAS), giant kangaroo rat (GIKR), small mammal trapping, golden eagle, Kern primrose sphinx moth, and fairy shrimp.

Protocol surveys for blunt-nosed leopard lizard, Nelson's antelope squirrel, and small mammal trapping surveys were conducted by William Vanherweg in 2008. In 2009, Paul Collins and Tom Olson conducted small mammal trapping surveys, and Alex Brown was the lead for BNLL and NEAS surveys. In 2010, Paul Collins, Tom Olson, and Larry Hunt conducted small mammal trapping surveys, and Alex Brown was the lead for the BNLL surveys. Also in 2010, Collins and Olson conducted a kangaroo rat burrow and scat measurement study to determine species identification at known precincts within the PSA. Assisting biologists for protocol surveys are listed in the original protocol reports, and specific protocol survey methods are discussed in detail (refer to Biological Report Technical Appendix, volumes 1 through 3). Survey methods for botanical and non-protocol wildlife surveys, as well as an overview of protocol survey methods, are included in Sections 6.1 and 7.2.

Biological surveys were conducted on foot, by 4-wheel drive vehicle, and by ATV in order to compile species lists, to search for special status plants and animals, to map habitats and drainages, and to photograph the PSA. The PSA is composed of one-mile square legal land Sections, and portions thereof, which were used to grid the site and guide surveying to ensure adequate coverage. All areas of the PSA were surveyed. All plant and animal species detected within the PSA were identified and recorded (Sections 6.0 and 7.0).

Mapping efforts utilized a Trimble GeoXT global positioning system (GPS) with ArcPad 6.0.3. The embedded firmware of the GPS unit includes the Satellite-based Augmentation System (SBAS) that utilizes a system of satellites and ground stations to provide GPS signal corrections, allowing sub-meter accuracy. Maps were created using GPS data imported to ArcGIS 9.3.1, a Geographic Information System (GIS) software program. GPS data was overlaid on 2005, 2006 and 2009 aerial photographs (USDA 2006a, 2006b, 2009) of the PSA. Some map layers, such as parcel boundaries, are from the County of San Luis Obispo.

Biological resource constraints were mapped using the Trimble GPS, with point and polygon layers overlaid on high resolution aerial photographs. Sensitive wildlife constraints were mapped where found, but due to their transient nature sensitive wildlife are expected to occur in other areas. Survey efforts were not designed to document all locations of mammal den sites or nests of sensitive species that are expected to be in different locations from year to year, rather we identified presence or absence on the site

and preferred habitat type(s). Locations of sensitive wildlife species observations, as well as den and nest sites that were detected, are provided on the Biological Resource Maps in Section 13.0. Discussions of special status species are provided throughout the document (refer to Sections 4.0, 6.0, 7.0, 10.0, and 11.0).

We conducted a search of the California Natural Diversity Database (CNDDB July 3, 2010 data) and the California Native Plant Society (CNPS) On-line Inventory of Rare and Endangered Plants of California for special status species reported to occur in the twelve USGS quadrangles that include and surround the PSA: La Panza NE, California Valley, La Panza, La Panza Ranch, Holland Canyon, Packwood Creek, Shale Point, Las Yeguas Ranch, Simmler, Chimineas Ranch, Branch Mountain, and Los Machos Hills.

Additional special status species research consisted of reviewing previous biological reports for the area and searching on-line museum and herbarium specimen records for locality data within San Luis Obispo County. We reviewed online databases of specimen records maintained by the Museum of Vertebrate Zoology (MVZ) at the University of California, Berkeley, and the Consortium of California Herbaria. Additional special status species with potential to occur on or near the PSA were added to our special status species list (refer to Table 4 and Table 5). We also contacted the U.S. Fish and Wildlife Service regarding rare species known in the area. They referred us to the Bureau of Land Management, who provided us with lists of plants and animals of the Carrizo Plain National Monument.

Special status species lists produced by database and literature searches were cross-referenced with the described habitat types within the PSA to identify all potential special status species that could occur on or near the project site. Each special status species with a potential for occurrence on or near the PSA is individually discussed (refer to Sections 4.1.4 and 4.1.6).

TABLE 3. BIOLOGICAL SURVEYS. Biological survey dates, times, weather observations, and biologist(s) are provided. Not included here are the 4,846 field hours conducted for the 2008 and 2009 BNLL protocol surveys, the on-going 2010 BNLL protocol survey, or hundreds of additional field hours conducted during other specialized wildlife studies.

Survey Date	Survey Type	Start Time Stop Time	Temp.	Wind	Weather Observations	Biologist(s)
3/6/08	Wildlife	0925 -1530	60-66 °F	0- 3 mph	Partly cloudy, cool	D. Meade J. Dart
3/17/08	Botanical Wildlife	1142 – 1550	59-63 °F	4 -12 mph	Sunny, cool, breezy	J. Dart
3/31/08	Botanical	0900 – 1700	55-65 °F	4 - 8 mph	Sunny, breezy, and cool	D. Meade L. Althouse D. Keil J. Dart M. Perry
4/4/08	Small Mammal	0900 – 1600	65 °F	0-5 mph	Clear	D. Meade W. Vanherweg
4/15/08	Botanical Nesting Bird	0930 – 1645	60-65 °F	5 -15 mph	Sunny, cool, windy	J. Dart M. Perry A. Woodruff K. Johnson
4/23/08	Botanical Habitat Mapping	0908 – 1350	60-64 °F	0-5 mph	Sunny but cool	J. Dart K. Johnson
4/24/08	Wildlife	0900 – 1200	70-77 °F	0-5 mph	Clear	D. Meade
5/7/08	Botanical Wildlife	1000 – 1830	65-70 °F	3-5 mph	Clear, warm, with breeze	L. Althouse M. Perry C. Murphy K. Johnson
5/16/08	Wildlife	0900 – 2000	80-100 °F	5 -10 mph	Scattered clouds	D. Meade
5/19/08	Wildlife	0900 – 1700	85-105 °F	calm	Clear	D. Meade
5/20/08	Botanical	0900 – 1630	77-95 °F	3-5 mph	Hot, breezy in p.m.	L. Althouse M. Perry
5/27/08	Wildlife Botanical	1400 – 1800	80-86 °F	5-10 mph	Cumulus clouds with 80% cover	D. Meade
5/28/08	Wildlife Botanical	1100 – 1800	74 °F	10 mph	Scattered clouds	D. Meade

Survey Date	Survey Type	Start Time Stop Time	Temp.	Wind	Weather Observations	Biologist(s)
5/29/08	Wildlife	1000 – 1830	77-80 °F	5-15 mph	Scattered clouds	D. Meade
6/4/08	Botanical	1000 – 1900	75-85 °F	5 -10 mph	Clear	D. Meade M. Perry
6/6/08	Remote Camera	0900 – 1400	75-85 °F	0-5 mph	Clear, warm	A. Woodruff
6/10/08	Wildlife	1300 – 1600	80-90 °F	0 -5 mph	Clear	D. Meade
6/13/08	Wildlife Botanical	1000 – 1545	85-98 °F	0-5 mph	Hot and hazy. Breezy in p.m.	D. Meade M. Perry
6/25/08	Remote Camera	0830 – 1440	80 °F	0-3 mph	Sunny with smoke haze	A. Woodruff
10/20/08	Winter Bird	0830 – 1245	75 °F	0-3 mph	Sunny and warm	A. Woodruff
12/2/08	Winter Bird	0930 – 1115	65 °F	0-3 mph	Sunny	A. Woodruff
2/11/09	Winter Bird	0800 – 1230	34-55 °F	0-7 mph	Light rain, very cold	J. Dart
2/20/09	Winter Bird	1125 – 1530	62 °F	0-3 mph	Sunny, calm, cool	J. Dart
3/1/09	Winter Bird	0820 – 1100	60-64 °F	0-3 mph	High clouds, calm	J. Dart
3/10/09	Botanical	1030 – 1630	55-70 °F	10-15 mph	Sunny, cold, windy	D. Meade J. Dart
3/19/09	Botanical	0955 – 1145	60-66 °F	0-3 mph	Overcast, warm, calm	J. Dart A. Woodruff
3/27/09	Botanical Wildlife	1020 – 1615	65-75 °F	3-5 mph	Sunny, clear, warm	J. Dart A. Woodruff
4/2/09	Botanical	0940 – 1600	70-72 °F	5-15 mph	Sunny and warm	J. Dart A. Woodruff
4/16/09	Botanical	0825 – 1630	59 °F	0-5 mph	Overcast and cool	D. Meade L. Althouse J. Dart
4/23/09	Botanical	1100 – 1515	70-73 °F	7-15 mph	Sunny, warm, and windy	J. Dart A. Woodruff
4/28/09	Wildlife	0830 – 1430	62-68 °F	0- 3 mph	Cloudy, cool early; sunny, warm in afternoon	M. Perry A. Woodruff

Survey Date	Survey Type	Start Time Stop Time	Temp.	Wind	Weather Observations	Biologist(s)
4/29/09	Wildlife Botanical	0900 – 1600	70-75 °F	0-3 mph	Clear, calm	D. Meade
5/14/09	Wildlife Botanical	0840 – 1330	68-86 °F	0-7 mph	Sunny and hot	J. Dart R. Stack
5/20/09	Remote Camera	0810 – 1530	64-85 °F	5-15 mph	Clear, sunny, warm	A. Woodruff
6/10/09	Botanical	0758 – 1510	58-75 °F	3-5 mph	Cool, cloudy AM, warming in PM	J. Dart A. Woodruff
7/2/09	Remote Camera	0845 – 1300	75-90 °F	0-5 mph	Sunny, warm	A. Woodruff R. Stack
7/17/09	Remote Camera	0800 – 1120	76-83 °F	0-3 mph	Sunny, warm	A. Woodruff R. Stack
7/31/09	Remote Camera	0820 – 1055	90 °F	0-3 mph	Sunny, warm to hot, on clouds	A. Woodruff
11/9/09	Wildlife Winter Bird	1156 – 1539	74-72 °F	0-3 mph	High clouds, warm, calm winds	J. Dart
11/10/09	Wildlife Winter Bird	1008 – 1247	70 °F	0-3 mph	High clouds	J. Dart
12/3/09	Wildlife Winter Bird	0902 – 1500	52-70 °F	0-3 mph	Cool, sunny	D. Meade C. Murphy
1/8/10	Wildlife Winter Bird	1015 – 1530	66 °F	0-5 mph	Few high clouds	J. Dart A. Weichert
1/15/10	Wildlife Winter Bird	1830 – 1408	38-64 °F	0-5 mph	High clouds, cool, warm in P.M.	J. Dart A. Weichert
2/2/10	Wildlife Winter Bird	0848 – 1449	48-54 °F	0-3 mph	Overcast, calm, cool	J. Dart R. Stack
2/4/10	Wildlife Winter Bird	0701 – 1500	38-50 °F	0-3 mph	Low morning fog, cold, high clouds	J. Dart A. Weichert
2/11/10	Winter Bird	0905 – 1645	46-54 °F	3-8 mph	High clouds	D. Meade J. Dart A. Weichert
2/16/10	Winter Bird	0830 – 1600	58-65 °F	0-3 mph	Very foggy morning, cleared at 9am, sunny, warm	J. Dart C. Murphy M. Perry A. Weichert

Survey Date	Survey Type	Start Time Stop Time	Temp.	Wind	Weather Observations	Biologist(s)
2/18/10	Winter Bird	0815 – 1600	50-60 °F	0-10 mph	Sunny a.m., high clouds p.m.	D. Meade J. Dart C. Murphy M. Perry A. Weichert
2/22/10	Winter Bird	0835 – 1515	45-55 °F	7-10 mph	Overcast and cold in a.m.	D. Meade J. Dart C. Murphy M. Perry A. Weichert
2/25/10	Wildlife Winter Bird	0800 – 1600	50-69 °F	4-12 mph	Overcast in a.m., clearing for afternoon	J. Dart
3/1/10	Remote Camera	1045 – 1650	66-48 °F	5-10 mph	Partly cloudy	J. Dart A. Woodruff
3/4/10	Wildlife Botanical	0845 – 1600	50 – 55 °F	5-10 mph	clouds	D. Meade
3/5/10	Wildlife	0915 – 1500	60-65 °F	0-3 mph	Mostly cloudy	D. Meade P. Collins
3/11/10	Botanical	1128 – 1624	55-63 °F	3-7 mph	Sunny, clear, breezy	L. Althouse J. Dart M. Perry
3/12/10	Botanical	0833 – 1645	50-60 °F	0-3 mph	Sunny, clear, cool	L. Althouse J. Dart
3/15/10	Botanical	0940 - 1745	58-70 °F	0-5 mph	Sunny, clear, warm	D. Keil L. Althouse D. Meade J. Dart M. Perry A. Weichert
3/18/10	Botanical	0829 – 1532	54-70 °F	0-5 mph	Sunny, warm	J. Dart M. Perry A. Weichert
3/19/10	Botanical	0909 – 1440	54-60 °F	3-5 mph	Sunny, clear, warm	J. Dart M. Perry

Survey Date	Survey Type	Start Time Stop Time	Temp.	Wind	Weather Observations	Biologist(s)
3/22/10	Botanical	0845 – 1700	76 °F	0-5 mph	Sunny, clear, few clouds	D. Keil L. Althouse J. Dart A. Weichert
3/25/10	Botanical	0915 – 1745	49 °F	3-7 mph	Low a.m. fog, cold, calm	D. Meade J. Dart M. Perry A. Weichert
3/26/10	Botanical	1000 – 1630	50-60 °F	6-12 mph	Few clouds	D. Meade
3/29/10	Wildlife Sphinx Moth Botanical	0900 - 1700	55-65 °F	0-10 mph	Sunny	D. Meade
4/2/10	Botanical	0928 – 1650	54-60 °F	0-5 mph	Sunny, cool	J. Dart
4/6/10	Botanical	1144 – 1530	40 °F	10-15 mph	Partly cloudy, cold, windy	J. Dart
4/8/2010	Botanical	0915 – 1630	60-75 °F	0-5 mph	Breezy, clear	D. Keil L. Althouse M. Perry
4/15/10	Botanical	0900 – 1630	55-67 °F	3-7 mph	Sunny	J. Dart M. Perry A. Weichert
4/16/10	Botanical	0840 – 1630	55-70 °F	0-7 mph	Few high clouds, breezy	J. Dart M. Perry
4/23/10	Botanical	0830 – 1710	49-62 °F	0-7 mph	Overcast and cold in a.m.; sunny and breezy in p.m.	J. Dart M. Perry A. Weichert
4/26/10	Botanical	0830 – 1700	59-67 °F	0-5 mph	Sunny and clear	J. Dart M. Perry A. Weichert
4/27/10	Botanical	0820 – 1620	58 °F	0-5 mph	Overcast morning	D. Keil J. Dart M. Perry
5/4/10	Wildlife Botanical	0800 – 1111	58-70 °F	0-3 mph	Sunny, hot, and calm	J. Dart

Survey Date	Survey Type	Start Time Stop Time	Temp.	Wind	Weather Observations	Biologist(s)
5/5/10	Remote Camera	0815 – 1345	64-80 °F	0-3 mph	Sunny and warm	A. Weichert
5/11/10	Pronghorn/Elk	1045 – 1810	60-62 °F	3-9 mph	Sunny	D. Meade
5/14/10	GIKR Training	0900 – 1200	75 °F	0-5 mph	Sunny	J. Dart P. Collins
5/24/10	Botanical	Botanical	0900-1700	70-85 °F	0-5 mph	M. Perry A. Weichert
5/25/10	Botanical Wildlife	0840 – 1545	58-74°F	4-7 mph	Sunny, cool, breezy	J. Dart M. Perry A. Weichert
5/28/10	Botanical Wildlife	0906 – 1540	57-65 °F	3-7 mph	Partly cloudy, cool, breezy	J. Dart A. Weichert
6/2/10	Burrowing Owl	0920 – 1600	60-79 °F	0-3 mph	Sunny	J. Dart P. Gaede
6/2/10	Remote Camera	0815 – 1238	67-78 °F	0-3 mph	Sunny	A. Weichert
6/3/10	Burrowing Owl	0715 – 1430	85 °F	0-3 mph	Sunny and hot	J. Dart P. Gaede
6/11/10	Botanical Wildlife	0658 – 1430	58-78°F	0-3 mph	Sunny, calm, clear	D. Meade J. Dart M. Perry A. Weichert
6/15/10	Botanical Wildlife	0718 – 1156	62-80 °F	0-3 mph	Sunny and warm	J. Dart M. Perry A. Weichert
6/18/10	Kangaroo Rat Burrow and Scat Measurements	0830 – 1530	64-78 °F	4-7 mph	Sunny and warm	P. Collins T. Olson J. Dart
6/21/10	Botanical	0930-1400	65-80 °F	0-5 mph	Sunny and warm	M. Perry
6/28/10	Botanical Pronghorn/Elk	1115-1435	90 °F	0-3 mph	Sunny and hot	J. Dart
6/28/10	Botanical	1200-1700	90 °F	0-5 mph	Sunny and hot	M. Perry
6/29/10	Botanical	0900-1615	65-90 °F	0-5 mph	Sunny and hot	M. Perry

Survey Date	Survey Type	Start Time Stop Time	Temp.	Wind	Weather Observations	Biologist(s)
6/30/10	Botanical	0700 -1030	65-85 °F	0-3 mph	Sunny and warm	J. Dart M. Perry
7/5/10	Botanical	0800-1330	65-90 °F	0-5 mph	Sunny and hot	J. Dart M. Perry D. Keil
7/8/10	Remote Camera Pronghorn/Elk	0835 - 0420	68-80 °F	0-3 mph	Sunny, clear, warm	A. Weichert
7/26/10	Botanical	0800-1200	65-80 °F	0-5 mph	Sunny, warm, with mild breezes	M. Perry

3.0 Topaz Solar Farm Project Study Area

3.1 Existing Conditions

The PSA is generally characterized by tree-less level terrain and low rolling hills and plain with ephemeral swales. Some steeper slopes occur in the north and northeast portions of the site. The PSA is primarily used for agricultural production of grain, and as rangeland for cattle. The entire site has been disturbed by dry-land farming and by ranching activities.

Farming practices consist of a summer fallow rotational program where fields are farmed for one year then plowed bare the next year to conserve soil moisture. Farming operations are conducted on a large scale utilizing 400 to 500 horsepower all-wheel drive tractors pulling 50 foot wide implements. Plowing is usually accomplished using a chisel plow that runs from 24 to 12 inches in depth depending upon soil moisture and condition. The typical two year cycle farming regime consists of plowing ground in the fall or winter after first rains. The fields are plowed again just prior to sowing, sometimes in the same operation. Crops are often sprayed (as they were in 2010) with selective herbicides that can include dicoticides and oaticides. A harvesting machine (combine) cuts the fields and harvests the grain in late spring or summer depending on the year, and cattle are turned into the field to graze into the fall. The cut field is plowed again in fall after rains. This cropland is then plowed again during the spring to remove vegetation that grows during the winter, and is left fallow over the summer. In some years two plowing passes, one in winter and one in late spring are necessary to remove vegetation. The purpose of this every-other year summer fallow method is to preserve two years of soil moisture for every one year of crop produced. In the fall, the fallow land is plowed after the first rains, starting the cycle again.

At any one time approximately half of the land is plowed bare and half is planted to grain. Areas that are left fallow for several years or more support naturally recruited annual grasslands. The primary crops grown on the PSA are wheat and barley. These grains are dry-farmed crops sown in the fall or winter and harvested for grain or used as cattle feed. Broad-leaf herbicides are sprayed on the crops by crop duster or ground spray rigs to control non-crop plants. Agricultural fields are described as cropland habitat in this report (refer to Section 5.0).

Fields that are plowed in the spring or fall and left unplanted through the following spring and summer tend to grow agrestal weeds. Some of these plants are native to the area, but most are naturalized (non-native, naturally recruiting) annual herbs and grasses. Early in the spring, vegetation is short, which allows establishment of ground squirrel den complexes and easy foraging by predators and grazing ungulates. If rainfall totals are average or above, as was the case in 2007-2008 and 2009-2010, fields left fallow more than one season become densely vegetated with annual grasses and forbs that can reach three feet in height. Tall dense vegetation limits use of these areas by some wildlife. With less than average rainfall, as in the winter of 2008-2009, vegetation in fallow fields and annual grasslands is typically less than two feet in height.

From mid spring into summer the plowed ground typically hosts an abundant growth of bindweed, an introduced perennial herb with a deep persistent taproot that sprouts green

leafy growth year after year. Bindweed provides summer forage for pronghorn antelope and tule elk, and the cropland fields in Sections 7, 8, 17 and 18 are considered by the California Department of Fish and Game (CDFG) to be important summer habitat areas for these species. Pronghorn antelope and tule elk commonly feed and rest in these fields (refer to BR Maps 3 and 4 in Section 13.0). Common reptiles, small mammals, and birds may forage in plowed fields, but the lack of cover increases the likelihood of predation and reduces food supply.

Several areas of the PSA were removed from farming rotation in the 1980's when the landowners voluntarily entered portions of their land into the Conservation Reserve Program (CRP). The CRP is a federal program administered by the U.S. Department of Agriculture Farm Service Agency, which provides landowners with annual rental payments, cost-sharing assistance, and technical assistance to remove land from annual tilling practices in order to minimize water run-off and sedimentation, and increase wildlife habitat value. CRP contracts are signed for periods of 10 to 15 years. The Natural Resources Conservation Service (NRCS) provides landowners with technical assistance regarding conservation planning and practice implementation.

Lands within the PSA that are in the CRP are managed as rangeland for watershed protection. Rangelands are described in this report as annual grasslands since species composition is similar to typical annual grassland habitats in the region. Annual grassland habitats within the PSA are variable with respect to dominant species due to different topography, soils, grazing regimes, and farming history.

Anthropogenic areas of the PSA are associated with residential compounds and other facilities. All roads are dirt ranch roads, with the exception of gravel-based access roads from Highway 58 to Sections 4, 27, 29, and 35.

3.2 Land Use Descriptions

Lands within the PSA are divided on USGS maps (refer to Figure 1 in Section 12.0), and often on the ground, into one mile square Sections (640 acres). The Public Land Survey System used by the United States to survey and identify land parcels utilizes one-mile square Sections as the base unit of measure, with 36 Sections equaling a Township. Sections are typically halved and quartered to identify further a parcel, with a quarter quarter Section equaling 40 acres as the smallest unit of measure.

The PSA is fenced and cross-fenced for cattle. Fence lines are not always on parcel boundaries, but are usually close. Land use descriptions provided below are based on Althouse and Meade, Inc. field observations in 2008, 2009 and 2010. In addition, we obtained information on farming history from landowners and ranch managers (refer to Figure 5, Section 12.0). Descriptions of these features are organized by the USGS land Section(s) within which they occur, and the proposed TSF Project Option that encompasses the Section is also designated. Each full Section is legally 640 acres. Actual acreage on the ground within fenced areas may vary. Where portions of Sections are included in the PSA, acreages were estimated using GIS software and high resolution aerial images. All acreages are approximate.

All of the Sections are in Township 29 South, Range 18 East, except Sections 4 and 5, which are in Township 30 South, Range 18 East. Representative photographs of each land Section are provided in Photo Collection #1, Section 14.0.

Wetland areas described as "potential wetlands" are subject to verification of the jurisdictional determination by the U.S. Army Corps of Engineers (USACE).

Section 7 - 178 acres, Option B

Approximately 178 acres of the southern portion of Section 7 are included in the PSA. All of the land is plowed seasonally, and planted with grain every other year. In spring 2010 this area of the PSA was planted with barley, and reached a height of nearly three feet in April. At that time the cropland had few other plant associates. Within the cropland *Polygonum arenastrum* was the most prevalent non-crop species, but was generally uncommon. Along fences and roads was a more diverse palate of species, some native to the region and some introduced, such as *Amsinckia* ssp., *Lepidium nitidum, Lepidium dictyotum, Erodium cicutarium, Plagiobothrys canescens, Chenopodium album, Monolepis nuttalliana,* and others.

Section 7 is poor wildlife habitat in general, but is frequented by elk and pronghorn in the spring and summer when preferred forage species are present, and occasionally in the fall months (refer to BR Maps 3 and 4, Section 13.0). In winter, when the ground is plowed bare, golden eagles and ferruginous hawks occasionally hunt ground squirrels in the fields.

Section 8 - 323 acres, Option B

Annual grassland and cropland habitat types on rolling terrain characterize the majority of Section 8. The dry-farmed grain fields in Section 7 continue into the west and southern portions of Section 8. A barbed-wire fence separates the cropland (213 acres) and annual grassland (110 acres) habitats. In 1986, portions of Section 8 croplands were put into the Conservation Reserve Program. The 110 acres of annual grassland habitat that is presently within the PSA has not been farmed since 1986. The grassland is variable in composition, generally dominated by *Avena fatua* and *Bromus madritensis* ssp. *rubens* to two feet in height, with large patches of fiddleneck, scattered wildflowers and other herbs. Notably abundant in 2008 were *Dichelostemma capitatum* bulbs, a native lily that is very uncommon in tilled lands.

Cropland areas of Section 8 were similar to those in Section 7 (see description above). Fence lines bordering the annual grassland habitat were generally more diverse than fences bordered only by cropland. Documented along the cropland-grassland fence in spring 2010 were *Amsinckia* ssp., *Calandrinia ciliata, Lasthenia gracilis, Lasthenia minor, Hordeum murinum, Phacelia ciliata, Erodium cicutarium, Lupinus bicolor,* and others.

Pronghorn and tule elk frequent Section 8 during the spring and summer. These large ungulates forage in croplands and grasslands. A badger den complex was observed to be occupied in 2009 and 2010 in a grassland area where California ground squirrels were common. Kit fox scat was detected in two locations at the southeast corner of the Section (Smith 2010). Hills at the northeast corner of the PSA support a sparse cover of short

grasses, which is a preferred habitat condition for reptiles such as the side-blotched lizard.

Section 15 - 162 acres, Option A and B

The southwest quarter of Section 15 is included in the PSA. It is mapped as annual grassland habitat. One ephemeral wetland depression is also present. The southwest quarter of Section 15 was periodically grazed by cattle during our surveys from 2008-2010, but has been grazed hard for many years, as evidenced by the short vegetation condition and depauperate flora. Bare ground was estimated to be less than ten percent in March 2010, with dominant cover of *Vulpia* ssp., *Bromus madritensis* ssp. *rubens*, and *Erodium cicutarium*. *Amsinckia* ssp., were present in large patches, to 24 inches in height. Native wildflower diversity was very low.

The short grass condition of Section 15 and lack of recent tilling makes this area good wildlife habitat for certain species. Rattlesnakes, which were observed infrequently across the majority of the PSA, were observed on several occasions in Section 15. Fresh and non-fresh kit fox scats were detected along the west fence (Smith 2010).

Section 16 - 652 acres, Options A and B

Most of Section 16 is mapped as annual grassland habitat (648.5 acres). Four shallow ephemeral depressions (0.41 acre total) and an anthropogenic area are also distinguished in mapping. The three acres of anthropogenic habitat includes areas associated with the existing residence.

Section 16 was last tilled in 2005, and as of spring 2010 has largely reverted back to annual grassland habitat. In some areas plow lines are still evident. Bare ground was estimated in 2010 to be five to ten percent by area. Dominant vegetation throughout the section consists of *Avena fatua*, *Bromus madritensis* ssp. *rubens*, *Hordeum murinum*, *Erodium cicutarium*, and *Amsinckia* ssp. Grass in the north half of Section 16 is generally taller, with large swaths of oats reaching three feet in height in 2008. In 2009, a drier year, the maximum grass height was about 18 inches. In 2010, grass height again reached three feet at the north end where it was dominated by *Avena fatua*, and averaged about one foot in height in the south half where it was dominated by *Bromus madritensis* ssp. *rubens*. At the northeast corner of the section are sparsely vegetated hills. Soils on these hills are thin, light-colored clay loams, possibly of gypseous origin, over weathered bedrock. These soils are susceptible to significant compaction when wet, as evidenced by dried, deep hoof-prints left from cattle grazing the site while soils were still wet.

Drainage swales in Section 16 dissipate in farm fields to the south. The swales do not contain wetland vegetation. Ephemeral depressions occur near the southern boundary fence. These depressions consist of small, mostly barren areas surrounded by annual grassland. The depressions are potential wetlands, as they contain hydrophytic plants including *Psilocarphus oregonus*, *Epilobium pygmaeum*, and *Veronica peregrina*. Two of the pools were determined to contain *Branchinecta lindahli*, a common fairy shrimp

species. In wet years, the pools are suitable for breeding spadefoot toads, although no tadpoles were detected in these pools during our surveys from 2008-2010.

Side-blotched lizards are present on and near the hills in the north, but are uncommon. Grasslands in portions of Section 16 are suitable for San Joaquin kit fox. One kit fox was photographed by remote camera traversing the grassland by cattle trail in spring 2009. Fresh and non-fresh kit fox scats were detected in the northwest corner and along the east fence (Smith 2010). An active badger den was present in the northwest corner in March 2010. A nesting pair of burrowing owls was detected in the northwest corner of the section in 2008. Ferruginous hawk, prairie falcon, tri-colored blackbird, and merlin are special status wintering birds that were observed occasionally foraging in Section 16 during late winter months.

Section 17 - 654 acres, Option B

Section 17 is an agricultural parcel that is bisected by an east-west oriented dirt road and parallel barbed-wire fence. The south half of the section was plowed to bare ground in the late winter of 2008 and was not sown. The north half was planted with grain in the winter, and was densely covered by a two to three foot high grain crop in the spring of 2008. The rotational farming practice leaves a farmed parcel fallow (usually plowed bare to promote moisture retention in the soil), for one season after being farmed. Other vegetation within the planted barley fields is typically minimal, consisting of occasional agrestal weeds like *Polygonum arenastrum* and *Descurainia sophia*. Fence lines and roads contain a variety of native and introduced species. Commonly present are *Plagiobothrys canescens, Lepidium dictyotum, Lepidium nitidum*, several *Amsinckia* species, *Capsella bursa-pastoris, Hirschfeldia incana, Calandrinia ciliata, Phacelia ciliata, Vulpia microstachys, Vulpia myuros, Hordeum murinum, Bromus diandrus, Bromus madritensis* ssp. *rubens*, and others.

Ephemeral drainages in Section 17 dissipate and the water infiltrates into farmed fields. An ephemeral depression occurs in the north half of the section. The depression has been farmed consistently for many decades, does not contain hydrophytic vegetation, and does not hold water long enough to support fairy shrimp or breeding amphibians.

Croplands are used seasonally by elk and pronghorn, particularly when the fallow lands are plowed and bindweed is prevalent as forage. Rodent populations are low in the croplands, except for California ground squirrels, which quickly colonize plowed fields. No kit fox scat was detected in Section 17 (Smith 2010). A badger was observed at a den site within a squirrel colony in Section 17 in February 2010.

Section 18 - 640 acres, Option B

Section 18 is cropland kept on a rotational farming system where barley is planted one year and the following year the land is fallow and plowed bare to maintain soil moisture. When bare, the fields become sparsely vegetated with *Salsola tragus* and *Convolvulus arvensis*, with a few other agrestal weeds. Cattle are grazed on the stubble of harvested grain. Roads and fence lines contain a variety of native and non-native grass and forb species, similar to Section 17 (see discussion above). This Section is located along the west edge of the PSA at Bitterwater Road, and is relatively flat terrain.

The largest ephemeral drainage within the PSA passes from north to south near the western boundary of the Section. The channel carries water from three tributary channels that begin in hills northeast of the PSA. This drainage ultimately connects to Soda Lake. Alignment of the drainage feature varies somewhat from the alignment shown on the USGS topographic map, probably due to years of farming. The main channel briefly splits into two shallow channels, which then converge into one channel near grain silos at the southwest corner of Section 18.

At the center of the southern boundary of Section 18 is a single residence, accessed from Bitterwater Road by a gravel driveway. Old grain silos and farm equipment are located in the southwest corner of the Section at Bitterwater Road.

As with other cropland parcels, elk and pronghorn frequent Section 18 seasonally. These ungulates are attracted by the summer forage, and probably by the cattle water troughs. We have observed badgers on occasion, but kit fox has not been detected in Section 18. Ferruginous hawks and other raptors hunt in the croplands when the ground is bare. Western spadefoot toads laid eggs in pools on the east side of the residence in 2010, and aestivate in the vicinity through the dry season (refer to spadefoot toad discussion in Section 7.3).

Section 19 - 639 acres, Options A and B

Section 19 is an agricultural parcel divided into north and south halves by a dirt ranch road lined with a barbed wire fence. Bitterwater Road forms the western parcel boundary. In 2009, the north half of Section 19 was planted with grain and the south half was plowed and left bare. In 2010, the south half was planted with barley and the north half was plowed bare. An ephemeral drainage (described above in Section 18) passes through Section 19 and connects to Soda Lake. Non-crop vegetation consists of a low diversity and abundance of agrestal weeds. Like other cropland parcels, roads and fence lines support a variety of annual species, including *Hordeum murinum*, *Eschscholzia californica*, *Lepidium* ssp., *Amsinckia* ssp., *Plagiobothrys canescens*, *Schismus arabicus*, *Vulpia myuros*, and others.

Along the west boundary fence at Bitterwater Road is a vernal pool, situated just south of the east-west dirt road bisecting the Section. The pool held water in 2010 sufficient to support hydrophytic plant species. Dominant vegetation described in the pool in April 2010 consisted of *Psilocarphus oregonus, Psilocarphus brevissimus, Veronica peregrina, Plagiobothrys leptocladus, Plagiobothrys acanthocarpus, Crassula aquatica*, and *Lolium multiflorum*.

Section 19 is generally characterized as poor wildlife habitat due to the intensive and long-term farming operation. However, the east-west dividing fence line was found to be occupied by Heermann's kangaroo rats (*Dipodomys heermannii swarthi*), a common species, and other small mammals (Collins 2009). A badger den was also detected along the fence line in 2009. A few kit fox scats were detected along the south and west fence lines (Smith 2010). Pronghorn and elk were not observed in Section 19.

Section 20 - 659 acres, Options A and B

Section 20 is bisected by an east to west road that divides approximately equal north and south halves. All of Section 20 is cropland habitat farmed on a rotational system. In the

spring of 2008 and 2010 the south half was actively dry-farmed and the north half was plowed and left bare to rest for a season. In 2009 the south half was plowed bare and the north half was planted. This Section is located on mostly level terrain. Two shallow ephemeral drainages enter from the north and northeast and dissipate into plowed ground. During very large storm events water may sheet flow across the lower half of Section 20 to connect with the ephemeral drainage on Section 29. A large vernal pool and several non-wetland ephemeral depressions were mapped in the southern half of the Section in 2010. These features were not visible during the below average rainfall seasons of 2008 and 2009 due to seasonal plowing and lack of inundation. The vernal pool, although plowed earlier in the season, contained constituent vernal pool plants such as *Myosurus minimus*, *Plagiobothrys leptocladus*, *Psilocarphus oregonus*, and *Juncus bufonius*. *Branchinecta longiantenna*, a federally listed endangered species of fairy shrimp, was positively detected in two ephemeral pools in Section 20, and two additional pools were mapped as potential habitat (BR Map 10 in Section 13.0).

An old abandoned reservoir created by above-ground earthen berms is located in the north half of the Section. The reservoir filled in 2010, and was a breeding site for Western spadefoot toads, a California Species of Special Concern.

Section 21 - 618 acres, Options A and B

The PSA includes 618 acres of Section 21, approximately 578 of which are in various stages of agricultural production. Most of the croplands were fallow for 2010 and were not plowed. Fallow lands were dominated by *Hirschfeldia incana* and *Descurainia sophia*, with very few native wildflowers. Dried barley stalks were visible, which indicates the land was not grazed after the last crop was harvested the previous year. One 40 acre parcel has not been plowed or planted in several years and is described as annual grassland habitat instead of cropland. The grassland had a very low diversity of plant species, and was dominated by *Bromus madritensis* ssp. *rubens*, an introduced annual grass. *Amsinckia* ssp. and and *Descurainia sophia* were noted to be abundant in spring 2010. Freshly dug badger dens were located in the grassland area in early 2010. Pronghorn may occasionally forage in this Section, but elk have not been found foraging in the middle areas of the PSA.

A privately owned residence on 40 acres that is not part of the PSA lies within the middle of Section 21. The southern border of the Section is separated from Section 28 by a dirt ranch road and barbed wire fence. Two PG&E power lines pass along this border in an east-west orientation. A dispersive ephemeral drainage with two primary tributary stems originating in hills to the northeast bisects the Section from north to south.

Section 22 - 246 acres, Options A and B

The PSA includes approximately 240 acres of Section 22, including approximately 40 acres of annual grasslands and 206 acres of croplands. Much of the croplands were left as bare plowed ground in 2008, planted to grain in 2009, and were again left bare in 2010. Ephemeral drainages pass through the west and east sides of the Section in a southwesterly direction. Drainages that pass through Section 22 are dispersed in fields immediately to the south, north of Highway 58.

Section 26 - 176 acres, Option A

The 176-acre portion of Section 26 within the PSA is mapped entirely as annual grassland habitat. It is an irregularly shaped area not consistent with existing fence lines. This parcel was added to the PSA in late 2009. In spring 2010, it was characterized as sparsely vegetated annual grassland four to six inches in height with shale gravels and cobbles on the surface. Plow lines were visible, despite last farming estimated to be in the mid to early 1980's. Bare ground was estimated at 15 to 30 percent by area in 2010, with dominant vegetation consisting of *Erodium cicutarium*, *Bromus madritensis* ssp. *rubens*, *Vulpia microstachys*, and *Vulpia myuros*. Native wildflowers were common, including large patches of *Lupinus bicolor* and *Amsinckia* ssp., as well as scattered *Stebbinsoseris heterocarpa*, *Lupinus microcarpus*, and *Castilleja exserta*. One dispersive ephemeral drainage passes through the area.

Wildlife was observed uncommonly in Section 26 during the spring 2010 season. An adult male pronghorn was seen occasionally on and near the Section in March. A San Joaquin kit fox latrine was active in April 2010 at the southeast fence corner, and fresh kit fox tracks were occasionally observed along the road between Sections 26 and 35 in March and April. Raptors and badgers likely hunt ground squirrels on occasion in this area.

Section 27 - 655 acres, Options A and B

All 655 acres of Section 27 are included in the PSA. Portions of this Section were previously developed as a solar project, however no facility remains except for a chain link fence and an abandoned building. Section 27 is dry farmed except for a small area around the existing building, based roads and in a substation easement area at the northern property boundary. The existing building is abandoned, and is currently occupied by barn owls and pigeons. Cattle were regularly kept in this Section during 2009, with watering stations located in the southwest corner. In April 2010 the entire cropland area was plowed for summer fallow.

Ground squirrels are abundant in the croplands, and several older coyote dens were identified during our surveys. One wintering burrowing owl was observed in a ground squirrel den complex in February 2008. Abundant San Joaquin kit fox scat was detected in Section 27, primarily on the diagonal dirt road accessing Section 34 from Section 21, but also along the south and west fence lines. A dead kit fox was found at the southeast corner of the chain link fence within this Section in March 2010.

Section 28 - 660 acres, Options A and B

Section 28 is a historically agricultural parcel that has been fallow since at least 2006. The fallow agricultural lands have reverted to annual grassland habitat with a generally poor diversity of native herbs and a predominance of introduced annual grasses. Vegetation varies across the site likely due to a history of farming certain plots at different times. The southwest quarter of the Section was dominated in April 2010 by a 24 to 36 inch tall crop of *Vicia villosa* ssp. *varia*, *Amsinckia* ssp., and *Descurainia sophia*, while the northwest and northeast quarters were dominated by *Bromus madritensis* ssp. *rubens*, *Hordeum murinum*, and *Vulpia myuros* with patches of

Plagiobothrys canescens and Erodium cicutarium. The southeast quarter was dominated by *Vulpia myuros, Hordeum murinum*, and *Amsinckia* ssp.

An abandoned ranch compound is situated in the center of the Section. One residence, several outbuildings, grain silos, old farm equipment, and two above-ground reservoirs are present.

Section 28 is moderate quality habitat for wildlife. We detected signs of recent badger activity in 2010, and numerous fresh kit fox scats were collected in 2009 (Smith 2010). Two pairs of burrowing owls nested in Section 28 in 2010. Two adult female pronghorn were observed in April 2010; elk do not forage on or pass through Section 28. Pacific chorus frogs (*Pseudacris regilla*) breed in the western reservoir when water is supplemented by a newer water tank.

Section 29 - 134 acres, Options A and B

The 134-acre portion of Section 29 included in the PSA is primarily cropland habitat planted to dry-farmed grain during the spring of 2008, left fallow for 2009, and was plowed but not planted to grain in 2010. An old abandoned above-ground reservoir is situated near the western edge of the parcel. The reservoir was once used for the farming operation, but the plumbing is dilapidated and no longer usable. It does not hold water due to the dilapidation and rodent burrowing. An access easement to Highway 58 runs along the southeast boundary of the Section that is mapped as annual grassland habitat. This area is not farmed and is mapped as annual grassland habitat.

Two special status small mammals, McKittrick pocket mouse and Tulare grasshopper mouse, were trapped and released within the easement during small mammal trapping efforts in 2008 (Vanherweg 2008). Pronghorn may forage in the cropland occasionally, but elk do not utilize this portion of the PSA. Badger and kit fox sign was observed occasionally.

Section 32 - 650 acres, Option A

Section 32 is entirely an agricultural parcel on level terrain. The main ephemeral drainage within the PSA that connects to Soda Lake passes through the northeast corner of Section 32. Four vernal pools were mapped in the northwest corner of the Section which contained *Branchinecta lindahli*, a common fairy shrimp species, and constituent vernal pool plants despite being plowed seasonally. Hydrophytic vegetation identified within the pools in March 2010 consisted of *Deschampsia danthonioides, Juncus bufonius, Crassula aquatica* and *Psilocarphus oregonus*. Other vernal pool plant species could potentially occupy the site; however the pools were plowed in preparation for planting shortly after drying in April 2010, before mid-spring botanical surveys were conducted.

Ground squirrels are generally uncommon in this Section. We observed evidence of temporary occupation by kit fox and badger in 2009 and 2010, but have not identified natal dens in this area for either badger or kit fox. We expect that these species move through the area on occasion while foraging or dispersing. Wintering birds such as ferruginous hawk and long-billed curlew regularly forage in Section 32.

Section 33 - 567 acres, Options A and B

This agricultural parcel contains an abandoned residential ranch compound at the east end accessed by a driveway from Highway 58. This area is described as anthropogenic habitat. Several abandoned homes, sheds and farm equipment are within a fenced area. The fenced area, which apparently has not been farmed in many years, extends west of the homes to a water tank. We mapped the fenced area as annual grassland habitat based on the vegetation present in spring 2010. Dominant species in the small grassland area included *Bromus madritensis* ssp. *rubens*, *Vulpia* ssp., and *Erodium cicutarium* with a variety of native wildflowers such as *Lupinus* ssp., *Heterodraba unilateralis, Lasthenia gracilis, Plagiobothrys canescens, Lepidium nitidum, Layia platyglossa, Castilleja exserta* and others.

The cropland habitat in this Section was last farmed in 2008, and with nearly two years of rest a variety of wildflowers and agrestal weeds are now established. In the absence of farming we expect this Section would return to low quality annual grassland habitat by 2012. In April 2010, the vegetation was six to eight inches tall and dominated by *Avena fatua, Erodium cicutarium, Bromus madritensis* ssp. *rubens, Lotus humistratus, Trifolium gracilentum*, and *Vulpia* ssp. Wildflowers were uncommon and scattered in the south half, but were prevalent in the north half. Common native wildflowers observed were *Layia platyglossa, Eschscholzia californica, Lupinus bicolor, Amsinckia* ssp., and *Achyrachaena mollis*. A population of *California macrophylla*, a rare plant known from the region, was mapped in the south half of Section 33, and a second rare species *Layia munzii* was identified in scattered localities within the fallow cropland habitat (refer to Section 6.0 for further discussion of rare plants).

The ranch compound is planted with a variety of landscape trees and shrubs that create a vegetated refuge for migrating and nesting birds. Pronghorn commonly forage in the cropland areas of the Section, however elk do not occupy this portion of the PSA. Sign of ground squirrels, badgers, and kit foxes were uncommon.

Section 34 - 518 acres, Option A

Section 34 is an annual grassland habitat with approximately 20 years of recovery since last farmed. It is presently in contract with the Conservation Reserve Program, and is periodically grazed from late winter through early summer, until almost no vegetation remains. The parcel is characterized by nearly level terrain and short vegetation. Two dispersive ephemeral drainages enter the parcel from the north, draining toward Highway 58. The Carissa Plains Elementary School is located in the southwest corner of the Section, and a setback of one-third mile is proposed between the school and project components. In March 2010, vegetation was estimated at two inches in height or less, dominated by *Erodium cicutarium*. By late April the vegetation was six to ten inches in height and dominated by *Vulpia microstachys, Vulpia myuros, Bromus madritensis* ssp. *rubens*, and *Lupinus bicolor*. The 2010 above-average rainfall season produced notable wildflower patches in the southern third of Section 34, along the Highway 58 corridor, including areas up to several acres in size. The wildflower patches consisted of *Layia platyglossa, Lasthenia gracilis* and *Castilleja exserta.* Bare ground was estimated to be zero to ten percent of the surface area. Several small non-wetland ephemeral depressions were mapped in the northeast quadrant, one of which contained *Branchinecta lindahli*, a common fairy shrimp species, in 2010.

Wintering burrowing owls were observed occasionally, and signs of kit fox and badger were commonly observed. One kit fox was observed at a den in February 2010. Pronghorn are occasionally observed in Section 34, but elk do not occupy this portion of the PSA.

Section 35 - 651 acres, Option A

Section 35 has been under the same ownership and management as Section 34, and is therefore similar to the description above. One ephemeral drainage enters the Section from the north, but disperses into the fields before reaching Highway 58. As with Section 34, large areas of wildflowers were present along the highway corridor in spring 2010. One ephemeral depression was mapped near the eastern boundary road, which contained *Psilocarphus oregonus* and *Plagiobothrys acanthocarpus*.

Section 4 -621 acres, Option A

Section 4 is an agricultural parcel located at the southern end of the PSA. Two residences are located in the Section, both on approximately 40-acre parcels that are excluded from the PSA. Active croplands, in an irregularly shaped configuration, are located in the north end of the Section. The croplands are planted to barley on a rotational system. Annual grasslands were entered into the CRP program in 1984-1985, and have not been farmed since.

The annual grassland habitat, with over 25 years of recovery from agricultural use, is a high diversity grassland system with five to twenty percent bare ground, and vegetation consisting almost entirely of annual herbs and small areas of low sparse shrub development. The dominant herbs are *Vulpia microstachys, Erodium cicutarium, Plagiobothrys canescens, Lasthenia gracilis, Layia munzii* (CNPS List 1B.2), *Castilleja* ssp., *Clarkia affinis*, and *Lupinus bicolor*.

Two areas of stabilized sand deposition from north-draining ephemeral drainages are located near the southern fence line. Patches of *Heterotheca sessiliflora* are common on these sands, and comprise the only shrub development in the Section. Also common in this area are *Camissonia strigulosa*, *Vulpia* ssp., *Microseris douglasii*, and others.

Because the soil type in the eastern portion of Section 4 is underlain by a shallow hard pan, numerous vernal pools and ephemeral wetlands have developed (refer to Section 5.0 for detailed descriptions of these habitats). This shallow hard pan also resulted in inundation of small mammal burrows in 2010. This explains the low abundance of small mammal burrows in the east end of Section 4.

Section 4 contains a variety of habitat types, and because much of the land has not been farmed in 25 years, numerous wildlife species utilize these habitats. A concentration of kit fox sign, including tracks, dens, and scats, were detected in the south and east ends of the Section. Badger diggings were also common. Pronghorn, although occasionally present, tend to forage to the west in Section 5. Burrowing owls were observed in several locations, and a variety of other birds forage in the upland and wetland habitats.

Section 5 - 360 acres, Option A

The 360 acres of Section 5 that is within the PSA is comprised of active croplands and untilled annual grasslands. In 1981-1982 approximately 250 acres in the southwest corner of the Section were placed in the Conservation Reserve Program (CRP) and have not been farmed since. Much of this area is outside the PSA. Grasslands in Section 5 did not contain potential ephemeral wetlands or vernal pools. Although species composition was similar to Section 4, this Section had a lower abundance of native wildflowers in spring 2010. *Layia munzii*, a rare endemic plant, was found to be common in the grassland areas at the southwest corner of the Section and in a strip of grassland along the west boundary of the PSA.

A kit fox den along the western boundary was occupied in March 2010, and a natal den territory was identified in the southeast corner of the Section. Badgers frequent the area, and were observed at a den in the southwest corner. Pronghorn enter the Section from the south by going under a barbed wire fence at the extreme southwestern corner and frequently pass through the area to more northern parcels. Elk do not occupy this area of the PSA.

3.3 Soils

The United States Department of Agriculture (USDA) Soil Survey of San Luis Obispo County, California, Carrizo Plain Area (2003) delineates eleven soil map units within the PSA: Capay clay, 0 to 2 percent slopes (109); Capay clay, 2 to 9 percent slopes (110); Seaback-Panoza-Jenks complex, 9 to 15 percent slopes (280), and 15 to 30 percent slopes (281); Yeguas-Pinspring complex, 0 to 2 percent slopes (310); Yeguas-Pinspring complex, 2 to 5 percent slopes (311); Thornhill loam, 2 to 5 percent slopes (321); Jenks clay loam, 2 to 9 percent slopes (330); Bellyspring-Panoza complex, 9 to 15 percent slopes (440); Wasioja loam, 0 to 2 percent slopes (490); and Wasioja-Pinspring-Yeguas complex, 2 to 5 percent slopes (497).

Soil map units typically encompass one or two dominant soils that cover more than 50 percent of the mapped area, and one to several soils that occur in small patches not differentiated in mapping at the 1 to 24,000 scale used for NRCS soil maps. Due to the procedures followed in making a soil survey, users of soil survey data are cautioned that not all areas included within a soil survey are closely sampled using soil pits and site descriptions, and a specific site may not have been sampled at all. Therefore, care must be taken in drawing conclusions regarding site-specific soil resources based solely on NRCS soil survey work. Digitized spatial data from the Carrizo Plain Soil Survey are shown as an overlay of soil map units on an aerial photo of the region with the following caution from NRCS regarding maps: "Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale." (Section 13.0, Figure 3).

Soils within the PSA can be generalized into two groups: (1) deep, alluvial soils on flats, fans, terraces, and low hills; and (2), shallow soils over soft, weathered bedrock on

foothills and steeper slopes. Typical surface soil textures range from loams to clay loams in both groups, with one alluvial soil, Capay, consisting of clay throughout the profile. The deep alluvial soils of the flats and gentlest slopes have accumulated by deposition of material carried by short ephemeral channels that cut through recently uplifted foothills and mountains of the Temblor Range east of the PSA, Hubbard Hill, Freeborn Mountain, and the La Panza Range west of the PSA, and the Caliente Range south of the PSA. Where these channels reach level or nearly level ground, they lose power, drop their sediment loads, and dissipate. Over time, deep layers of alluvium accumulate. On steeper slopes and hills, soils are shallower, often with only 10 to 20 inches of soil underlain by bedrock.

Soil formation and properties are heavily influenced by the properties of the soil parent material, which is partially controlled by the geology of a site and its immediate surroundings. For instance, soils formed from marine sedimentary rocks differ in chemistry and properties from soils formed in non-marine sedimentary rock; soils formed from volcanic rock often have higher metal and micronutrient content than soils formed from sedimentary rock. Hills northeast of the PSA contribute alluvium from Pliocene-Pleistocene non-marine sedimentary rock, typically Paso Robles formation (Dibblee 1999; Jennings 1959). The Paso Robles formation consists of non-marine, coarse-grained, braided-river deposits produced from continental alluvial outwashed during the Pliocene and Pleistocene (1.7 to 5.3 MYA). Hills west and south of the PSA contribute alluvium from Miocene marine sedimentary rock, including Monterey shale formation and Vaqueros sandstone. These formations are older than the rock in hills east of the PSA. In addition, small inclusions of a Miocene basaltic (volcanic) formation occur on hills southwest of the PSA, and could influence parent material of those soils.

Our observations of soils within the PSA found that they often vary from the mapped soil unit in the USDA Soil Survey, but tend to be consistent within the same soil order (Mollisol, Alfisol, Inceptisol, or Vertisol) as the mapped soil unit.

Capay clays (109, 110) are typically found in the western Carrizo Plain at elevations ranging from 1,800 to 2,095 feet. Map Unit 109 comprises areas of 0 to 2 percent slopes, and Map Unit 110 comprises areas of 2 to 9 percent slopes. Both map units consist of approximately 80 percent Capay soils, with minor components comprising the remaining 20 percent. Capay clay forms in alluvium derived from mixed rock types, and typically has a profile with clay textures over 60 inches deep. Capay soils are Vertisols, which are soils high in shrinking/swelling clay minerals that cause deep vertical cracks to form in the soil during the dry season. Capay is the only Vertisol soil series shown in the PSA on USDA soil survey maps.

Seaback-Panoza-Jenks complex (280, 281) is typically found in the central Temblor Range at elevations ranging from 2,000 to 2,600 feet. This complex occurs within the PSA on slopes ranging from 9 to 30 percent. It consists of approximately 35 percent Seaback soils, 30 percent Panoza soils, 15 percent Jenks soils, and 20 percent minor components. Occurring on hills and mountains, the major components of this complex are formed from weathered sandstone, shale, or conglomerate, in some areas calcareous. Seaback and Panoza soils are Inceptisols, soils with weakly developed subsurface horizons that are often not very dark in color or high in plant nutrients. Jenks soils are

Mollisols: thick, dark soils high in plant nutrients. Mollisols are often good agricultural soils.

Yeguas-Pinspring complex (310, 311) is generally located in the northern Carrizo Plain at elevations ranging from 2,000 to 2,295 feet. This complex occurs within the PSA on slopes ranging from 0 to 5 percent. It consists of approximately 40 percent Yeguas soils, 40 percent Pinspring soils, and 20 percent minor components. Occurring on alluvial pans and alluvial flats, the major components of this complex are alluvium derived from sandstone, shale, and basalt (Yeguas soil) and from mixed rocks (Pinspring soil). Yeguas and Pinspring soils are Alfisols, moderately leached soils that have a subsurface zone of clay accumulation, but are not as dark in color or nutrient rich as Mollisols. Alfisols can be productive agricultural soils but are typically less rich than Mollisols.

Thornhill loam (321) is usually located in the northern Carrizo Plain at elevations ranging from 1,895 to 2,400 feet. This map unit is comprised of approximately 80 percent Thornhill loam and 20 percent minor components. Occurring on alluvial pans and alluvial flats, this soil type is derived from mixed rock alluvium. Thornhill soils are Mollisols: thick, dark soils high in plant nutrients. Where they are not under cultivation, Mollisols often occur in grasslands.

Jenks clay loam (330) is generally located in the San Juan Hills at elevations ranging from 1,800 to 2,495 feet. This map unit is comprised of approximately 80 percent Jenks clay loam and 20 percent minor components. Occurring on hills, this soil type is formed from weathered soft sandstone or shale. Jenks soils are Mollisols: thick, dark soils high in plant nutrients.

Bellyspring-Panoza complex (440) is typically found in the San Juan Hills at elevations ranging from 2,200 to 3,300 feet. Map Unit 440 comprises areas of 9 to 15 percent slopes. It consists of approximately 35 percent Bellyspring soils and 25 percent Panoza soils, with minor components comprising the remaining 40 percent. The major components of this complex are formed from weathered sandstone, shale, or conglomerate, in some areas calcareous. Panoza soils are Inceptisols, soils with weakly developed subsurface horizons that are often not very dark in color or high in plant nutrients. Bellyspring soils are Alfisols, moderately leached soils that have a subsurface zone of clay accumulation, but are not as dark in color or nutrient rich as Mollisols.

Wasioja loam (490) is typically found in the central Carrizo Plain at elevations ranging from 1,895 to 2,495 feet. Map unit 490 comprises areas of 0 to 2 percent slopes. It consists of approximately 75 percent Wasioja soils, with minor components comprising the remaining 25 percent. The major component of this map unit forms in alluvium derived from mixed rock types, and a typical profile consists of loams and clay loams to over 60 inches in depth. Wasioja soils are Alfisols, moderately leached soils that have a subsurface zone of clay accumulation, but are not as dark in color or nutrient rich as Mollisols.

Wasioja-Pinspring-Yeguas complex (497) is typically located in the Carrizo Plain south of Carrizo Plain School at elevations ranging from 1,895 to 2,495 feet. Map unit 497 comprises areas of 2 to 5 percent slopes. It consists of approximately 35 percent Wasioja soils, 30 percent Pinspring soils, 15 percent Yeguas soils, with minor components comprising the remaining 20 percent. The major components of this map unit form in

alluvium derived from mixed rock types. Typical profiles have a mixture of loams, clay loams, sandy loams, and clay textures, and inclusions in the map unit often have bedrock as shallow as 20 inches below the soil surface. Yeguas, Pinspring, and Waisoja soils are Alfisols, moderately leached soils that have a subsurface zone of clay accumulation, but are not as dark in color or nutrient rich as Mollisols.

4.0 Special Status Plants and Animals

We reviewed records of special status species reported from the two USGS quadrangles that contain the PSA, as well as the surrounding ten quadrangles. The designated search area encompasses approximately 735 square miles (470,400 acres) of land, and is consistent with typical search area requirements by the California Department of Fish and Game. The CNDDB and the CNPS On-line Inventory of Rare and Endangered Plants of California contain records for 50 special status species and two sensitive natural communities within the designated search area (Tables 4, 5, and 6). The search area includes the following twelve USGS 7.5 minute quadrangles: La Panza NE, California Valley, La Panza, La Panza Ranch, Holland Canyon, Packwood Creek, Shale Point, Las Yeguas Ranch, Simmler, Chimineas Ranch, Branch Mountain, and Los Machos Hills.

Twenty-seven additional special status species were added to the list from our knowledge of the area, from review of museum specimen data and other private consultant survey reports from the region, and from results of on-site biological surveys of the PSA and vicinity. These additional species are marked with an asterisk (*). Appropriate habitat and soil conditions are present within the PSA for 20 special status plants and 31 special status animals.

Figure 4 in Section 13.0 depicts the current GIS data for special status species mapped in the vicinity of the PSA by the CNDDB. Biological resource maps indicating locations of special status species detected within the PSA are provided in Section 13.0.

4.1.1 Introduction to CNPS lists

Plant species are considered rare when their distribution is confined to localized areas, when there is a threat to their habitat, when they are declining in abundance, or are threatened in a portion of their range. The listing categories range from species with a low threat (List 4) to species that are presumed extinct (List 1A). The 1096 plants of List 1B are rare throughout their range. All but a few species are endemic to California. All of them are judged to be vulnerable under present circumstances, or to have a high potential for becoming vulnerable.

4.1.2 Introduction to CNDDB definitions

"Special Plants" is a broad term used to refer to all the plant taxa inventoried by the CNDDB, regardless of their legal or protection status (CDFG April 2010). Special plants include vascular plants and high priority bryophytes (mosses, liverworts, and hornworts).

"Special Animals" is a general term that refers to all of the animal taxa inventoried by the CNDDB, regardless of their legal or protection status (CDFG July 2009). The Special Animals list is also referred to by the CDFG as the list of “species at risk” or “special

status species". These taxa may be listed or proposed for listing under the California and/or Federal Endangered Species Acts, but they may also be species deemed biologically rare, restricted in range, declining in abundance, or otherwise vulnerable.

Each species included on the Special Animals list has a corresponding Global and State Rank (refer to Table 4). This ranking system utilizes a numbered hierarchy from one to five following the Global (G-rank) or State (S-rank) category. The threat level of the organism decreases with an increase in the rank number (1=Critically Imperiled, 5=Secure). In some cases where an uncertainty exists in the designation, a question mark (?) is placed after the rank. More information is available at www.natureserve.org.

Animals listed as California Species of Special Concern (SSC) may or may not be listed under California or Federal Endangered Species Acts. They are considered rare or declining in abundance in California. The Special Concern designation is intended to provide the Department of Fish and Game, biologists, land planners and managers with lists of species that require special consideration during the planning process in order to avert continued population declines and potential costly listing under federal and state endangered species laws. For many species of birds, the primary emphasis is on the breeding population in California. For some species that do not breed in California but winter here, emphasis is on wintering range. The SSC designation thus may include a comment regarding the specific protection provided such as nesting or wintering.

Animals listed as Fully Protected are those species considered by CDFG as rare or faced with possible extinction. Most, but not all, have subsequently been listed under the California Endangered Species Act (CESA) or the Federal Endangered Species Act (FESA). Fully Protected species may not be taken or possessed at any time and no provision of the CDFG code authorizes the issuance of permits or licenses to take any Fully Protected species.

4.1.3 Potential special status plant list

Table 4 lists 33 special status plant species reported from the region. Federal and California State status, global and State rank, and CNPS listing status for each species are given. Typical blooming period, habitat preference, potential habitat on site, and whether or not the species was observed within the PSA are also provided.

TABLE 4. SPECIAL STATUS PLANT LIST. Thirty-three special status plants reported from the region are listed. Potentially suitable habitat is present within the PSA for 18 special status plant species.

	Common and Scientific Names	Fed/State Status Global/State Rank CNPS List	Blooming Period	Habitat Preference	Potential Habitat?	Detected Within PSA?
1.	**Forked Fiddleneck** *Amsinckia vernicosa furcata*	None/none G4T3/S3.2 List 4.2	February–May	Cismontane woodland, valley and foothill grassland, often on shale outcrops, talus slopes, or gypsum-affected soils in disturbed, open sites. 50-1000 m. w SnJV, SCoRI	No. Suitable open shale, talus, or gypsum affected slopes do not occur within the PSA.	No
2.	**Oval-leaved Snapdragon** *Antirrhinum ovatum*	None/none G3/S3.2 List 4.2	May–November	Heavy, adobe-clay soils on gentle, open slopes, also disturbed areas; 200-1000 m. s SnJV, s SCoRI	Yes. Suitable clay soils are present within the PSA.	Yes Option A
3.	**Santa Margarita Manzanita** *Arctostaphylos pilosula*	None/none G2/S2.2 List 1B.2	December–March	Shale outcrops, slopes, chaparral; 300-1100 m. s SCoRO Endemic to SLO County	No. Suitable shale outcrops are not present within the PSA.	No
4.	**Indian Valley Spineflower** *Aristocapsa insignis*	None/none G2/S2.2 List 1B.2	May–September	Cismontane woodland; 300-600 m. SCoRI	Yes. Potentially suitable sandy soils are present in the south end of Section 4.	No
5.	**Salinas Milk-vetch*** *Astragalus macrodon*	None/none G3/S3.3 List 4.3	April–July	Eroded pale shales or sandstone, or serpentine alluvium; 300-950 m. SCoR	Yes. Suitable habitat is present within the PSA.	Yes Option A Option B
6.	**Heartscale** *Atriplex cordulata*	None/none G2?/S2.2 List 1B.2	April–October	Alkaline flats and scalds in chenopod scrub, grassland, meadows; 1-375 m. s ScV, SnJV	No. Suitable alkaline wetlands are not present within the PSA.	No
7.	**Lost Hills Crownscale** *Atriplex vallicola*	None/none G1/S1.1 List 1B.2	April–August	Powdery, vernally moist alkaline soils in chenopod scrub, grassland, vernal pools; 0-605 m. SnJV	No. Suitable moist alkaline soils are not present within the PSA.	No

	Common and Scientific Names	Fed/State Status Global/State Rank CNPS List	Blooming Period	Habitat Preference	Potential Habitat?	Detected Within PSA?
8.	**Round-leaved Filaree** *California macrophyllum*	None/none G3/S3.1 List 1B.1	March–May	Clay soils in cismontane woodland, valley and foothill grassland; 15-1200 m. ScV, n SnJV, CW, SCo, n ChI	Yes. Suitable clay soils are present in Sections 4, 5, 32, and 33.	Yes Option A
9.	**Palmer's Mariposa Lily** *Calochortus palmeri* var. *palmeri*	None/none G2T2/S2.1 List 1B.2	May–July	Meadows, vernally moist places in yellow-pine forest, chaparral; 1200-2200 m. Teh, s CW, TR, SnJt	No. Suitable habitat is not present within the PSA.	No
10.	**San Luis Obispo Mariposa Lily** *Calochortus simulans*	None/none G2/S2.3 List 1B.3	April–May	Grassland, oak woodland & pine forest, on sand, granite, or serpentine; <1100 m. Endemic to SLO County	No. Suitable soil and habitat types are not present within the PSA.	No
11.	**Dwarf Calycadenia** *Calycadenia villosa*	None/none G2/S2.1 List 1B.1	May–October	Dry, rocky hills, ridges, in chaparral, woodland, meadows and seeps; <1100 m. c&s SCoRO	No. Suitable habitat is not present within the PSA.	No
12.	**California Jewelflower** *Caulanthus californicus*	Endangered/ Endangered G1/S1.1 List 1B.1	February–May	Chenopod scrub, grassland, pinyon-juniper woodland on sandy soils; 65-900 m. s SnJV	No. Suitable habitat conditions and soil types are not present within the PSA.	No
13.	**Lemmon's Jewelflower** *Caulanthus coulteri* var. *lemmonii*	None/none G4T2/S2.2 List 1B.2	March – May	Dry, exposed slopes; 80-800 m. sw SnJV, se SnFrB, e SCoRO, SCoRI	No. Suitable habitat conditions are not present within the PSA.	No
14.	**Straight-awned Spineflower** *Chorizanthe rectispina*	None/none G1/S1.2 List 1B.3	May–July	Chaparral, dry woodland, usually on granitic soil; 200-600 m. SCoRO	No. Suitable habitat and soil types are not present.	No

	Common and Scientific Names	Fed/State Status Global/State Rank CNPS List	Blooming Period	Habitat Preference	Potential Habitat?	Detected Within PSA?
15.	**Hall's tarplant** *Deinandra halliana*	None/none G1/S1.1 List 1B.1	April–May	Chenopod scrub, Cismontane woodlands, valley and foothill grasslands on variety of soil types including alkaline; 300- 950 m.; SCoRI	Yes. Suitable habitat is present within the PSA.	No
16.	**Gypsum-loving Larkspur*** *Delphinium gypsophilum* ssp. *gypsophilum*	None/none G4T3/S3.2 List 4.2	February - May	Chenopod scrub, cismontane woodland, grassland; s SNF, Teh, SnJV, SCoRI	Yes. Potentially suitable habitat is present in untilled annual grasslands within the PSA.	No
17.	**Recurved Larkspur** *Delphinium recurvatum*	None/none G2/S2.2 List 1B.2	March–June	Poorly drained alkaline soils in chenopod scrub, grassland, cismontane woodland; 3-685 m. GV	Yes. Potentially suitable habitat is present in untilled annual grasslands within the PSA.	No
18.	**Umbrella Larkspur** *Delphinium umbraculorum*	None/none G2G3/S2S3.3 List 1B.3	April–June	Moist oak forest; 400-1600 m. SCoRO, WTR	No. Suitable habitat is not present in the PSA.	No
19.	**Hoover's Eriastrum** *Eriastrum hooveri*	Delisted/none G3/S3.2 List 4.2	March–July	Sparsely vegetated alkaline alluvial pans in chenopod scrub, grassland, pinyon-juniper woodland; 50-915 m. s&e SCoR	No. Suitable soil conditions are not present within the PSA.	No
20.	**Temblor Buckwheat** *Eriogonum temblorense*	None/none G3/S3.2 List 1B.2	May–September	Barren clay in grassland, sandstone outcrops; 300-1000 m. s SCoRI	Yes. Marginally suitable habitat may be present in Sections 15 and 16.	No
21.	**Spiny-sepaled Button Celery** *Eryngium spinosepalum*	None/none G2/S2.2 List 1B.2	April - May	Vernal pools in valley and foothill grasslands, sometimes in granitic clays; 100-420 m.	Yes. Suitable vernal pool habitat is present within the PSA.	Yes Option A
22.	**Diamond-petaled California Poppy** *Eschscholzia rhombipetala*	None/none G1/S1.1 List 1B.1	March–April	Alkaline clay flats and slopes in grasslands, fallow fields; 0-975 m. NCoRI, e SnFrB, e SCoRO, SCoRI	Yes. Suitable habitat is present in Section 5, and possibly elsewhere.	No (Occurs Outside Option A Boundary)

	Common and Scientific Names	Fed/State Status Global/State Rank CNPS List	Blooming Period	Habitat Preference	Potential Habitat?	Detected Within PSA?
23.	**Santa Lucia Dwarf Rush*** *Juncus luciensis*	None/none G3/S3 List 1B.2	April – July	Vernal pools, ephemeral drainages, wet meadow habitats, and streams; 300-2040 m. n SNH, SCoRO, TR, PR	Yes. Suitable ephemeral aquatic habitat is present in the PSA.	Yes Option A
24.	**Ferris' Goldfields** *Lasthenia ferrisiae*	None/none G3/S3.2 List 4.2	February–May	Vernal pools or wet saline flats in alkaline clay soil; <700 m ScV, SnJV.	Yes. This species could occur in vernal pools and other mesic areas within the PSA.	Yes Option A Option B
25.	**Coulter's Goldfields** *Lasthenia glabrata* ssp. *coulteri*	None/none G4T3/S2.1 List 1B.1	February–June	Saline places, vernal pools; Occurs near Soda Lake in Carrizo Plain; <1000 m. s SCoRO, SCo, n ChI, PR, w DMoj	Yes. Suitable habitat may be present in the ephemeral aquatic habitats within the PSA.	No
26.	**Pale-Yellow Layia** *Layia heterotricha*	None/none G1/S1.1 List 1B.1	March–June	Alkaline or clay soils, open areas, in pinyon-juniper woodland, grassland; 270-1705 m. Teh, SnJV, SCoR, n WTR	Yes. Potentially suitable habitat is present in grasslands with clay soils.	No (See discussion in Section 4.1.4 I)
27.	**Munz's Tidy-tips** *Layia munzii*	None/none G1/S1.1 List 1B.2	March–April	Alkaline clay soils in chenopod scrub, grasslands; 45-760 m. SnJV	Yes. Suitable habitat is present.	Yes Option A Option B
28.	**Jared's Peppergrass** *Lepidium jaredii* ssp. *jaredii*	None/none G1T1/S1.2 List 1B.2	March–May	Alkali bottoms, slopes, washes, <500 m. SCoRI, SnJV	Yes. Potentially suitable habitat and soil conditions may be present in Section 4.	No
29.	**Showy Madia** *Madia radiata*	None/none G2/S2.1 List 1B.1	March–May	Grassy slopes, often in heavy clay; <900 m. w SnJV, e SnFrB, SCoRI	Yes. Suitable habitat is present within the PSA.	No
30.	**San Joaquin Woollythreads** *Monolopia congdonii*	Endangered/none G3/S3.2 List 1B.2	February–May	Chenopod scrub, grassland, in alkaline or loamy plains or sandy soils. 60-800 m. s SnJV	Yes. Suitable habitat is present in sandy and loamy areas of Section 4 and 5 in short grasslands.	No
31.	**Paso Robles Navarretia*** *Navarretia jaredii*	None/none G3S3.3 List 4.3	April–July	Open, grassy areas, often in clay or serpentine. 200-500 m. SCoRI, SW	Yes. Suitable habitat is present in untilled grasslands within the PSA.	Yes Option A Option B

	Common and Scientific Names	Fed/State Status Global/State Rank CNPS List	Blooming Period	Habitat Preference	Potential Habitat?	Detected Within PSA?
32.	**Shining Navarretia** *Navarretia nigelliformis* ssp. *radians*	None/none G4T1/S1.1 List 1B.2	May - July	Vernal pools, clay depressions, dry grasslands; 76-1000 m. SCoRI	Yes. Moderately suitable habitat and soil conditions are present within the PSA.	Yes Option A
33.	**Parish's Checkerbloom** *Sidalcea hickmanii* ssp. *parishii*	None/Rare G3T1/S1.2 List 1B.2	June–August	Disturbed, burned, or cleared areas on dry rocky slopes, mountain summits; 1000-2135 m. SCoRO, WTR, SnBr	No. Suitable habitat is not present within the PSA.	No

Habitat Preference Abbreviations:

CCo: Central Coast
SCo: South Coast
SCoR: South Coast Ranges
SCoRO: Outer South Coast Ranges
SCoRI: Inner South Coast Ranges
SnFrB: San Francisco Bay
TR: Transverse Ranges
WTR: Western Transverse Ranges
SnJV: San Joaquin Valley
ScV: Sacramento Valley
SLO: San Luis Obispo
SN: Sierra Nevada
SnJt: San Jacinto Mtns
SnBr: San Bernardino
Teh: Tehachapi Mtn Area
CW: Central West
SW: South West
DMoj: Mojave Desert
PR: Peninsular Range

4.1.4 Special status plants discussion

Twenty special status plant species could potentially occur within the PSA based on an analysis of known ecological requirements of these species and the habitat conditions present within the PSA. We discuss each species and describe habitat, range restrictions, known occurrences, and survey results for the PSA. Detailed discussions of special status plant occurrences within the PSA are provided in Section 6.3.

Nine special status plant species occur within the PSA. One additional special status plant species, diamond-petaled California poppy, was detected and mapped just outside the PSA boundary of Option A (Section 5). Locations of special status plants within the PSA are indicated by Option on BR Map 12 in Section 13.0. Photo Collection #2 in Section 14.0 contains representative photographs of some special status plants identified within the PSA. Potential project impacts on special status plants are discussed in detail in Section 10.4.1 and Tables 24 and 25.

Reference sites were visited for many of the special status species determined to have the potential to occur within the PSA. For each species which was observed at a reference site we include the survey information in the descriptions below. A full outline of reference site visits is provided in Section 6.1.3.

A. Oval-leaved Snapdragon (*Antirrhinum ovatum*) is a CNPS List 4.2 species with a limited distribution from Fresno County south to Ventura County. Although it has a low threat rank, it is a species of strong conservation interest due to its infrequent blooming episodes. It occurs in a variety of habitats, including cismontane woodlands, grasslands, and vernal pools, where it blooms from May to November. Fire and/or alternating wet and dry years that suppress the growth of competing grasses are likely to play a role in germination, such that the species can be abundant in some years, and entirely absent in other years. The Jepson Manual describes *A. ovatum* as "Abundant every 20 to 50 years". *A. ovatum* has bloomed rarely in San Luis Obispo County in the last 20 years (D. Keil, pers. comm.).

Antirrhinum ovatum is distinguished from other species of *Antirrhinum* by pedicels less than 2.6 centimeters long, not twining or hooked, a weakly erect stem that may cling to other plants and debris, flowers subtended by twining branchlets, unequal calyx lobes, a corolla lower lip base not swollen, and the presence of longitudinal folds in the corolla throat. Suitable grassland habitat with clay soils or clay loam soils high in gypsum occur within one area of the PSA, specifically in the west end of Section 5, Option A. The closest reported occurrence is a 1952 collection from Bitterwater Road approximately 5.4 miles north of the PSA. *A. ovatum* was grown from soil collected at this site in 1984, so the seed bank is presumed viable (CNDDB 7). Four additional collections (CNDDB 8, 11, 12 and 13) range from 6.6 miles east-southeast of the PSA to 10.4 miles northeast of the PSA in the Temblor Range.

Oval-leaved snapdragon occurs in one location within the PSA. Approximately 35 plants were found scattered in cropland habitat in the east end of Section 5, Option A.

B. Indian Valley spineflower (*Aristocapsa insignis*) is a CNPS List 1B.2 species that is endemic to Monterey and San Luis Obispo Counties. Indian valley spineflower is the

only taxon in California in the genus *Aristocapsa*. Key characteristics distinguishing *Aristocapsa* from other Polygonaceae genera are involucral bracts obviously fused into a funnel or tube-like involucre, with five dull awns, and one deeply three-lobed inflorescence bract per node that occurs on one side of the stem. Indian Valley spineflower typically blooms between May and September. The CNDDB contains records of four documented localities for this species; two in Monterey County and two in San Luis Obispo County. Potentially suitable sandy substrate occurs within the PSA for Indian Valley spineflower in the southern part of Option A in Section 4. The closest occurrence is approximately 1.4 miles west of the PSA, along San Juan Creek near Highway 58 (CNDDB 1), with the second report for the County on Black Mountain, approximately fourteen miles west of the PSA (CNDDB 2).

Botanical surveys conducted through July 2010 determined Indian valley spineflower does not occur within the PSA.

C. Salinas Milk-vetch (*Astragalus macrodon*) is a CNPS List 4.3 species that ranges from San Benito County south to San Luis Obispo County and east to Kern County. It is uncommon in most areas but occurs regularly in appropriate soil conditions. It usually occurs on sandstone, pale shales, or serpentinite soils in grassland, chaparral, and cismontane woodland habitats. *A. macrodon* is distinguished from the more common Douglas's milkvetch (*A. douglasii*) by its purple to red leaflet margins and midribs, wavy to incurled hairs on fruits and leaves, and 29 to 52 seeds per fruit.

Salinas milk-vetch, a perennial species, occurs within both project Options. Sections 15 and 16 are the only locations where Salinas milk-vetch occurs within Option B. In Option A, Salinas milk-vetch occurs in scattered patches in Sections 4, 5, and 33.

D. Round-leaved Filaree (*California macrophylla*) is a CNPS List 1B.1 annual species known from sporadic occurrences throughout the interior region of California. Round-leaved erodium is the only taxon occurring in California in the genus *California*. It is distinguished from other genera in the Geranium family by having stamens that are free and fertile, no staminodes, and a simple, palmately lobed and veined leaf. The red-veined leaves of round-leaved erodium are distinctive to experienced botanists familiar with the species (refer to Photo Collection 4, Section 14.0).

Round-leaved erodium occurs in clay soils in woodland and grassland habitats. The closest reported occurrence of this species is an old collection from Pinole Hills approximately 3.5 north-northeast of the PSA (CNDDB 106). We confirmed the bloom period for this species on March 26 and April 6, 2010 at a reference site located approximately 10 miles southeast of the PSA (CNDDB 105). We also observed this species in 2010 at a reference site for other rare plants at the corner of Belmont Trail and Clarksburg Road in California Valley, approximately 4.6 miles southeast of the PSA.

Round-leaved erodium occurs only in Option A, as scattered patches in two locations in Sections 5 and 33.

E. Hall's Tarplant (*Deinandra halliana*) is a CNPS List 1B.1 species that occurs in Fresno, San Benito, Monterey, and San Luis Obispo Counties, where it blooms in April and May. Hall's tarplant is distinguished from other species in the genus *Deinandra* by its yellow to brown anthers, lack of disk pappus, glabrous proximal leaves (sometimes with scabrous to bristly margins and midribs), hollow stems, and presence of 18 to 60 disk flowers. It reaches its southern distribution limit in eastern San Luis Obispo County north of the Carrizo Plain on the east side of Bitterwater Road just north of Pinole Spring (CNDDB 1). It is reported most commonly on clay soils in annual grassland habitat, but may also occur in sandy washes and other cismontane woodland vegetation communities. The PSA is located approximately five miles south of the southernmost occurrence of Halls's tarplant. Moderately appropriate habitat and soils are present for Hall's tarplant within the PSA. The CNPS Online Inventory (CNPS 2010) reports that this species appears only in unusually wet years; 2010 was an above average year thus this species should have been detectable had it occurred within the PSA.

Botanical surveys conducted through July 2010 determined Hall's tarplant does not occur within the PSA.

F. Gypsum-loving larkspur (*Delphinium gypsophilum* ssp. *gypsophilum*) is a CNPS List 4.2 subspecies known from scattered localities in eastern San Luis Obispo County, western Kern County, and elsewhere in interior southern California, where it blooms February through May. Hoover reports the range of *Delphinium gypsophilum* in San Luis Obispo County as the eastern part, from Caliente Mountain north and west to San Miguel (1970). Hoover's reports of this species in the Carrizo are from friable, light-colored clays and disintegrating shale or sandstone on hillslopes and spreading onto adjacent alluvial areas of the plain. CNDDB records are not currently available for most List 4 species; Althouse and Meade, Inc. botanists observed this species along Highway 58 west of the Carrizo Plain in late April 2010. Potentially suitable habitat occurs on annual grassland hill slopes in Option B, Sections 15 and 16.

Botanical surveys conducted through July 2010 determined gypsum-loving larkspur does not occur within the PSA.

G. Recurved Larkspur (*Delphinium recurvatum*) is a CNPS List 1B.2 species endemic to California that occurs in scattered populations through the San Joaquin Valley, reaching its southern distribution limit in the Carrizo Plain. Recurved larkspur is distinguished from other species of *Delphinium* by light blue reflexed lateral sepals, white petals, stems generally less than 60 centimeters, and its affinity for fine textured alkaline soils. It is common in chenopod scrub habitat in the Carrizo Plain National Monument in areas that are not over-grazed. The nearest documented occurrences include two locations in California Valley approximately 3.0 to 3.5 miles southeast of the PSA (CNDDB 39, 74). We visited a reference site on April 2, 2010 at Belmont Trail and Clarksburg Road in California Valley to observe this species in bloom. We also observed it blooming along Seven Mile Road on April 16, 2009. Moderate to poor quality habitat is present in areas of the PSA that have not been plowed recently.

Botanical surveys conducted through July 2010 determined recurved larkspur does not occur within the PSA.

H. Temblor buckwheat (*Eriogonum temblorense*) is a CNPS List 1B.2 species known from barren slopes extending through the Temblor range and adjoining hills north to Parkfield and Cottonwood Pass, where it typically blooms from May through September. The nearest reported occurrence to the PSA is a specimen from 1955 from approximately 11.6 miles northeast of the PSA, growing in "barren white shale on a hilltop" (CAS TWI55S0016, CNDDB 5). CNDDB records also report the species growing in shale talus, shale gravel, sandstone outcrops, and barren white and grey clays. Temblor buckwheat is distinguished from other annual buckwheats by having all of the following: involucres ribbed or angled, and tomentose; involucres appearing terminal, with lower involucres stalked; inflorescence repeatedly forked or umbel-like; perianth approximately 2 millimeters, white to red, and papillate when fresh, with styles 0.7 to 1.0 millimeters long; some cauline leaves or lowest bracts leaf-like. Moderately appropriate habitat is present on hill slopes in the north end of Section 16.

Botanical surveys conducted through July 2010 determined Temblor buckwheat does not occur within the PSA.

I. Spiny-sepaled button-celery (*Eryngium spinosepalum*) is currently a CNPS List 1B.2 species, with a distribution for the listed taxon presumed to be limited to Tulare County at the time this species was described for the first edition of The Jepson Manual (Hickman 1993). The CNPS Online Inventory now includes Fresno, Madera, Merced, Stanislaus, and Tuolumne Counties for spiny-sepaled button celery. However, recent revisions to the taxonomy of *Eryngium* based on molecular data and inspection of additional specimens may support revisions to the CNPS List status of spiny-sepaled button-celery because the taxon may be less rare than previously presumed. The original Jepson treatment did not resolve status of some specimens, did not satisfactorily account for species occurring well outside Tulare with features similar to *E. spinosepalum*, nor did it address specimens that intergrade between taxa described in the original text. The new treatment for the Jepson Manual Second Edition has resolved many of these problems with the descriptions and distribution of taxa in the genus *Eryngium*. Rob Preston, author of the new treatment, notes that the range of *Eryngium spinosepalum* extends from Kern County north to Fresno County, and into the west side of the valley as far as Contra Costa County and into eastern San Luis Obispo County (Preston and Keil 2009).

Spiny-sepaled button celery is distinguished from other species of button celery by the following features: plants are stout and erect; bracts and sepals are green and inner bracts are not lobed; bract margins are not thickened; outer bracts generally have spines on margins only, or only a few spines abaxially; leaf blades are much longer than petioles and are deeply pinnately or bipinnately lobed; sepals are pinnately lobed or toothed (occasionally entire), lanceolate, and tapered to a long tip-spine; fruit scales are oblong to ovate, and acute. In contrast, coyote thistle (*Eryngium vaseyi*), which occurs commonly in eastern San Luis Obispo County, is slender, decumbent to ascending, and has entire sepals that are aristate (abruptly narrowed at the tip, with a

short spine). The nearest reported occurrences of spiny-sepaled button celery in the CNDDB are from Tulare County (CNDDB 1-6, 10, 13-18, etc.), which is more than 40 miles northeast of the PSA. However, Hoover made collections "south of Simmler, Carrizo Plain", approximately 2 miles from the PSA, of a specimen he described as *Eryngium vaseyi* var. *globosum*, a synonym of *E. spinosepalum* (UC771669; Hoover 6171). Preston notes that this specimen, which had been annotated to *E. vaseyi*, is in fact *E. spinosepalum*. Appropriate habitat is present in vernal pools within the PSA for spiny-sepaled button-celery.

Spiny-sepaled button-celery was identified in Option A only, in one vernal pool in Section 4.

J. Diamond-petaled California Poppy (*Eschscholzia rhombipetala*) is a CNPS List 1B.1 species reported to occur (or once occurred) in Alameda, Contra Costa, Colusa, San Joaquin, Stanislaus, and San Luis Obispo Counties. Distinctive characteristics of the diamond-petaled California poppy include the presence of both basal and cauline leaves (sometimes minute), a barrel-shaped receptacle tapered at the base but with parallel sides distally, a peduncle as long as basal leaves, and yellow petals 3 to 15 millimeters long. It occurs on alkaline clay soils on slopes or flats. Most of the historic localities for this species are extirpated. The diamond-petaled California poppy is presently known from two populations, one in Livermore, California and one in the Carrizo Plain. Each population consists of two extant subpopulations. Three localities are reported from San Luis Obispo County. One locality in the La Panza District has not been verified since 1986, and the taxonomic identity of these plants is in question (CNDDB 1). The second locality is a 1950 collection from Camp Flat along Yeguas Creek, approximately 5.3 miles east of the PSA, however, this population has not been found since 1950 (CNDDB 5). The diamond-petaled California Poppy was rediscovered on the Carrizo Plain by Dr. David Keil in 1992, and was not seen again after 1995 (CNDDB 8) until its rediscovery in 2010 (Keil, pers. comm.).

During botanical surveys of the PSA in March and April 2010 a new population of the diamond-petaled California poppy was detected, taxonomically verified, and mapped. This small, isolated population is outside both project options, occurring just outside the Option A boundary, in the southwest quarter of Section 5.

K. Santa Lucia dwarf rush (*Juncus luciensis*) is a CNPS List 1B.2 species known from vernal pools, ephemeral drainages, wet meadows, and streamsides in coastal counties from San Diego County north to Monterey County, as well as interior areas from Placer County north through Modoc County. It blooms from April through July. This annual rush is reported from two occurrences in San Luis Obispo County, a 2001 collection from a clay vernal pool at Camp Roberts 44 miles northwest of the PSA (CNDDB 9) and a 1958 collection from Creston Road near Paso Robles, approximately 32 miles northeast of the PSA (CNDDB 8). Santa Lucia rush is distinguished from other annual rushes by stems that are leafless and un-branched, basal leaves, flowers or inflorescences terminal, two to three stamens, two inconspicuous, membranous inflorescence bracts that are shorter than the inflorescence and acute to acuminate, six perianth parts with sepals and petals that are

similar in size and shape, anthers less than 8 millimeters long and shorter than the filaments, perianth pale green to pale red in age with dark red midvein tips and perianth parts short and the same color as the capsule, one to two flowers per stem, more than 40 seeds per capsule with seeds striate, and seeds 0.3 to 0.4 millimeters in size. A similar annual rush, *Juncus uncialis*, has only one bractlet sheathing the stem, with truncate tip, and only one flower on every per stem. Appropriate habitat is present within the PSA in vernal pools and ephemeral wetlands.

Santa Lucia dwarf rush occurs in two vernal pools in Option A, Section 4.

L. Ferris' Goldfields (*Lasthenia ferrisiae*) is a CNPS List 4.2 species that typically occurs in vernal pools and alkali flats in the San Joaquin Valley. Ferris's goldfields is distinguished from other species of *Lasthenia* by phyllaries that are fused more than 2/3 their length, absence of pappus, and fruits that are not strongly flattened but have short curved hairs. Locality information for List 4 plants is not yet available through the CNDDB. We visited a known reference site at the corner of Belmont Trail and Clarksburg Road in California Valley on March 15, 2010 and observed Ferris's goldfields in bloom.

Ferris's goldfields were detected occurring as a single plant per observation in four locations scattered within both Options, in Sections 5, 28 and 33.

M. Coulter's Goldfields (*Lasthenia glabrata* ssp. *coulteri*) is a CNPS List 1B.1 species that typically blooms from February through June. Coulter's goldfields is distinguished from other species of *Lasthenia* by phyllaries that are fused more than two-thirds of their length, absence of pappus, and fruits that are not strongly flattened but are papillate. Near the coast, it occurs in salt marsh habitats and alkaline soils on coastal bluffs. In inland areas Coulter's goldfields occurs on alkaline soils in playas, sinks, grasslands, and vernal pools. The closest reported occurrence is from 1950, approximately 7.5 miles west of the PSA. The exact location is unknown and is mapped at the headwaters of Yeguas Creek (CNDDB 60). Moderately suitable habitat is present for Coulter's goldfields in mesic grassland areas of the PSA.

Botanical surveys conducted through July 2010 determined Coulter's goldfields does not occur within the PSA.

N. Pale-yellow Layia (*Layia heterotricha*) is a CNPS List 1B.1 species known from alkaline or clay soils in cismontane woodland, chaparral, and grassland habitats of central California. In San Luis Obispo County this species occurs in the La Panza Range, Elkhorn Hills, Carrizo Plain, the Temblor Range, and the vicinity of Lake Nacimiento. The nearest recorded occurrence is approximately seven miles southwest of the PSA. Found in 1937, this occurrence is mapped between Willow Canyon and Beartrap Creek (CNDDB 10). Moderate to poor quality habitat is present in annual grasslands within the PSA. URS reported a single individual pale-yellow layia plant occurring in Section 28 of the PSA in 2008 (URS 2009). However, a voucher was not collected thus identification of the species cannot be verified by an expert.

Our 2010 botanical surveys of the PSA identified *Layia pentachaeta* ssp. *albida* (identification of specimen verified by Dr. David Keil), which, like *Layia heterotricha*, has a pale creamy or whitish flower color. It is possible the URS survey misidentified *L. pentachaeta* ssp. *albida* as *L. heterotricha*. Pale yellow layia is distinguished from other species of *Layia* as follows: if pappus is absent, the plant is glandular, has paleae in one involucre-like series between disk and ray flowers, has a banana or apple scent, with basal leaves minutely dentate to minutely serrate; or, if pappus is present, pappus is of bristles or bristle-like scales proximally plumose, generally not woolly adaxially, and readily falling as a unit, with plants strongly scented, and basal leaves minutely dentate to minutely serrate. In contrast, *Layia pentachaeta* ssp. *albida* has strongly lobed basal leaves, persistent pappus, and lemon or acrid scent.

Botanical surveys conducted through July 2010 determined pale-yellow layia does not occur within the PSA.

O. Munz's Tidy-tips (*Layia munzii*) is a CNPS List 1B.2 species that occurs in Fresno, Kern, and San Luis Obispo Counties. It typically occurs in chenopod scrub and grassland habitats on white-grey alkaline clay soils. The nearest recorded occurrence is from 1932 and is located approximately six miles northeast of the PSA (CNDDB 8). At this location it occurs on rolling plains in the Yeguas Hills, between Choice Valley and Carrizo Plain. Appropriate soils are present within the PSA for Munz's tidy-tips. We visited a reference site along Belmont Trail in California Valley on April 15, 2008, March 30, 2009, and March 15, 25, and 26, 2010 to observe this species in bloom and to review the key characteristics differentiating this species from common tidy-tips (*Layia platyglossa*). Common tidy tips have a pappus of bristles, while the rare Munz's tidy-tips have a pappus of scales; leaf characteristics also differ between these two species. Common tidy-tips are widespread in grassland and some fallow cropland habitats within the PSA, most notably in Option A. Most of the suitable habitat within the PSA is highly disturbed from farming and grazing, which reduces the quality of the habitats for Munz's tidy-tips.

Despite a history of intensive land use, Munz's tidy-tips occur in both project Options, within Sections 4, 5, 26, 28, 32, 33, 34 and 35.

P. Jared's Peppergrass (*Lepidium jaredii* ssp. *jaredii*) is a CNPS List 1B.2 subspecies with extant populations known only from the vicinity of Soda Lake on the Carrizo Plain in San Luis Obispo County and Devil's Den in Kern County (CNDDB 2010). Jared's peppergrass occurs in grasslands and alkali bottoms, slopes, and washes, where it blooms from March to May. Jared's peppergrass is distinguished by having a style longer than the fruit tip notch, while also having yellow petals, an annual form, and lower pedicels four to five times the length of the fruit. We visited a reference site on April 25, 2010 on Belmont Trail in California Valley where Dr. Keil previously collected this species. We found Jared's peppergrass in bloom at the reference site. This reference site locality represents the closest occurrence, approximately 4.5 miles southeast of the PSA, for Jared's peppergrass. Moderately suitable habitat for Jared's peppergrass is present in limited areas of Option A.

Botanical surveys conducted through July 2010 determined Jared's peppergrass does not occur within the PSA.

Q. Showy Madia (*Madia radiata*) is a CNPS List 1B.1 species known to occur in interior areas of California from Contra Costa County to northeastern Santa Barbara County. Showy madia is distinguished by paleae readily falling, beaked ray fruit with beak adaxially offset and curved, rays 6 to 19 millimeters long, and yellow to brown anthers. It occurs in grassland, woodland, and chenopod scrub habitats, usually on adobe clay soils. The nearest recorded occurrence is located approximately 4.8 miles northeast of the PSA. It was found at this location in 1965 growing in friable clay soils on a broad grassland hillside at the head of Bitterwater Creek in the Pinole Hills (CNDDB 3). We visited a reference site for showy madia on Soda Lake-San Diego Creek Road on March 26 and April 6, 2010, where it was found in full bloom. Moderately suitable habitat is present for showy madia in Option A, Sections 4, 5 and 33.

Botanical surveys conducted through July 2010 determined showy madia does not occur within the PSA.

R. San Joaquin Woollythreads (*Monolopia congdonii*) is a federally listed endangered species (also CNPS List 1B.2) that occurs in interior areas of the southern San Joaquin Valley, extending westward into San Luis Obispo County. San Joaquin woolly threads is distinguished by disciform heads, minute rays, disk fruits that are 2-angled, and disk pappus of 2 to 7 scales. It occurs in grassland and chenopod scrub habitats, typically in sandy or loamy alkaline soils, where it blooms from February to May. The nearest recorded occurrence is a 1954 collection from approximately 14 miles east-northeast of the PSA, a site that is now presumed extirpated (CNDDB 17). This species is also reported from the Carrizo Plain National Monument, beginning approximately 19 miles southeast of the PSA (CNDDB 31, 45, 46, 79). A reference population in the Monument was visited on March 26, 2010 where this species was observed in flower.

Botanical surveys conducted through July 2010 determined the San Joaquin woollythreads does not occur within the PSA.

S. Paso Robles Navarretia (*Navarretia jaredii*) is a CNPS List 4.3 species endemic to Monterey and San Luis Obispo Counties. Paso Robles navarretia is distinguished from other *Navarretia* species by strap-shaped calyx ribs wider at base than membranes, axis of upper leaves and bracts wider above middle, central stem shorter than or equal in length to branches, with axis white-hairy. It grows in a variety of soils in areas with little competition from annual grasses. Its rarity status relates to the limited distribution of the species, but it may be found abundantly within this range in appropriate conditions. The closest known locality for this species is approximately 1.5 miles northwest of the PSA (Althouse and Meade, Inc. unpublished field notes, 2008).

This taxon is currently under revision and is likely genetically identical to *Navarretia mitracarpa*, which is presently considered a synonym of *N. pubescens* (D. Keil pers. comm. 2010; Johnson 2007). Johnson's taxonomic recommendation is to elevate *N.*

mitracarpa to full species, and consider *N. jaredii* a synonym. This recommendation has been accepted in the proposed key for the second edition of the Jepson Manual (in press; preliminary keys available at http://ucjeps.berkeley.edu/jepsonmanual/review/). Revision of the taxonomy for this genus could result in inclusion of the currently recognized *Navarretia jaredii* as part of a much more common taxon that does not meet criteria to remain on CNPS List 4.

Botanical surveys conducted through July 2010 detected *Navarretia jaredii* in scattered localities within Option A and Option B, Sections 4, 5, 28, 32, 33 and 34.

T. Shining Navarretia (*Navarretia nigelliformis* ssp. *radians*) is a CNPS List 1B.2 species known from Fresno, Merced, Monterey, San Benito, and San Luis Obispo Counties. Shining navarretia is distinguished from other *Navarretia* species by strap-shaped calyx ribs wider at base than membranes, axis of upper leaves and bracts not wider above middle, yellow corolla lobes and spotted corolla throat, a white-hairy inflorescence, 5 corolla lobes, a corolla 9 to 11 millimeters in length and grey green herbage. The similar *Navarretia nigelliformis* ssp. *nigelliformis*, adobe navarretia, a CNPS List 4.2 species, has a corolla length 12 to 16 millimeters and typically dark green herbage. This subspecies is not reported from San Luis Obispo County. Shining navarretia is the only species of *Navarretia* in San Luis Obispo County with a yellow flower. Shining navarretia reportedly grows in vernal pools, valley and foothill grassland, and cismontane woodland habitats. Recent reports from the Paso Robles area have not yet been included in the CNDDB, but the species has been observed in eastern Paso Robles in 2006, 2007, and 2008, approximately 32 to 35 miles northwest of the site (Dart collections 237, 279, 281, 317; Althouse collection 544). The closest known locality for this species is a 2003 collection from near Creston, approximately 28 miles west-northwest of the PSA (CNDDB 45).

Botanical surveys conducted through July 2010 detected *Navarretia nigelliformis* ssp. *radians* in a swale near the southwestern corner of Option A, in Section 5. Approximately 100 individuals were observed in a single patch. Shining navarretia was not located in any other localities within the PSA. The occurrence of shining navarretia in the PSA may indicate a range extension for the subspecies by more than 20 miles southeast of previous collections, based on searches of catalogued herbarium specimens and the CNDDB. Specimens collected within the PSA have corollas between 8 and 11 millimeters in length, and grey green to dark grey green herbage. Bract tips of the collected specimens are generally glabrous, which is typical for subspecies *radians.* The similar subspecies *nigelliformis* has longer corolla length and bract tips that are typically glandular puberulent.

Shining navarretia occurs in one small location within Option A, Section 5.

4.1.5 Potential special status animals list

Table 5 lists 44 special status animal species reported from the region. Federal and California State status, global and State rank, and CDFG listing status for each species are given. Typical nesting or breeding period, habitat preference, potential habitat on site, and whether or not the species was observed within the PSA are also provided.

TABLE 5. SPECIAL STATUS ANIMAL LIST. Forty-four special status animals known or reported from the region are listed. Thirty-one special status animals could potentially occur within the PSA based on review of preferred habitat types.

	Common and Scientific Names	Fed/State Status Global/State Rank DFG Rank	Nesting/ Breeding Period	Habitat Preference	Potential Habitat?	Detected Within PSA?
1.	**Tricolored Blackbird*** *Agelaius tricolor*	None/none G2G3/S2 SSC (Nesting)	March 15 through August 15	Requires open water, protected nesting substrate, & foraging area with insect prey near nesting colony.	No. Nesting habitat is not present within the PSA. Wintering habitat is present.	Yes Option A Option B Wintering Only
2.	**California Tiger Salamander** *Ambystoma californiense*	Threatened/ Threatened G2G3/S2S3 SSC	Rainy season	Need underground refuges, ground squirrel burrows & vernal pools or other seasonal water for breeding.	No. Suitable habitat is not present within the PSA. No historic suitable aquatic habitat on the Carrizo Plain. No specimen records from region.	No
3.	**Grasshopper Sparrow*** *Ammodramus savannarum*	None/none G5/S2 SSC (Nesting)	March 15 through August 15	Nests in grassland habitats on mountain slopes, foothills, and valleys. May nest colonially.	Yes. Suitable nesting habitat is present within the PSA.	Yes Option B
4.	**Nelson's Antelope Squirrel** *Ammospermophilus nelsoni*	None/Threatened G2/S2 SSC	Late winter to early spring	Dry, sparsely vegetated loamy soils in Western San Joaquin Valley; 200-1200 ft.	Yes. No current records from vicinity. Habitat within the PSA is highly disturbed.	No
5.	**Silvery Legless Lizard** *Anniella pulchra pulchra*	None/none G3G4T3T4Q/S3 SSC	May - September	Sandy or loose loamy soils under coastal scrub or oak trees. Soil moisture essential.	No. Suitable habitat conditions are not present within the PSA.	No
6.	**Pallid Bat** *Antrozous pallidus*	None/none G5/S3 SSC	Spring - Summer	Rock crevices, caves, tree hollows, mines, old buildings, and bridges.	Yes. Potentially suitable roosting habitat may be present in old buildings within the PSA.	No

	Common and Scientific Names	Fed/State Status Global/State Rank DFG Rank	Nesting/ Breeding Period	Habitat Preference	Potential Habitat?	Detected Within PSA?
7.	**Golden Eagle*** *Aquila chrysaetos*	None/none BGEPA Protected G5/S3 SSC Fully Protected	March 15 through August 15	Nests in large, prominent trees in valley and foothill woodland. Requires adjacent food source.	Yes. Potential nesting on power towers, few perches at abandoned ranch sites, and foraging habitat are present within the PSA.	Yes Option A Option B No nests onsite
8.	**Short-eared Owl*** *Asio flammeus*	None/none G5/S3 SSC (Nesting)	March 15 through August 15	Fresh and salt swamps, lowlands. Nests on dry ground in tules/tall grasses.	Yes. Suitable wintering habitat is present within PSA; poor nesting habitat due to lack of tall grass.	No
9.	**Long-eared Owl** *Asio otus*	None/none G5/S3 SSC (Nesting	March 15 through August 15	Roost and nest in woodlands; Require adjacent open land productive of mice and the presence of old nest of crows, hawks, or magpies for breeding.	Yes. Suitable nesting, roosting, and foraging habitat areas are present within the PSA.	No
10.	**Burrowing Owl** *Athene cunicularia*	None/none G4/S2 SSC (Burrow sites and some wintering sites)	February 1 through August 31	Burrows in squirrel holes in open habitats with low vegetation.	Yes. Suitable wintering and nesting habitat is present within the PSA.	Yes Option A Option B
11.	**Longhorn Fairy Shrimp** *Branchinecta longiantenna*	Endangered/ None G1/S1 Special Animal	Rainy Season	Small clear water depressions in sandstone, and clear to turbid clay/grass bottomed pools in shallow swales.	Yes. Suitable aquatic habitat is present in ephemeral pools within the PSA.	Yes Option A Option B
12.	**Vernal Pool Fairy Shrimp** *Branchinecta lynchi*	Threatened/none G3/S2S3 Special Animal	Rainy Season	Clear water sandstone depression pools, grassed swale, earth slump, or basalt flow depression pools.	Yes. Moderate to poor quality aquatic habitat is present in ephemeral pools in grassy swales within the PSA.	Yes Option A

	Common and Scientific Names	Fed/State Status Global/State Rank DFG Rank	Nesting/ Breeding Period	Habitat Preference	Potential Habitat?	Detected Within PSA?
13.	**Ferruginous Hawk*** *Buteo regalis*	None/none G4/S3S4 Special Animal (Wintering)	October - April (Winterin g)	Winters locally in open grassland or savannah habitats. More common in interior SLO County than coast.	Yes. Suitable wintering habitat is present within the PSA. Does not nest locally.	Yes Option A Option B
14.	**Swainson's Hawk*** *Buteo swainsoni*	None/Threatened G5/S2 Special Animal (Nesting)	March 15 through August 15	Breeds in grasslands with scattered trees, juniper-sage flats, riparian areas, savannahs, agricultural fields. Does not nest in SLO County; occurs as seasonal migrant or transient in Carrizo Plain.	No. Suitable nesting habitat is not present within the PSA. Uncommon migrant in Carrizo Plain.	Yes Option A Migrant Only
15.	**Costa's Hummingbird*** *Calypte costae*	None/none G5/S3? Special Animal (Nesting)	March 15 through August 15	Nests in desert riparian and arid scrub foothill habitats. Nests in interior areas of SLO County and elsewhere in central and southern CA.	No. Suitable nesting habitat is not present within the PSA.	Yes Option A No nests onsite
16.	**Mountain Plover*** *Charadrius montanus*	None/none G2/S2? SSC (Wintering)	November - February (Wintering)	Short grasslands, plowed fields, etc. Winters locally, does not nest in SLO County.	Yes. Winters in the Carrizo Plain National Monument, and could occur within the PSA.	Yes Option A
17.	**Lark Sparrow*** *Chondestes grammacus*	None/none G5/SNR Special Animal (Nesting)	March 15 through August 15	Nests on the ground near edges of grasslands and tree or shrublands.	Yes. Suitable nesting habitat is present within the PSA.	Yes Option A
18.	**Northern Harrier*** *Circus cyaneus*	None/none G5/S3 SSC (Nesting)	March 15 through August 15	Nests on ground in shrubby areas, usually near water. Forages in open areas.	No. Grasslands within the PSA do not have grass tall enough to attract nesting harriers.	Yes Option A Option B Wintering only

	Common and Scientific Names	Fed/State Status Global/State Rank DFG Rank	Nesting/ Breeding Period	Habitat Preference	Potential Habitat?	Detected Within PSA?
19.	**Giant Kangaroo Rat** *Dipodomys ingens*	Endangered/ Endangered G2/S2 Special Animal	Spring - Summer	Sandy loamy soil on level and gently sloping ground with annual grasses, forbs, and scattered shrubs. sw SnJV	Yes. Potentially suitable habitat may be present within the PSA.	No Refer to Sections 4.1.6 J & 7.3.3 C
20.	**Short-nosed Kangaroo Rat*** *Dipodomys nitratoides brevinasus*	None/none G3T1T2/S1S2 SSC	Spring - Summer	Grasslands with scattered shrubs, desert shrub association on powdery soils.	Yes. Potentially suitable habitat may be present within the PSA.	No
21.	**Tipton Kangaroo Rat** *Dipodomys nitratoides nitratoides*	Endangered/ Endangered G3T1/S1 Special Animal	Spring - Summer	Arid-land vegetative communities with level or nearly level terrain.	No. Does not occur in Carrizo Plain per B. Stafford, CDFG and ESRP species profile.	No
22.	**White-tailed Kite*** *Elanus leucurus*	None/none G5/S3 Fully Protected	March 15 through August 15	Nests in dense tree canopy near open foraging areas	Yes. Potentially suitable nesting habitat may be present in landscape trees in Sections 16, 18, 28, and 33.	No
23.	**Kern Primrose Sphinx Moth*** *Euproserpinus euterpe*	Threatened/None G1/S1 Special Animal	Spring	Host plant is evening primrose (*Camissonia contorta epilobioides*) and potentially other *Camissonia* species.	Yes. Potential habitat is present in sandy washes in Section 4 of the PSA.	No
24.	**Merlin*** *Falco columbarius*	None/none G5/S3 Special Animal (Wintering)	September - April (Wintering)	Winters on seacoasts, estuaries, woodlands, savannas, grassland edges, deserts. Winters locally, does not nest in SLO County.	Yes. Suitable wintering habitat is present within the PSA.	Yes Option A Option B

	Common and Scientific Names	Fed/State Status Global/State Rank DFG Rank	Nesting/ Breeding Period	Habitat Preference	Potential Habitat?	Detected Within PSA?
25.	**Prairie Falcon** *Falco mexicanus*	None/none G5/S3 Special Animal (Nesting)	March 15 through August 15	Inhabits dry, open terrain. Nests on cliffs near open areas for hunting.	No. Suitable nesting habitat is not present within the PSA. Prairie falcons do forage within the PSA.	Yes Option A Option B
26.	**Blunt-nosed Leopard Lizard** *Gambelia sila*	Endangered/ Endangered G1/S1 Fully Protected	Spring	Semiarid grasslands, alkali flats, and washes; SnJV and adjacent lands. 30-730 m.	Yes. However, most areas of the PSA are too disturbed. Grasslands are generally too densely vegetated, with no shrub cover. Suitable burrows are present.	No 2010 adult surveys complete. Juvenile survey results expected in September
27.	**Lesser Sandhill Crane** *Grus canadensis canadensis*	None/none G5T4/SNR SSC (Wintering)	N/A	Feeds in short-grass plains and grain fields and roosts in groups in moist fields or shallow water	Yes. Suitable foraging habitat may be present on farm fields in the PSA.	No
28.	**Greater Sandhill Crane** *Grus canadensis tabida*	None/Threatened G5T4/S2 Special Animal	N/A	Feeds in short-grass plains and grain fields and roosts in groups in moist fields or shallow water	Yes. Suitable foraging habitat may be present on farm fields in the PSA.	No
29.	**California Condor** *Gymnogyps californianus*	Endangered/ Endangered G1/S1 Special Animal	March 15 through August 15	Wide-ranging over Coast Ranges from Ventura to Big Sur, California.	Yes. Condors likely pass over the area on occasion, and could feed locally on carrion when available.	No
30.	**Bald Eagle*** *Haliaeetus leucocephalus*	Delisted/ Endangered BGEPA Protected G4/S2 Special Animal (Nesting and Wintering)	March 15 through August 15	Nests within 1 mile of water in tall live tree with open branches.	Yes. Migrant or transient bald eagles do occasionally forage on Carrizo Plain. Suitable nesting habitat is not present within the PSA or near vicinity.	Yes Option A Option B Wintering only
31.	**Loggerhead Shrike*** *Lanius ludovicianus*	None/none G4/S4 SSC (Nesting)	March 15 through August 15	Open areas with appropriate perches, near shrubby vegetation for nesting.	Yes. Nesting and foraging habitat is present within the PSA.	Yes Option A Option B

	Common and Scientific Names	Fed/State Status Global/State Rank DFG Rank	Nesting/ Breeding Period	Habitat Preference	Potential Habitat?	Detected Within PSA?
32.	**San Joaquin Whipsnake** *Masticophis flagellum ruddocki*	None/none G5T2T3/S2? SSC	May	Open, dry, treeless areas, including grasslands and saltbush scrub; takes refuge in burrows and under shaded vegetation	Yes. Moderately Suitable habitat is present within the PSA.	Yes Option A
33.	**Long-billed Curlew*** *Numenius americanus*	None/none G5/S2 Special Animal (Nesting)	March 15 through August 15	Breeds in upland short grass prairies in NE California. Favors gravelly habitats on rolling terrain.	No. This species does not breed locally, but does winter in Carrizo Plain and forages within the PSA.	Yes Option A Option B Wintering only
34.	**Tulare Grasshopper Mouse** *Onychomys torridus tularensis*	None/none G5T1T2/S1S2 SSC	May through July	Hot arid valleys and scrub deserts in southern San Joaquin Valley. Eats arthropods.	Yes. Suitable habitat is present within the PSA.	Yes Option A Option B
35.	**San Joaquin Pocket Mouse** *Perognathus inornatus inornatus*	None/none G4T2T3/S2S3 Special Animal	n/a	Grasslands and blue oak savannahs with friable soil and occasional shrubs. Also chaparral.	No. Reports of this subspecies from Carrizo Plain are incorrect. Museum specimens used as the basis of CNDDB reports are annotated to *P. inornatus neglectus.*	No
36.	**McKittrick Pocket Mouse*** *Perognathus inornatus neglectus*	None/none G4T2T3 S2S3 Special Animal	n/a	Arid annual grasslands and desert scrub communities. Needs friable soils for digging.	Yes. *Perognathus inornatus* was identified within the PSA, and is presumed to be ssp. *neglectus* based on range.	Yes Option A Option B
37.	**Blainville's (Coast) Horned Lizard** *Phrynosoma blainvillii*	None/none G4G5/S3S4 SSC	May - September	Frequents a wide variety of habitats, most common in lowlands along sandy washes with scattered low bushes.	Yes. Suitable habitat is present in some areas of the PSA.	No

	Common and Scientific Names	Fed/State Status Global/State Rank DFG Rank	Nesting/ Breeding Period	Habitat Preference	Potential Habitat?	Detected Within PSA?
38.	**Oregon Vesper Sparrow*** *Pooecetes gramineus affinis*	None/none G5T?/S? SSC (nonbreeding/ wintering)	March 15 through August 15	Winters in grassland habitats and may frequent agricultural fields.	Yes. Suitable wintering habitat is present within the PSA; does not breed locally.	Yes Option A Option B
39.	**California Red-legged Frog** *Rana draytonii*	Threatened/none G4T2T3/S2S3 SSC	January - March	Lowlands and foothills in or near sources of deep water with dense, shrubby or emergent riparian vegetation.	No. Suitable habitat is not present within the PSA.	No
40.	**Western Spadefoot Toad** *Spea hammondii*	None/none G3?/S3? SSC	January – August	Vernal pools in grassland and woodland habitats	Yes. Suitable breeding habitat may be present in ephemeral pools within the PSA.	Yes Option A Option B
41.	**American Badger** *Taxidea taxus*	None/none G5/S4 SSC	February – May	Needs friable soils in open ground with abundant food source such as California ground squirrels.	Yes. Suitable foraging and denning habitat is present within the PSA.	Yes Option A Option B
42.	**Two-striped Garter Snake** *Thamnophis hammondii*	None/none G2G3/S2 SSC	Spring	Coastal California from Salinas to Baja, sea level to 7000', aquatic, in or near permanent water, streams with rocky beds and riparian growth	No. Suitable habitat not present within the PSA.	No
43.	**San Joaquin Kit Fox** *Vulpes macrotis mutica*	Endangered/ Threatened G4T2T3/S2S3 Special Animal	December – July	Annual grasslands or grassy open stages with scattered shrubby vegetation.	Yes. Suitable foraging and denning habitat is present within the PSA.	Yes Option A Option B
44.	**Yellow-headed Blackbird*** *Xanthocephalus xanthocephalus*	None/none G5/S3S4 SSC (Nesting)	March 15 through August 15	Nests in freshwater emergent wetlands with dense vegetation and deep water.	No. This species does not nest locally, but may be present as a rare transient during migration.	Yes Option B Winter transient

Habitat characteristics are from the Jepson Manual and the CDNNB.
*not listed in the CNDDB or CNPS for the search area, but possibly for the location.

4.1.6 Special status animals discussion

Thirty special status animal species could potentially occur within the PSA. We discuss each species and describe habitat, range restrictions, known occurrences, and survey results. Locations of special status animals occurring within the PSA are indicated on maps provided in Section 13.0. Wildlife survey methods and results are discussed in Section 7.0.

A. Grasshopper sparrow *(Ammodramus savannarum*) is a California Species of Special Concern that breeds in grassland habitats in San Luis Obispo County, and elsewhere in California. It has no state or federal status. Grasshopper sparrows have been extirpated from much of their former range in Southern California but continue to breed locally in ungrazed grasslands. Singing male grasshopper sparrows were detected in Section 15 east of the PSA boundary in 2009. A single singing male was detected in 2010 on hills in the north end of Section 16. Grasshopper sparrows likely nest in low numbers in ungrazed annual grasslands within the PSA.

B. Nelson's Antelope Squirrel *(Ammospermophilus nelsoni*), also known as the San Joaquin antelope squirrel, is listed as a threatened species in the state of California. It inhabits the arid grassland, shrubland, and alkali sink habitats of the San Joaquin Valley and adjacent foothills, including some portions of the Carrizo Plain. Antelope squirrels are active year-round and live in burrows that they construct themselves or that are modifications of kangaroo rat burrows. They are most active above ground between April 1 and September 30. Their diet consists mainly of insects, but also includes green vegetation, fungi, and seeds. The nearest recorded occurrence is from 1969, located approximately four miles southeast of the PSA in the Simmler USGS quadrangle along State Highway 58 (CNDDB 262). In May of 2008 Althouse and Meade, Inc. biologists observed Nelson's antelope squirrels at reference sites approximately 30 miles southeast of the PSA along Elkhorn Road in the foothills of the Temblor Range.

Protocol surveys for the Nelson's antelope squirrel, which are complete as of July 2010, were conducted concurrently with protocol surveys for the blunt-nosed leopard lizard (BNLL). In consultation with Dave Hacker of the California Department of Fish and Game (CDFG) during a meeting at the San Luis Obispo CDFG office on April 17, 2008, it was agreed upon that protocol surveys for these two species could be conducted simultaneously.

Field surveys for the Nelson's antelope squirrel covered 1,584 acres of potentially suitable habitat within the PSA in 2008. An additional 229 acres of habitat was surveyed in 2009. Nelson's antelope squirrels were not detected in 2008 or 2009. In 2010, approximately 2,010 acres of annual grassland habitat was surveyed. The 12 full passes conducted for the 2010 BNLL adult period confirmed Nelson's antelope squirrels do not occur within the 2010 survey area.

C. Pallid bat (*Antrozous pallidus*) is a California Special Concern species. This is a large, long-eared bat occurring throughout the state from deserts to moist forests. *Antrozous pallidus* is primarily a crevice roosting species and selects roosts where

they can retreat from view. They frequently occur in oak woodlands where they roost in tree cavities. These roosts are generally day or night roosts for one or a few bats. Attics may be used as roosts and during hot days they may emerge from crevices and roost on open rafters. Communal wintering or maternity colonies are more common in rock crevices and caves. Pallid bats are known to roost and forage in the Carrizo Plain region (CNDDB 26, 281, 287, 288, 290). Numerous specimens have been collected in the Carrizo Plain region, and roosts have been identified in rock outcroppings and abandoned buildings. Potentially suitable roost areas are located in buildings within Sections 16, 18, 22, 27, 28, and 33. Visual surveys of structures in Sections 27, 28, and 33 found no evidence of roosting bats. Structures in Sections 16, 18, and 22 are not abandoned and were not surveyed. We expect pallid bats may forage in grassland and cropland habitats within the PSA seasonally, but do not roost on site.

D. Golden Eagle (*Aquila chrysaetos*) is a California Species of Special Concern. It is not listed under the California Endangered Species Act (CESA) or the Federal Endangered Species Act (FESA). Golden eagles are designated a Fully Protected species by the California Department of Fish and Game (CDFG). The primary federal legislation governing golden eagles is the Federal Bald and Golden Eagle Protection Act.

Golden eagles occur throughout the western United States, Alaska, and large portions of Canada and Mexico. They occupy nearly all habitats in the western U.S., including deserts, grasslands, woodlands, and all but the densest forests where hunting is impractical (Johnsgard 1990). Highly adaptable, golden eagles readily occupy habitats where basic needs are met. These basic needs include suitable nesting sites (typically large trees or cliffs), dependable food supplies, and large open areas for foraging.

California supports both wintering and nesting golden eagle populations. In winter, regional populations increase with the influx of northern breeders that migrate south. Occupied wintering habitats often contain a mix of adult and sub-adult birds. Golden eagles do not form large wintering congregations in California, as is reported for bald eagles in Alaska and elsewhere, however they can be abundant in some regions. As the nesting season commences, territorial behaviors limit the number of golden eagles in a particular area. Territory size of a breeding pair is highly variable, depending upon the resources available. Average breeding territories reported in Southern California are approximately 36 square miles. In Northern California, territories are approximately 48 square miles (Johnsgard 1990). One of the highest densities reported for the species is from the vicinity of the Altamont Pass Wind Energy Resource Area east of the San Francisco Bay near Livermore, where at least 44 pairs were documented in an area of approximately 317 square miles (Hunt 1998). The eagle density was thus one pair every 7.3 square miles. In less productive environments, or where potential nest sites are scarce, breeding territories of up to 60 square miles are reported (Johnsgard 1990).

The Carrizo Plain region, extending from the southern tip of the Carrizo Plain National Monument to the extreme northern end of the plain north of the PSA, and

including portions of both the Temblor Range and the Caliente Range, is approximately 500,000 acres (781 square miles) in size. Based on estimated average territory sizes for Southern and Northern California, this area could support between 16 and 22 breeding pairs if sufficient nesting sites and prey availability are present.

The approximately 10,000-acre (15.6 square mile) PSA contains limited potential nesting habitat for golden eagles. Trees associated with abandoned ranch compounds are very poorly suited for golden eagle nest construction. The PG&E towers that pass through the PSA could be utilized for nesting purposes by golden eagles; red-tailed hawks and ravens presently nest on the towers within the PSA. There are no cliff faces or other suitable nesting areas on site. Golden eagles did not nest within the PSA in 2008, 2009, or 2010. Grassland and cropland habitats within the PSA are suitable foraging grounds for golden eagles, especially in winter (refer to Section 7.0 for details of golden eagle nest survey methods and results).

E. Short-eared Owl (*Asio flammeus*) is one of the most globally widespread of all owls (Peeters 2007); however it is declining in certain areas of its range and is designated as a Species of Special Concern in California. The short-eared owl can be active by day and night, and usually roosts and nests on the ground, concealed by tall grass or other vegetation. It is a year-round resident in select areas of California, where its breeding range fluctuates with prey availability. In drought years, when prey availability is reduced, the breeding range contracts (Shuford 2008). In winter, the California population of short-eared owls inflates dramatically with the influx of migrants. In the winter it often roosts communally and may sometimes roost in trees. Short-eared owl prey commonly includes small mammals such as vole, shrew, pocket gopher, and pocket mice and occasionally small birds. Short-eared owls are reported as uncommon residents in the Carrizo Plain region (Cooper 2004). Short-eared owls were not detected within the PSA, but could forage on-site. Habitats within the PSA are unlikely to attract short-eared owls for nesting.

F. Long-eared Owl (*Asio otus*) is a California Species of Special Concern that prefers riparian habitats as well as belts of live oak paralleling stream courses. The long-eared owl requires adjacent open land for foraging and the presence of old nests of crows, hawks, or magpies for breeding. Old nests are present in large trees planted within ranch compounds throughout the PSA and may provide limited potential nesting habitat. The nearest reported occurrence is located approximately 13.8 miles southeast of the PSA. Two adults and three fledglings were observed nesting in a blue oak near the Chimineas Ranch headquarters. Habitat consisted of oak woodland, annual grassland, and mixed chaparral (CNDDB 53). Long-eared owls were not detected within the PSA. We expect the long-eared owl could roost on rare occasion in trees within the PSA, but do not regularly roost on site. Long-eared owls did not nest within the PSA in 2008, 2009, or 2010.

G. Burrowing Owl (*Athene cunicularia*) is a California Species of Special Concern that prefers open, dry annual or perennial grasslands, deserts and scrublands characterized by low-growing vegetation. Burrowing owls usually nest in abandoned burrows of ground squirrels, badgers, or other small mammals, although they may dig their own

burrow in soft soil. Primarily nocturnal, the burrowing owl hunts insects, small mammals, and birds from a perch or in low flights. During daylight hours they are often seen perched conspicuously at the entrance to their burrow. Rosenberg (2007) conducted a study in grassland habitats of the Carrizo Plain National Monument and found burrowing owl nests were present at an average density of one nest per 1.4 square kilometers (346 acres) of suitable nesting habitat. Nesting territories are generically defined as a 100-meter radius around an occupied nest in which the owls regularly utilize satellite burrows (Rosenberg 2007). Burrowing owls show high site fidelity from year to year, and therefore it is recommended that a site be considered occupied if a burrowing owl has been observed occupying a burrow within the last three years (California Burrowing Owl Consortium 1993).

Approximately 3,463 acres of annual grassland habitat is present within the PSA, with varying suitability for burrowing owls. If all grassland areas of the PSA are suitable for nesting, the PSA could potentially support 10.6 breeding pairs at a nest density of one nest per 346 acres. We detected burrowing owls at wintering and nesting den sites in grasslands within Option A and Option B. Nesting and wintering sites could vary from year to year (refer to Sections 7.2.5 and 7.3.5 for details of burrowing owl survey methods and results).

H. Vernal Pool Fairy Shrimp (*Branchinecta lynchi*) is a federally listed threatened species, and **Longhorn Fairy Shrimp** (*Branchinecta longiantenna*) is a federally listed endangered species; neither is listed under the California Endangered Species Act. These rare fairy shrimp occur in vernal pools and other ephemeral pool types in the Carrizo Plain region. Appropriate seasonal aquatic habitat is present for fairy shrimp in various ephemeral pool types throughout the PSA, and in puddles in existing agricultural roads. Vernal pool fairy shrimp were detected in vernal pools in Section 4, and longhorn fairy shrimp were detected in Section 20 during protocol wet season surveys in the winter of 2010 by Advantage Environmental Consultants, LLC (refer to Section 7.3.4 for details of protocol surveys).

I. Ferruginous Hawk (*Buteo regalis*) is a California Species of Special Concern that winters in grassland habitats in California. It does not breed in San Luis Obispo County, but is considered a sensitive wintering raptor. Ferruginous hawks choose open perches, both man-made and natural, while they are hunting. They generally feed on small mammals, snakes, insect swarms, and occasionally birds taken on the ground. Ferruginous hawks were observed roosting throughout the PSA in grassland and bare cropland habitats.

J. Mountain Plover (*Charadrius montanus*) is a California Species of Special Concern that winters in California and nests in short-grass prairie habitats from Wyoming to New Mexico. In California, the CDFG listing status is for wintering birds. The U.S. Fish and Wildlife Service (USFWS) published a proposed rule to list the mountain plover as threatened in 1999 and again in 2002. In 2003, the listing was withdrawn because new information suggested the threats to mountain plovers were not as serious as previously thought.

The wintering population in California accounts for approximately 50 percent of the total mountain plover population (Andres 2009). Mountain plovers prefer short grass habitats such as heavily grazed pastures, burned fields, fallow fields, and tilled fields (without furrows). Historic wintering colonies in the Central Valley of California were often associated with kangaroo rat precincts and California ground squirrel den complexes (Andres 2009). Wintering (non-breeding) mountain plovers are highly nomadic. Mountain plovers occur regularly in the Carrizo Plain National Monument in low to moderate numbers (a few hundred) primarily from November through March. In winter they are regularly found in the vicinity of Panorama Road, over 20 miles south of the PSA. Mountain plovers were observed foraging on three occasions within the PSA during the 2010 winter season, with a maximum count of 17 individuals.

K. Lark Sparrow (*Chondestes grammacus*) is a Special Animal that is a common inhabitant of inland grassland habitats in San Luis Obispo County. Lark sparrows are usually found in open areas near trees or shrubs. They occur infrequently in the PSA, preferring areas with more shrub development. We did not locate any nests, but expect lark sparrows were nesting in Section 8 based on observations of adult breeding behaviors in April and May of 2008 and 2009. In 2010, fledglings were observed along the west PSA boundary fence in Sections 5 and 32, Option A, where they presumably nested in the adjacent olive grove.

L. Giant Kangaroo Rat (*Dipodomys ingens*) is listed as an endangered species under the Federal and California Endangered Species Acts. It inhabits the arid southwestern edge of central California's San Joaquin Valley and adjacent valleys and plateaus of the Inner Coastal Ranges, including the Carrizo Plain. Giant kangaroo rats are described by the Endangered Species Recovery Program (ESRP) as inveterate diggers that frequently remodel their burrows, closing old entrances and creating new ones. These burrows also provide shelter for the federally listed endangered blunt-nosed leopard lizard, state-listed threatened Nelson's antelope squirrel, and other animals. The nearest reported occurrence in the CNDDB is located approximately three miles east of the PSA. The occurrence was recorded in 1979 and is located at the north end of the Carrizo Plain, approximately 3.5 air miles north-northeast of Simmler (CNDDB 110).

Surveys conducted within the PSA for the giant kangaroo rat consisted of visual burrow searches, small mammal trapping studies, and a scat and burrow measurement study (refer to Section 7.3.3 for detailed survey results). The federally listed endangered giant kangaroo rat does not occur within the PSA.

M. Short-nosed Kangaroo Rat (*Dipodomys nitratoides brevinasu*) is a California Species of Special Concern that occurs in grasslands with scattered shrubs and desert-shrub associations on friable soils. It occurs along the western edge of the San Joaquin Valley, including in highly alkaline soils near Soda Lake. The only CNDDB record listed for San Luis Obispo County is occurrence 70, from a capture and release study conducted from 1987 to 1991 in an area between the Temblor Mountains and the Carrizo Plain (CNDDB 2010). Habitats within the PSA are poorly suited to short-

nosed kangaroo rat due to the lack of shrub development and the frequent disturbance by farming operations. Small mammal trapping studies were conducted in 2008, 2009 and 2010 (refer to Section 7.3.3 for detailed survey results). The short-nosed kangaroo rat does not occur within the PSA.

N. White-tailed kite (*Elanus leucurus*) is a Fully Protected species that nests primarily in solitary evergreen trees near meadows, marshes, or grasslands. They are often seen perched along roadsides on telephone wires or dead snags. They prey primarily on small rodents. No records of white-tailed kite exist in the vicinity of the PSA; however, it is listed on the Bureau of Land Management's website for Birds of the Carrizo Plain National Monument (BLM 2010). Evergreen trees near scattered homesteads within the PSA could provide low quality nesting habitat. White-tailed kites were not observed during wildlife surveys conducted throughout the PSA.

O. Kern Primrose Sphinx Moth (*Euproserpinus euterpe*) is a federally listed threatened species known from Ventura, Santa Barbara, Kern, and San Luis Obispo Counties. This sphinx moth is a medium-sized, day-flying moth that has been found in cropland, hedge rows, grassland, herbaceous areas, shrubland, chaparral, and open weedy areas in desert scrub. The sphinx moth requires the presence of the larval host plant, evening primrose (*Camissonia* ssp.). Grassland and sandy washes provide potentially suitable habitat for the sphinx moth. Potential low quality habitat is present in sandy washes that contain patches of *Camissonia strigulosa* in Section 4 of the PSA (Arnold 2010). A single-day survey by Richard Arnold of Entomological Consulting Services Ltd. did not detect the Kern primrose sphinx moth (refer to Section 7.3.2 for detailed survey results).

P. Merlin (*Falco columbarius*) is a Special Animal that winters in various habitats in San Luis Obispo County. Merlins do not breed locally, but are considered a sensitive wintering raptor. Appropriate wintering habitat is present within the PSA. The wide-open spaces and abundance of wintering horned larks, savannah sparrows, and other prey provide very good foraging habitat. Merlins were observed hunting in several areas within the PSA during 2010 winter bird surveys.

Q. Blunt-nosed Leopard Lizard (*Gambelia sila*) is a federal and state-listed endangered species. It is a Fully Protected species by CDFG, meaning no take may be authorized. Blunt-nosed leopard lizards live in the San Joaquin Valley and Carrizo Plain in expansive, arid areas with scattered vegetation. They inhabit non-native grassland and alkali sink scrub communities of the valley floor marked by poorly drained, alkaline, and saline soils. Insects comprise the major portion of their diet, although other lizards also are eaten. They are opportunistic when foraging for animals, feeding on whatever prey is of appropriate size for capture and consumption. BNLL use small mammal burrows such as those of ground squirrels and kangaroo rats for permanent shelter and dormancy. Seasonal activity above ground depends on weather conditions, especially temperature. The optimum activity period occurs when air temperatures are between 77 and 95 °F and soil temperatures are between 86 and 122 °F. The breeding season begins in April and lasts into or through June. Eggs are laid in June and July, with young emerging in August or September. The nearest

recorded occurrence, from July of 1958, is located approximately 13.5 miles south of the PSA, 8.75 miles northwest of Painted Rock (CNDDB 134).

A protocol level survey for BNLL was conducted in 2008 on 1,584 acres of the land. The survey area included portions of the PSA, and some surrounding lands that are no longer part of the project proposal. A second protocol level survey for BNLL was conducted in 2009 in suitable grassland habitat within parcels added to the PSA in early 2009. For each survey, all areas of potentially suitable habitat were surveyed 17 times; 12 surveys for adult BNLL were conducted in the spring and five surveys for juveniles were conducted in the fall. The BNLL was not detected during the 2008 and 2009 protocol surveys. A third protocol survey is presently being conducted on 2,010 acres within the PSA. As of July 15 BNLL had not been detected during 12 full-coverage passes for the adult survey period. A 2010 protocol survey report will be provided as an addendum to this report in September 2010 after completion of five full-coverage passes for the juvenile survey period.

R. Lesser Sandhill Crane (*Grus canadensis canadensis*) **and Greater Sandhill Crane** (*Grus canadensis tabida*) are uncommon winter visitors to the Carrizo Plain. The lesser sandhill crane is a California Species of Special Concern and the greater sandhill crane is a State-listed threatened species. The most common subspecies inhabiting the Carrizo Plain National Monument are lesser sandhill cranes with approximately 5 to 10 percent of the population estimated to be greater sandhill crane. Sandhill cranes are closely associated with standing water in Soda Lake and forage in nearby farm fields. Preferred night roosting sites are associated with shallow water, an open shoreline, level terrain, and isolated locations away from human disturbance. Cranes have been observed flying between Soda Lake habitats and the San Joaquin Valley during the winter season. Historically, sandhill cranes were present annually at the Carrizo Plain from November to February, but numbers have dropped dramatically. No cranes have been recorded during the last four Carrizo Plain Christmas Bird Counts dating back to December 31, 2005 (National Audubon Society 2009). Sandhill cranes were not observed within the PSA, but could potentially forage in low numbers within the PSA during years when Soda Lake has filled.

S. California Condor (*Gymnogyps californianus*) is a federal and state-listed endangered species. It is a Fully Protected species by CDFG, meaning no take may be authorized. Condors utilize vast expanses of open savannah, grasslands, and foothill chaparral in mountain ranges of moderate altitude. Deep canyons containing clefts in rocky walls provide nesting sites. The California condor may forage up to 100 miles from its nightly roosting site.

From the late 1970's until 1987, wild condors foraged in foothills bordering the San Joaquin Valley, including San Luis Obispo County. The Elkhorn Hills-Cuyama Valley-Carrizo Plain complex and the southern San Joaquin Valley were the primary feeding areas for wild condors after 1982 (USFWS 1996b).

The United States Fish and Wildlife Service designated nine critical habitat areas for the California Condor, including one area in San Luis Obispo County. The area in San Luis Obispo County is split into the East and West Units of the High Mountain-

Beartrap Condor Area. The PSA is situated approximately 5.5 miles east of the closer 8,320 acre East Unit. The Carrizo Plain is not part of a critical habitat area for the California Condor, although its proximity and potential food sources make it suitable foraging habitat.

There are no adequate roosting or nesting areas within the PSA for California Condors. However, large open areas for foraging are present, and cattle and wild ungulate carcasses in the region may provide feeding opportunities that could attract condors to the Carrizo Plain periodically. The California condor could potentially feed within the PSA if a large mammal carcass was present. Condors were not observed in the vicinity of the PSA during our 2008, 2009 and 2010 field surveys.

T. Bald Eagle (*Haliaeetus leucocephalus)* is delisted from FESA, and is listed as endangered under CESA. The bald eagle is a Fully Protected species, with additional protections provided under the Federal Bald and Golden Eagle Protection Act. Bald eagles are wide ranging migrants that typically nest within one mile of water. In San Luis Obispo County, there is a small nesting population of reintroduced bald eagles at Lake Nacimiento, and recent records of a nest at Santa Margarita Lake and possibly Lopez Lake. Adults and young are wide ranging and often migratory. Preferred prey is fish, although they will occasionally hunt water fowl, small mammals, and will scavenge carrion. Migrating or transient bald eagles will hunt ground squirrels and other prey, or feed on carrion, on the Carrizo Plain during the non-breeding season. A bald eagle was observed in the vicinity of the PSA in February 2008 (DFG 2008c). We observed an adult bald eagle along Bitterwater Road at the west edge of Section 18 of the PSA in March 2009. A sub-adult bald eagle was observed in Section 32 of the PSA in February 2010. These and other observations in the region suggest bald eagles occasionally forage on the Carrizo Plain during the non-breeding season; however, no breeding habitat is present.

U. San Joaquin Whipsnake (*Masticophis flagellum ruddocki*) is a California Species of Special Concern known to occur in the Sacramento Valley, San Joaquin Valley and in the South Coast Ranges. The San Joaquin whipsnake prefers open, dry, treeless areas, including grassland and saltbush scrub and typically takes refuge in rodent burrows, under shaded vegetation, and under surface objects. Suitable habitat is present within the PSA for the San Joaquin whipsnake. The closest occurrence reported in the CNDDB is a road-killed specimen collected on Seven Mile Road near Highway 58, approximately 10 miles southeast of the PSA (CNDDB 63). The San Joaquin whipsnake was not observed during our wildlife surveys or during the protocol survey for the blunt-nosed leopard lizard within the PSA in 2008, 2009 and through July of 2010. However, a piece of shedded snake skin found in the northeast corner of Section 28 was positively identified by Paul Collins as a shed from a San Joaquin whipsnake. The San Joaquin whipsnake is a highly mobile species that is likely present within the PSA in low numbers.

V. Tulare Grasshopper Mouse (*Onychomys torridus tularensis*) is a California Species of Special Concern that occurs along the western margin of the Tulare Basin, including western Kern County, Carrizo Plain, along the Cuyama Valley side of the Caliente Mountains in San Luis Obispo County, and the Ciervo-Panoche region in Fresno and San Benito Counties. Tulare grasshopper mice typically inhabit arid shrubland communities in hot, dry grassland and shrubland communities. They eat mostly arthropods, but may take lizards, frogs, and other small rodents. The closest reported occurrence is approximately seven miles west of the PSA along Placer Creek (CNDDB 31) where one specimen was collected in 1930. Cropland areas of the PSA are poorly suited to sustaining a population of the Tulare grasshopper mouse due to the regular disturbance from the farming operation and lack of shrub cover. Grassland areas of the PSA are moderately suitable. The Tulare grasshopper mouse was detected in one location within the PSA (refer to Section 7.3 for small mammal survey methods and results).

W. McKittrick Pocket Mouse (*Perognathus inornatus neglectus*) is a Special Animal closely related to the San Joaquin pocket mouse (*P. inornatus inornatus*). The McKittrick pocket mouse occurs on the western side of the San Joaquin valley and areas to the west in Alameda, Fresno, Kern, Merced, San Benito, San Luis Obispo, and San Joaquin Counties, whereas the San Joaquin pocket mouse occurs on the eastern side and floor of the San Joaquin Valley in Fresno, Kern, Kings, Madera, and Stanislaus Counties. The two subspecies are very similar in appearance, with the McKittrick pocket mouse averaging slightly larger with a relatively longer tail (Best 1993). The McKittrick pocket mouse prefers arid annual grasslands and desert scrub communities, where they dig burrow systems in friable soils. Diet consists mainly of seeds, but some soft-bodied insects and earthworms are eaten. McKittrick pocket mice were commonly captured during small mammal trapping studies conducted within the PSA in 2008, 2009, and 2010 (refer to Section 7.3).

X. Blainville's (Coast) Horned Lizard (*Phrynosoma blainvillii*) is a California Special Concern species. Horned lizards are found in dry habitats from coastal dunes to inland deserts. Populations in San Luis Obispo County are widespread, but the lizards are always uncommon. There are no reports of coast horned lizard in the vicinity of the PSA, however suitable habitat is present and horned lizards are known from the Carrizo Plain. The coast horned lizard was not observed within the PSA during our wildlife surveys or during protocol surveys for the blunt-nosed leopard lizard.

Y. Oregon Vesper Sparrow (*Pooecetes gramineus affinis*) is a California Species of Special Concern that winters in grassland habitats in California. It nests in the Pacific Northwest from Oregon into Canada. It is considered very rare on its nesting grounds, and is a regular but uncommon winter migrant to the Carrizo Plain and other areas of the Central Coast from mid September to March (Lehman 1994). Winter bird surveys conducted within the PSA in February and March 2009 found Oregon vesper sparrows to be uncommon winter residents in mixed flocks of savanna sparrows and horned larks. They frequent weedy areas and un-grazed fence lines. Vesper sparrows were not observed during 2010 winter bird surveys within the PSA,

but were seen over 15 miles north of the PSA near the Palo Prieto Conservation Bank on April 9, 2010.

Z. Western Spadefoot Toad (*Spea hammondii*) is a California Species of Special Concern known from ephemeral pools in open grassland habitats across the interior region of San Luis Obispo County. During the dry season, spadefoot toads excavate burrows up to three feet deep. Sandy, gravelly, or other friable (crumbly) soil types are a prerequisite to spadefoot toad occurrence. While in the burrows, the toads are completely surrounded by soil and are likely in a state of torpor (USFWS 2005). Between February and May spadefoot toads emerge from their burrows and move into ephemeral pools to breed. The length of time required for larval development from egg to metamorph depends upon environmental factors associated with the breeding pool. Larval development is typically completed in three to eleven weeks. Shallow warm pools with short inundation periods facilitate faster larval development. Deeper cooler pools stall metamorphosis while the larvae attain larger size. After metamorphosis is complete, the young spadefoot toads disperse into the surrounding upland habitat. Little is known about dispersal distances, or minimum habitat size requirements to support a local population.

The nearest reported occurrence of the Western spadefoot toad is from approximately 4.9 miles southeast of the PSA along Soda Lake Road (CNDDB 7). Fourteen Western spadefoot toad breeding localities were documented within the PSA in 2010 (refer to Section 7.3, and BR Map 7 in Section 13.0).

AA. American Badger (*Taxidea taxus*) is a California Species of Special Concern known from open grassland habitats throughout San Luis Obispo County and elsewhere in California. Badgers were observed within the PSA in many locations during our surveys. They are residents of grassland areas, but also forage in croplands on occasion in areas where California ground squirrels have become established. They are highly mobile and could be present anywhere within the PSA.

BB. San Joaquin Kit Fox (*Vulpes macrotis mutica)* is listed as endangered under the Federal Endangered Species Act, and threatened under the California Endangered Species Act. The Carrizo Plain National Monument population is a core population located in San Luis Obispo County. Prior to our surveys, kit foxes were documented as occurring regularly in the vicinity of the PSA (CNDDB 973, 974, 77, 1112). The San Joaquin kit fox was determined to occur within the PSA, in both Project Options, in 2008, 2009 and 2010. Details of our surveys are provided in Section 7.0, and a map of den locations, direct observations, and camera detections is provided as BR Map 14, Section 13.0).

TABLE 6. SENSITIVE NATURAL COMMUNITIES. Two sensitive natural communities reported from the region are listed.

	Common Name	Federal/State Status Global/State Rank	Potential Habitat?
1.	**Northern Claypan Vernal Pool**	None/none G1/S1.1	Yes. Vernal pools occur in the PSA. Vernal pools on site do not fit described classifications of sensitive natural community types, however they are sensitive habitats. Refer to discussion in Section 5.2.3.
2.	**Valley Sink Scrub**	None/none G1/S1.1	No. Valley sink scrub habitat is not present within the PSA. Shrubs and other vegetation typical of sink scrub habitat are not present.

4.1.7 Special status species not expected to occur within the PSA

The remaining 27 special status species reported to occur in the La Panza NE, California Valley, La Panza, La Panza Ranch, Holland Canyon, Packwood Creek, Shale Point, Las Yeguas Ranch, Simmler, Chimineas Ranch, Branch Mountain, and Los Machos Hills quadrangles are not expected to occur within the PSA due to the absence of required soil type, lack of appropriate habitat, or because the PSA is substantially outside the known range of the species.

4.1.8 Tule elk and pronghorn antelope

Tule elk (*Cervus elaphus nannodes*) and pronghorn antelope (*Antilocarpa americana*) herds in the Carrizo Plain and elsewhere in the state of California are managed by the California Department of Fish and Game. They are reintroduced herds, with local groups that live year round in the Carrizo Plain National Monument (CPNM) and surrounding public and private lands. CDFG tracks the population status and movement patterns of both species (refer to BR Maps 3 and 4 in Section 13.0). The number of hunting tags issued annually is based on population status. Tule elk and pronghorn antelope are not listed under FESA or CESA, and are not designated as Species of Special Concern by CDFG. Both animals are regulated game mammals (CDFG code 3950) that are provided protections under CEQA typical to any wildlife species (refer to Section 8.3).

The Fish and Game Code provisions regarding elk primarily deal with management and regulation of hunting of the animals, and provide the Department with the ability to move elk. The Code provisions regarding pronghorn antelope only address hunting regulations and define the animal as a game mammal. No special protection is afforded these species. Regarding tule elk, Fish and Game Code section 3951 states:

> *"The commission may authorize the taking of tule elk pursuant to Section 332. When relocating tule elk, the department shall relocate the elk in areas suitable to them in the state and shall cooperate to the maximum extent possible with Federal and local agencies and private property owners in relocating tule elk in suitable areas under their jurisdiction or ownership. When property or environmental damage occurs, emphasis shall be placed on managing each tule elk herd at a biologically sound level through the use of relocation, regulated hunting, or other appropriate methods, individually or in combination, as determined by the department in accordance with the statewide elk management plan developed pursuant to Section 3952, after consulting with local landowners."*

4.1.9 Sensitive natural communities and special aquatic sites

The CNDDB recognizes several types of vernal pools as sensitive natural communities, including Northern claypan vernal pools, San Jacinto Valley vernal pools, and San Diego Mesa claypan vernal pools that share some characteristics with vernal pools located in the PSA. However, vernal pools in the PSA do not fit habitat descriptions or typical species composition for vernal pool habitats listed as sensitive natural communities. See Section 5.2.3 for more discussion of vernal pools in the PSA compared with listed vernal pool alliances.

A delineation of wetlands and other waters of the U.S. was prepared for the project in 2010 (Althouse and Meade, Inc. and Huffman-Broadway Group, Inc. 2010). Delineation of wetlands and waters was performed according to federal standards presented in the 1987 Army Corps of Engineers *Wetlands Delineation Manual*, the 2008 *Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States: A Delineation Manual*, and the 2008 Army Corps of Engineers *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)*. The Army Corps of Engineers (USACE) uses a three-factor approach to defining wetlands, requiring presence of hydric soil, wetland hydrology, and dominance of hydrophytic vegetation over an area at least five feet in diameter to define a wetland. Discussion of wetland and other aquatic habitat types in this biological report are intended as discussion of habitat function and value, and do not consider jurisdictional status. Refer to the 2010 wetland delineation for a complete discussion of findings and potential regulatory jurisdiction over wetland and other federal jurisdictional surface waters.

5.0 Habitat Types

5.1 Habitat Survey Methods

Each habitat type occurring within the PSA was inspected, described, and catalogued. Representative photographs were taken of each land Section, of all habitat types, and of native plants and animals where feasible. Representative photographs of all habitat types are provided in Photo Collection 2 in Section 14.0. Agricultural fields plowed bare and planted with grain were surveyed by ATV and on foot. An ATV was used to scout cropland fields and cropland fence lines in order to locate any areas of non-crop vegetation, wetlands, drainage channels, or other sensitive resources. Annual grasslands were systematically surveyed by walking transects with two to eight surveyors at a time (refer to Botanical Transect Methods, Section 6.1.1). Habitat features, variation in vegetation type, and aquatic habitat type locations were identified during transect walking surveys and during an aerial survey. The aerial survey was conducted in a Cessna 172XP airplane flying at slow speeds during peak inundation of aquatic habitats in March 2010. High-resolution photographs taken from the plane were geo-referenced using Arc-GIS software, and the approximate coordinates of pools were sent to teams on the ground for field verification. We investigated all non-drainage aquatic habitats for hydrophytic vegetation, wetland hydrology, and hydric soils.

5.2 Habitat Types in the PSA

We describe eight habitat types within the PSA: cropland (6,205 acres), California annual grassland (3,463 acres), vernal pool (2.2 acres), ephemeral wetland depression (0.7 acres), natural non-wetland pool (0.7 acres), anthropogenic non-wetland pool (0.77 acres), agricultural reservoir (0.04 acres) and anthropogenic (28 acres). Table 7 provides habitat acreages by project Option. Ephemeral drainages within the PSA are described in detail in the TSF wetland delineation (Althouse and Meade, Inc. and Huffman-Broadway Group, Inc. 2010), and are not discussed here as a habitat type. BR Map 1 in Section 13.0 indicates the locations of each habitat type within the PSA. Photo Collection 3 in Section 14.0 contains representative photographs of each habitat type.

All habitat types within the PSA are either created for or by agricultural activities, or show signs of past agricultural management practices (refer to Land Use History map, Figure 5, Section 12.0). No habitats remain within the PSA in their natural condition. Croplands are those areas that are in active agricultural use as of the 2010 spring season, either planted with grain, plowed bare, or fallow less than three years. Annual grasslands were historically farmed, but most have not been farmed for many years and are now dominated by introduced annual grasses typical of grasslands in the region. Anthropogenic areas indicate residences or abandoned buildings and associated lands. Ephemeral aquatic habitat types are distinguished based on flora and fauna present and length of inundation.

TABLE 7. HABITAT ACREAGES. Acreages of each habitat type are provided separately for the entire PSA, Option A, and Option B. Note that the project Options overlap and the combined total of acreages does not equal the size of the PSA acreage for each habitat type.

Habitat Type	PSA (Acres)	Option A (acres)	Option B (acres)
Cropland	6,205	4,380	4,712
California Annual Grassland	3,463	3,356	1,689
Vernal Pool	2.2	2.2	0.1
Ephemeral Wetland Depression	0.7	0.6	0.6
Natural Non-wetland Pool	1.1	1.0	0.2
Anthropogenic Non-wetland Pool	0.77	0.7	0.1
Agricultural Reservoir	1,742 sq. ft. (0.04 acres)	1,742 sq. ft. (0.04 acres)	1,742 sq. ft. (0.04 acres)
Anthropogenic	28	23	25

5.2.1 Cropland

Land in varying stages of dry-farm production constitutes approximately 6,205 acres, or 64 percent, of the PSA. Option A includes approximately 4,380 acres and Option B includes approximately 4,712 acres of cropland habitat. The cropland habitat designation includes fields planted to grain and fields left bare during rotation. Farming on the parcels utilizes a summer fallow program. Summer fallow is the practice of idling farmland and removing weeds for up to 14 months to allow soil moisture to increase. Barley and wheat, non-irrigated grain crops planted in alternate years, are harvested for grain and then the stubble is used for cattle grazing. Herbicides are regularly used to control weeds in planted fields. Cropland habitat supports few native plant species, and is generally low quality wildlife habitat.

Although wildlife use of the cropland habitat is limited, several species are regular inhabitants. Ferruginous hawk is a Species of Special Concern that winters in the region, and was observed roosting on the bare ground croplands in the PSA. Deer mice (*Peromyscus maniculatus*) occur in fallow grain fields, notably along fence-lines. Mammals such as kit fox and badger may forage for squirrels and other rodents that live in the habitat. San Joaquin kit fox were photographed by motion detecting camera moving regularly along a fence line on bare cropland field adjacent to annual grasslands in Section 21 in spring 2008. Farm fields are used as resting and feeding areas for elk and pronghorn antelope and as late season grazing habitat when bindweed (*Convolvulus arvensis*), a preferred forage plant, becomes common.

5.2.2 California annual grassland

Annual grassland habitat constitutes approximately 3,463 acres, or 36 percent, of the PSA. Option A includes approximately 3,356 acres, and Option B includes approximately 1,689 acres. It is a dry seasonal habitat consisting of low-lying annual grasses and forbs. California annual grassland habitat in the PSA is dominated by non-native and native annual grass species, with varying percentages of native and introduced forbs. This habitat type is ubiquitous throughout the State of California where cultivation and grazing for the past century or more has converted native annual or perennial grasslands to annual grasslands. Throughout its range the California annual grassland habitat type takes on many forms, and the PSA likewise contains several forms depending upon the land use history. The CRP lands within the PSA have been untilled for at least 20 years and generally show significant recovery in terms of native forb diversity and abundance. These areas include Sections 4, 5, 8, 26, 34 and 35. Some areas of the PSA, such as Sections 16 and 28, were removed from farming more recently. These grasslands are predominantly composed of introduced annual grasses and support a lower diversity of native forbs and grasses.

Early season vegetation in all grasslands within the PSA is dominated by redstem filaree (*Erodium cicutarium*), an introduced species. CRP lands develop large areas of native annual fescue (*Vulpia microstachys*) with significant patches of soft chess brome (*Bromus hordeaceus*) and introduced annual fescue (*Vulpia myuros*). In addition, native wildflowers such as *Layia platyglossa*, *Lupinus bicolor*, *Castilleja* ssp., and *Lasthenia gracilis* are common to abundant. Other native forbs common in the CRP grasslands are *Microseris* ssp., *Uropappus lindleyi*, *Stebbinsoseris heterocarpa*, *Lotus humistratus*, and *Calandrinia ciliata*.

Fallow agricultural fields that have recently reverted to annual grasslands tend to be dominated by introduced annual grasses such as wild oats (*Avena fatua*), soft chess brome, introduced annual fescue, and foxtail barley (*Hordeum murinum*). Common and sometimes abundant native wildflowers include the native Great Valley phacelia (*Phacelia ciliata*) and several species of fiddleneck (*Amsinckia menziesii*, *A. lycopsoides*, and *A. tessellata*).

Grassland habitat within the PSA is suitable for several special status animal species. American badger (*Taxidea taxus*) and burrowing owl (*Athene cunicularia*) occur regularly in all grassland areas. San Joaquin kit fox (*Vulpes macrotis mutica*) was

documented using grassland habitat for denning and foraging. In addition, several special status plants occur in the grassland habitat on site.

5.2.3 Vernal pool

Forty-seven vernal pools occur within the PSA, with a complex of vernal pool/upland mosaic concentrated in Option A, Section 4, and scattered vernal pools in Sections 19, 20, 32, and 35. All 47 vernal pools are within Option A, and 2 vernal pools are located within Option B. Vernal pool habitat occurs over approximately 2.2 acres (92,347 square feet) of the PSA, with approximately 2.2 acres situated within Option A and 0.1 acre in Option B. Vernal pools within the PSA occur in topographic depressions that are isolated from drainages and do not, under normal circumstances, experience flow of water. They occur in shallow loamy soil up to 8 inches deep over an abrupt textural change to clay at 6 to 8 inches depth. A continuous, cemented hardpan was not encountered during pits excavated as part of wetland delineation, although exposed bedrock of marine sedimentary mudstone and sandstone is visible in a streambed adjacent to these vernal pools, at approximately 24 to 36 inches depth. The Carrizo Soil Survey identifies Pinspring, a soil map unit component mapped across the site, as having a sandy loam horizon weakly cemented by silica at 30 to 39 inches depth. A backhoe pit was not excavated to avoid unnecessary damage to sensitive vernal pool habitat and surrounding upland during the wet season, but would be required to determine whether the exposed layer observed in the streambed is bedrock or cemented soil.

Vegetation typically consists of several species from a suite of plant species strongly affiliated with vernal pools in the region, including hair grass (*Deschampsia danthonioides*), water starwort (*Callitriche marginata*), water pygmyweed (*Crassula aquatica*), mousetails (*Myosurus minimus, M. sessilis*), woolly marbles (*Psilocarphus brevissimus, P. chilensis*), inch-high rush (*Juncus uncialis*), pillwort (*Pilularia americana*) and alkali plagiobothrys (*Plagiobothrys leptocladus*). Many of these pools also support another species of woolly marbles (*P. oregonus*), toad rush (*Juncus bufonius*), wandering speedwell (*Veronica peregrina*), loosestrife (*Lythrum hyssopifolia*), and adobe allocarya (*Plagiobothrys acanthocarpus*), but these species also occur in other mesic habitat types in the PSA and do not have a high fidelity to vernal pool habitat. Not all vernal pools in the PSA have all species listed here, but vernal pools we mapped had at least two species with high fidelity to vernal pool habitat in the region (meaning they typically occur in vernal pools and not in other habitats).

Vernal pool habitat includes several pools that have not been farmed for 20 years or more in Sections 4 and 35, as well as a few additional pools that have been regularly disturbed by farming activities in the last 2 years, in Sections 19, 20, and 32. Pools in Sections 19 and 20 were planted with barley in 2010; pools in Section 32 were fallow two years then plowed in 2010. Despite plowing and planting activities in 2009-2010, these pools support *Psilocarphus* spp., *Plagiobothrys leptocladus*, *Myosurus* spp., *Crassula aquatic*, and *Callitriche marginata.* Cultivated barley is generally absent from within vernal pools because it does not tolerate long periods of inundation, although it may be present around the upper margins.

Vernal pools on site also had strong indication of wetland hydrology via biotic crusts, algal mats, and oxidized rhizospheres, as well as clear indication of hydric soils. Many

vernal pools in the PSA support fairy shrimp (*Branchinecta* spp.) and many other aquatic invertebrates including seed shrimp, backswimmers, and *Daphnia*. A few of the larger pools also support breeding Western spadefoot toads.

Adjacent upland habitat surrounding undisturbed vernal pools supports a variety of wildflowers and grasses, including *Vulpia microstachys*, *Bromus madritensis* ssp. *rubens*, *Erodium cicutarium*, *Lasthenia gracilis*, *Microseris douglasii* ssp. *tenellus*, and *Castilleja* ssp. In farmed vernal pools, surrounding vegetation is predominantly cultivated barley.

Classification of vernal pools has been addressed through several approaches, at several scales, ranging from a system based solely on landform to a system presented in the Manual of California Vegetation based on geographic region, type of aquatard, and indicator species, to the recently developed vernal pool vegetation classification system, which identifies three orders of plant communities based on studies of how species co-occur (Solomeshch et al, 2007; Solomeshch and Barbour, 2008; Sawyer and Keeler-Wolf, 1995). Sawyer and Keeler-Wolf (1995) initially identified eight vernal pool groups from an ecosystem approach. In the 1995 edition of the Manual of California Vegetation, the authors note the difficulties associated with classifying vernal pools. Vernal pools in the PSA lack *Downingia*, a common vernal pool plant, and do not fit well with any of the descriptions under the Sawyer Keeler-Wolf scheme. Species composition is most similar to San Diego mesa claypan vernal pools or San Jacinto valley vernal pools. However, geographic location, soil conditions, and species diversity vary. Also, presence of an abrupt increase in clay content and shallow bedrock/weakly cemented hardpan are more similar to Northern claypan vernal pools, but species composition described in the Manual for this alliance is not consistent with our site observations, with only one of the described species for this alliance observed on the PSA.

Using the Solomesch and Barbour key (2008), vernal pools in the PSA clearly meet diagnostic criteria for vernal pool vegetation, with seven of the listed diagnostic species regularly occurring on the site. Vernal pools occurring within the PSA best fit the *Lasthenia fremontii-Downingia bicornuta* group of alliances (in spite of the fact that neither species named in the alliance title occur in the PSA) due to freshwater conditions, absence of spikerush, and presence of *Deschampsia danthonioides* and *Psilocarphus brevissimus*. The association occurring in the PSA has not been classified and does not key any further than group of alliances in the Solomesch-Barbour key because the appropriate combination of species and substrate are not an option in this key.

Vernal pools observed in the PSA do not fit any of the described alliances or vernal pool "types" very well, and do not match criteria for vernal pool habitats listed as sensitive natural communities by the CNDDB (refer to Section 4.1.9). Although they do not match published descriptions, they do qualify as vernal pools for reasons described above, and should be regarded as sensitive habitat types.

5.2.4 Ephemeral wetland depression

Some isolated pools occur in the PSA that do not meet criteria for vernal pools, although they do support wetland vegetation, have hydric soils, and wetland hydrology. These pools occur in both project Options, specifically in Sections 4, 15, 16, 18, and 35, and have a total area of 0.7 acres (30,006 square feet). These features are described as ephemeral wetland depressions. Typical vegetation includes *Polygonum arenastrum*,

Psilocarphus oregonus, *Veronica peregrina*, *Plagiobothrys acanthocarpus* and *Chamomilla suaveolens*. Ephemeral wetland depressions are not considered vernal pools because they lack plant species with high fidelity to vernal pools in the vicinity (refer to Section 5.2.3, above). Ephemeral wetland depressions in the PSA vary in size from approximately 250 square feet to nearly 5,000 square feet.

Vegetation is sparse and stunted in the ephemeral wetland depressions. Some pools contain clear redoximorphic features such as oxidized rhizospheres and redoximorphic concentrations in the soil matrix and pore linings. Others lack clear indication of hydric soils, probably due to a number of factors, including high soil pH, which interferes with formation of visible iron oxides; low carbon, which slows microbial activity that usually generates redoximorphic features in soil; and ephemeral nature of the pools. These problematic soils meet USACE criteria for problematic hydric soils because water is ponded or soil is saturated for more than 14 days continuously (USACE 2008, p. 101).

The presence of ponded water in the ephemeral wetland depressions appears to be very limited, but may be suitable breeding habitat in some years for the Western spadefoot toad (*Spea hammondii*), a California Species of Special Concern, and is potential habitat for common and federally listed fairy shrimp. Ephemeral wetland depressions in Section 16 did not fill in 2009, while two filled in 2010.

5.2.5 Natural non-wetland pool

Numerous naturally occurring pools that do not meet wetland criteria due to absence of hydric soils and/or non-dominance of hydrophytic vegetation occur within the PSA. The pools are situated within both project Options in Sections 4, 15, 17, 20, 29, 32 and 34, occupying a total of approximately 1.1 acres. Some hydrophytic plant species such as *Plagiobothrys leptocladus*, *Plagiobothrys acanthocarpus*, and *Psilocarphus oregonus* are present in low quantities but do not form dominant cover. Upland species are present in equal or greater quantities, including such species as *Plagiobothrys canescens*, *Chamomilla suaveolens*, *Erodium cicutarium*, and *Microseris douglasii* ssp. *douglasii*. In Section 20, cultivated barley, while stunted, continues to grow as one of the dominant species in the non-wetland pools observed, whereas in vernal pools in section 20, this saturation-intolerant species is absent. Despite lacking dominance of hydrophytic vegetation, in years with above average rainfall, these naturally occurring non-wetland pools provide habitat for fairy shrimp and other aquatic invertebrates, and larger pools provide potential breeding habitat for spadefoot toads.

5.2.6 Anthropogenic non-wetland pool

Use of unpaved roads during the wet season has generated many ruts and depressions within the roadways that, while not meeting criteria for wetlands due to lack of hydric soils and/or non-dominance of hydrophytic vegetation, do provide poor quality habitat for aquatic invertebrates and spadefoot toads in wet years. These pools occupy approximately 0.77 acre of the PSA, and are separated from naturally occurring non-wetland pools because they are more transitory in nature, with pools being created or enlarged during the wet season and eliminated during regular road maintenance in the dry season. Some hydrophytic species, such *Plagiobothrys acanthocarpus* and *Psilocarphus oregonus*, are present in low quantities but do not form dominant cover and often form

less than five percent total cover. Upland species are present in equal or greater quantities, including *Chamomilla suaveolens* and *Lepidium nitidum* var. *nitidum*.

5.2.7 Agricultural reservoir

Four agricultural reservoirs are located within the PSA. Two of the reservoirs are dilapidated and no longer are capable of holding ponded water, and therefore are not considered potential aquatic habitat. These are located in Sections 28 and 29, and are not indicated on the habitat map. They both were created above ground by earthen berms, and were one time plumbed so that they could be filled from a well and water could be pumped for irrigation. The piping is dilapidated and no longer usable.

Two reservoirs, one in Section 20 and one in Section 28, hold water and are indicated on the habitat map. The one in Section 20 filled with rainwater to several feet deep in 2010, and was used by Western spadefoot toads as a breeding pool. Insufficient water was present in 2008 and 2009 for spadefoot toad breeding. Several pronghorn antelope were observed resting in this reservoir in May 2008 when it was dry. In Section 28, the westernmost reservoir held a few inches of rainwater in 2010 and was filled by a well in April 2010. Pacific chorus frog, Western toad, and Western spadefoot toad larvae were detected during aquatic amphibian dip-net surveys (refer to Section 7.3.7).

5.2.8 Anthropogenic

All areas within the PSA that are heavily influenced by human development are mapped and described as anthropogenic habitat. Anthropogenic habitat includes abandoned and occupied ranch compounds and other structures within both project Options, specifically in Sections 16, 18, 21, 22, 28 and 33. Approximately 28 acres of anthropogenic habitat occurs in the PSA. Several of the ranch compounds are liberally planted with ornamental trees and shrubs, which create areas of tree canopy and shrub understory that are otherwise entirely lacking in the vicinity. A variety of bird species utilize the vegetated portions of the anthropogenic habitat for nesting, wintering, and general foraging. Loggerhead shrikes were documented nesting in three areas of the PSA, all mapped as anthropogenic habitat. Migrant species such as warblers, hummingbirds, and orioles find temporary refuge as well.

6.0 Floristic Inventory

6.1 Methods

Botanical surveys conducted by Althouse and Meade, Inc. from March 2008 through July 2010, by Dr. David Keil in 2008 and 2010, and by URS Corp in 2007 and 2008 (URS 2008) resulted in a comprehensive floristic inventory of vascular plant species that occur within the PSA (refer to Table 3 for survey dates). A floristic inventory is a compilation of all plants on a given site, generally compiled using a large amount of resources in order to ensure detection of rare, threatened, or endangered species that could potentially be present. Botanical surveys conducted within the PSA were thorough, appropriate to the terrain, and consistent with botanical survey protocols published by the California Department of Fish and Game (CDFG 2009), United States Fish and Wildlife (USFWS 2000), and California Native Plant Society (CNPS 2001).

Botanical surveys conducted in 2008 and 2009 were conducted on foot, utilizing meandering transect and focused survey methods. Croplands that were plowed bare were surveyed on an all-terrain vehicle (ATV). The surveyor in this case drove transects searching for patches of vegetation, and all species present were then identified. Approximately 6,030 acres of land were surveyed in 2008, and in 2009 approximately 5,970 acres were surveyed (Table 8).

In 2010, botanical surveys commenced in March on approximately 10,000 acres of land, and continued through July. Some of the 2010 survey areas overlapped land covered by previous surveys. Numerous areas, mostly within Option B, including Sections 7, 8, 16-18, 20-22, and 29 were surveyed at least three consecutive seasons (Table 8). Botanical surveys conducted in 2010 utilized a combination of transect survey and focused survey methods. Transect survey methods are described in Section 6.1.1, and focused survey methods are described in Section 6.1.2. Transect surveys were conducted to ensure adequate coverage over the PSA, and to collect data in a systematic format that is both repeatable and comparable. The focused survey method allowed our botanists to target specific areas or micro-habitats of the PSA for additional survey time. Typically this was done to search for special status plants in areas of suitable habitat, but information on weeds and other species was also gathered. Additionally, focused surveys worked on collecting, identifying, and vouchering specimens of taxonomic interest.

Surveys in agricultural fields were accomplished primarily by walking transects. An ATV was utilized for the early season survey of Section 27, just prior to plowing. All other surveys of agricultural fields were conducted on foot.

Identification of botanical resources included field observations and laboratory analysis of collected material. Voucher specimens were collected for all special status species and for many other common species, particularly those for which previous botanical surveys in the region resulted in misidentifications (refer to Section 6.2, below). Collection numbers for voucher specimens are indicated after the scientific name of the plant in Table 10. All voucher specimens will be deposited in the R. F. Hoover Herbarium at Cal Poly.

Botanical nomenclature used in this document generally follows the Jepson Manual (Hickman 1993). An effort was made to use the most recent published scientific names, and where more recent nomenclature is used, the Jepson Manual name is provided in brackets.

TABLE 8. BOTANICAL SURVEYS. Botanical surveys were conducted in portions of the PSA from 2007 through 2009. In 2010, the entire PSA was surveyed. All surveys were conducted by Althouse and Meade, Inc., except where noted.

Township, Range, Section	2007 Survey	2008 Survey	2009 Survey	2010 Survey
T30 S, R18 E, **S4**				X
T30 S, R18 E, **S5**				X
T29 S, R18 E, **S7**		X	X	X
T29 S, R18 E, **S8**		X	X	X
T29 S, R18 E, **S15**			X	X
T29 S, R18 E, **S16**		X	X	X
T29 S, R18 E, **S17**		X	X	X
T29 S, R18 E, **S18**		X	X	X
T29 S, R18 E, **S19**			X	X
T29 S, R18 E, **S20**		X	X	X
T29 S, R18 E, **S21**		X	X	X
T29 S, R18 E, **S22**		X	X	X
T29 S, R18 E, **S26**				X
T29 S, R18 E, **S27**			X	X
T29 S, R18 E, **S28**	X (URS)	X (URS)		X
T29 S, R18 E, **S29**		X	X	X
T29 S, R18 E, **S32**				X
T29 S, R18 E, **S33**	X (URS)	X (URS)		X
T29 S, R18 E, **S34**				X
T29 S, R18 E, **S35**				X
Total	**~1,020 acres**	**~6,030 acres**	**~5,970 acres**	**~10,000 acres**

6.1.1 Transect survey methods

Botanical surveys conducted in 2010 utilized a transect survey method in which botanists covered parallel belts of land in north-south orientation across all 3,463 acres of annual grasslands and approximately 6,205 acres of croplands within the PSA[2]. Each transect belt was 660 feet wide and up to 5,280 feet (one mile) long. Botanists walked meandering lines within each transect, ultimately compiling a complete flora for every Section. Land Sections within the PSA were sampled individually to generate a separate dataset for each Section (refer to Table 11). Each botanist compiled a list of all plants

[2] Habitat acreages are slightly different than reported in the preliminary biological report (Althouse and Meade, Inc. May 2010) due to changes in the project layout.

encountered during their first transect in a new Section; only plant species new for the Section were listed on subsequent transect data sheets. Some plants that could not be positively identified in the field were collected, pressed, and identified in the lab. In addition to compiling plant lists, the botanists recorded notes on dominant species, percent cover, percent bare ground, and vegetation height in all transects. When the botanists identified rare plant populations, they recorded coordinates taken by hand-held GPS, number of plants present, and the approximate size of the occurrence. This data was used to direct focused surveys to completely map rare plant populations (refer to Section 6.1.2). The 2010 transect surveys reported herein completed total ground cover once in March, once in April, and once in May.

The benefit of the transect survey method is that a dataset is generated that can be used in a comparative analysis. By generating datasets for each land Section individually, we were able to compare vegetative diversity, height, and percent cover to better understand which Section(s) have a higher value for native plants and wildlife. We also wanted to create a dataset that represents the baseline vegetative conditions within the PSA so that future studies can be conducted and compared to the baseline. For example, botanical transect surveys can be conducted within the completed solar farm to determine how the installation affected the baseline condition. Additionally, because the proposed solar farm would be a temporary project with plans to return the PSA to natural conditions after it is decommissioned, project biologists would be able to compare post-project vegetative conditions to pre-project conditions.

6.1.2 Focused survey methods

We conducted focused surveys for botanical resources throughout the spring season. Focused surveys were conducted by senior botanists, often working with Dr. David Keil, Curator of the R.F. Hoover Herbarium at Cal Poly, in order to make determinations on species identity questions raised during transect surveys, collect voucher specimens, map rare plant populations, and to fully investigate complex habitat types such as vernal pools.

6.1.3 Botanical reference sites

Botanical surveys were timed to coincide with the typical blooming period for special status plant species with potential to occur in the PSA (refer to Section 4.0 and Table 4). In order to verify that our surveys were conducted at appropriate times, and to make sure all surveyors were adequately familiar with potential special status species, site visits were made to known locations of special status species in the Carrizo Plain region.

We visited nine botanical reference sites to observe special status plants in full bloom. Repeat visits were necessary to find certain species in flower.

1. **Intersection of Belmont Trail and Clarksburg Road, California Valley**
   Coordinates: 35.307827° N, 119.943151° W (WGS 84)
   Site Visit Dates: April 15, 2008, March 30, 2009, March 15, 25, and 26, 2010
   Species Observed: *Layia munzii, Lasthenia ferrisiae, Atriplex vallicola, Delphinium recurvatum, Eschscholzia rhombipetala,* and *California macrophylla*
2. **Belmont Trail 0.2 mile east of Soda Lake Road, California Valley**
   Coordinates: 35.30797° N, 119.98409° W (WGS 84)
   Site Visit Dates: March 25, 2010
   Species Observed: *Delphinium recurvatum, Lepidium jaredii*
3. **Belmont Trail and Courtland Road, California Valley**
   Coordinates: 35.30757° N, 119.95402° W (WGS 84)
   Site Visit Dates: March 25 and April 6, 2010
   Species Observed: *Delphinium recurvatum, Layia munzii,* and *Lasthenia ferrisiae*
4. **Soda Lake San Diego Creek Road, approximately 3.6 mile south of intersection with Soda Lake Road**
   Coordinates: 35.21833° N, 120.95264° W (WGS 84)
   Site Visit Dates: March 26 and April 6, 2010
   Species Observed: *Madia radiata* and *California macrophylla*
5. **Soda Lake Road, Carrizo Plain National Monument**
   Coordinates: 35.08211° N, 119.67530° W (WGS 84)
   Site Visit Dates: March 26, 2010
   Species Observed: *Monolopia congdonii*
6. **Soda Lake Road, Carrizo Plain National Monument**
   Coordinates: 35.07780° N, 119.66692° W (WGS 84)
   Site Visit Dates: March 26, 2010
   Species Observed: *Caulanthus californicus*
7. **Unnamed Dirt Road, Carrizo Plain National Monument**
   Coordinates: 35.167910° N, 119.77370° W (WGS 84)
   Site Visit Dates: March 26, 2010
   Species Observed: *Lepidium jaredii, Layia munzii, Lasthenia ferrisiae, Atriplex vallicola*
8. **Soda Lake San Diego Creek Road, Chimineas Ranch**
   Coordinates: 35.13654° N, 119.97633° W (WGS 84)
   Site Visit Dates: March 27, 2010
   Species Observed: *Caulanthus coulteri* var. *lemmonii*
9. **Highway 58 Roadcut, 0.1 mile West of La Panza Road**
   Coordinates: 35.46855° N, 120.38026° W (WGS 84)
   Site Visit Dates: May 25, 2010
   Species Observed: *Delphinium gypsophilum* ssp. *gypsophilum*

6.2 Previous Botanical Surveys Conducted on the PSA

Botanical surveys were conducted within portions of the PSA since 2007 (Table 8). URS Corp conducted botanical surveys within Section 28 and the north half of Section 33 in 2007 and 2008 during the planning process for the former Ausra solar project (URS 2008). A total of approximately 1,020 acres were surveyed. Althouse and Meade, Inc. (A&M) initiated botanical surveys in potential project areas in March 2008. Results of the 2008 and 2009 botanical surveys were reported in the Biological Report for the Topaz Solar Farm (Althouse and Meade, Inc. 2009b). Some plant species included in the A&M 2009 report are not included here because they occurred on lands not part of the current PSA (e.g. *Atriplex vallicola*). The URS 2008 report contains numerous plant species that we believe do not occur within the PSA, as explained in Table 9. Therefore these species are not included on our current vascular plant list for the PSA (Table 10).

TABLE 9. PLANTS ERRONEOUSLY REPORTED FROM THE PSA. The following plant species were reported from Sections 28 and the north half of 33 during botanical surveys conducted for the former Ausra project (URS 2008), but are not included on the 2010 floristic inventory.

Species Reported by URS 2008	Species Reported by A&M 2010	Reason for Omission
Amsinckia eastwoodiae	***A. lycopsoides*** ***A. menziesii*** var. ***menziesii*** ***A. menziesii*** var. ***intermedia*** ***A. tessellata*** var. ***tessellata*** ***A. tessellata*** var. ***gloriosa***	Presumed misidentification. *A. tessellata* has large flowers similar to *A. eastwoodiae*, but has 3 calyx lobes instead of 5. *A. menziesii* has 5 calyx lobes, but small flowers, and anthers that are appressed to the stigma, unlike *A. eastwoodiae*.
Acroptilon repens	**None**	Presumed misidentification. We did not find *Acroptilon repens* in PSA.
Camissonia californica	***C. strigulosa, C. contorta, C. campestris***	Presumed misidentification.
Cryptantha flaccida, C. muricata, C. oxygona	***C. intermedia***	Presumed misidentification. Only one species present within the PSA.
Deinandra *(=Hemizonia)* ***fascicularis***	***Deinandra*** *(=Hemizonia)* ***pentactis***	*D. fascicularis* is a coastal species that is similar in form to *D. pentactis*. No specimen records of *D. fascicularis* are from the Carrizo Plain region.
Deinandra *(=Hemizonia)* ***kelloggii***	***Deinandra*** *(=Hemizonia)* ***pentactis***	*D. kelloggii* differs from *D. pentactis* in color of anthers. Could occur in region, but all plants identified from PSA by A&M were *D. pentactis.*
Eschscholzia glyptosperma	***E. californica***	Misidentification of small-flowered *E. californica*. Desert species, does not occur in SLO County.
Eschscholzia minutiflora	***E. californica***	Misidentification of small-flowered *E. californica*. Desert species, does not occur in SLO County.
Gilia minor	***G. clivorum***	Misidentification. The two species are distinguished primarily by types of hairs, presence of glands, and leaf characters.

Species Reported by URS 2008	Species Reported by A&M 2010	Reason for Omission
Juncus capitatus	***Juncus uncialis*** ***Juncus bufonius*** var. ***bufonius*** ***Juncus luciensis***	Misidentification. *J. capitatus* does not occur in SLO County
Lasthenia californica	***Lasthenia gracilis***	*L. californica* occurs in northern California only. *L. gracilis* is the local form. These two species were formerly considered one species.
Layia heterotricha	***L. platyglossa, L. munzii, L. pentachaeta*** ssp. ***albida***	Habitat unlikely, but could occur as a waif. Similar species, *L. pentachaeta* collected along Bitterwater Road (Dart 362) and observed in Section 15. No specimen for *L. heterotricha* within the PSA available, and photo in URS 2008 is inconclusive.
Logfia (=*Filago*) ***depressa***	***Logfia gallica, Logfia filaginoides***	*Logfia depressa* is a desert species that does not occur in SLO County.
Lotus wrangelianus	***L. humistratus***	Presumed misidentification.
Lupinus concinnus	***L. microcarpus, L. bicolor***	Presumed misidentification. *L. concinnus* occurs along Highway 58 near Santa Margarita, but is not known from Carrizo Plain.
Lastarriaea coriacea	**None**	Was not verified by July 2010.
Mentzelia albicaulis	***M. affinis***	Misidentification. Seeds in one row above mid-ovary; seeds with grooved angles, therefore *M. affinis*.
Papaver rhoeas	***P. hybridum***	Presumed misidentification; Keil 30494.
Plagiobothrys collinus var. ***fulvescens***	***P. canescens*** ***P. acanthocarpus*** ***P. leptocladus***	Occurs in coastal areas of SLO County. Not known from Carrizo Plain region.
Raphanus sativus	***R. raphanistrum***	Presumed misidentification. *R. raphanistrum* is occasional in farm fields and roadsides within the PSA.
Schismus barbatus	***S. arabicus***	Presumed misidentification. All plants collected within PSA have lower lemmas greater than 2.5 mm; therefore *S. arabicus*.
Trifolium bifidum	***T. gracilentum***	Presumed misidentification. Superficially similar to *T. gracilentum*, differs in calyx size and hairs on peduncle. *T. bifidum* not reported from Carrizo Plain region.
Triphysaria micrantha	***Castilleja brevistyla, C. densiflora, C. exserta*** (and hybrids)	Presumed misidentification of small *Castilleja* spp. and/or hybrids.
Vicia americana var. ***americana***	***Vicia villosa*** ssp. ***varia***	Woodland species. Does not occur in Carrizo Plain.
Vicia benghalensis	***Vicia villosa*** ssp. ***varia***	Misidentification. Inflorescence is greater than subtending leaf, therefore *V. villosa*.
Vulpia octoflora	***V. myuros*** ***V. microstachys***	Presumed misidentification.

6.3 Final Botanical Survey Results

Botanical surveys conducted from March 2008 through July 2010 identified 248 species, subspecies, varieties, and hybrids of vascular plant taxa within the PSA (Table 10). The list includes 160 species native to California and 88 introduced (naturalized or planted) species. Landscape plants that have persisted in abandoned farm and ranch compounds (not currently inhabited or maintained) within PSA were included. Landscape plants in currently maintained landscaped areas surrounding existing inhabited residences were not included.

Native plant species account for approximately 65 percent of the flora within the PSA; introduced species account for approximately 35 percent. Approximately 83 percent of the flora in the State of California is native, while 17 percent is introduced (Hickman 1993). The significantly lower than the state-wide average percent of native species and higher than average percent of introduced species is indicative of the land use history within the PSA. The flora of land Sections within the PSA that have cropland as the dominant habitat type average 62 percent native species, 38 percent introduced. The flora of land Sections within the PSA that have annual grassland as the dominant habitat type average 68 percent native species and 32 percent introduced.

Fifty-two plant families are represented in the flora of the PSA. These include 1 fern family, 2 gymnosperm families, and among angiosperms, species from 45 families of dicotyledons and 4 families of monocotyledons.

TABLE 10. VASCULAR PLANT LIST. The 248 species of vascular plants identified at the PSA consist of 146 native species and 73 introduced species. The vascular plant list is separated into general life form categories, within which the taxa are listed alphabetically by family and scientific name.

Ferns and Fern Allies – 1 species

Scientific Name	Common Name	Family	Status	Origin	Option A	Option B	Notes and Collection Numbers
Pilularia americana	Pillwort	Marsileaceae	None	Native	✓	✓	Vernal pools; Keil 30692, 30729.

Gymnosperms – 5 species

Scientific Name	Common Name	Family	Status	Origin	Option A	Option B	Notes and Collection Numbers
Calocedrus decurrens	Incense cedar	Cupressaceae	None	Planted	✓		Section 33 residential area
Juniperus californicus	California juniper	Cupressaceae	None	Native	✓		Section 5, west edge
Juniperus sp.	Juniper	Cupressaceae	None	Planted	✓		Section 33
Cedrus deodora	Deodar cedar	Pinaceae	None	Planted	✓	✓	Sections 16 and 18 residential areas.
Pinus sp.	Pine	Pinaceae	None	Planted	✓		Section 33 residential area.

Angiosperms, Dicotyledons – 201 species

Scientific Name	Common Name	Family	Status	Origin	Option A	Option B	Notes and Collection Numbers
Amaranthus albus	Tumbleweed	Amaranthaceae	None	Introduced	✓	✓	Common in croplands throughout PSA. Keil 30919.
Amaranthus blitoides	Procumbent pigweed	Amaranthaceae	None	Native	✓	✓	Common along roads throughout PSA.
Eryngium spinosepalum	Spiny-sepaled button-celery	Apiaceae	**List 1B.2**	Native	✓		Very uncommon, located in one vernal pool in Section 4; Keil 30737-1.

Scientific Name	Common Name	Family	Status	Origin	Option A	Option B	Notes and Collection Numbers
Lomatium utriculatum	Biscuit root	Apiaceae	None	Native	✓	✓	Occasional in untilled annual grasslands throughout PSA.
Vinca major	Periwinkle	Apocynaceae	None	Planted	✓		Section 33 ranch compound.
Asclepias eriocarpa	Milkweed	Apocynaceae	None	Native	✓	✓	Very uncommon; Section 18.
Asclepias fascicularis	Narrow-leaved milkweed	Apocynaceae	None	Native	✓	✓	Occasional in annual grasslands throughout PSA.
Ancistrocarphus filagineus	Woolly fish-hooks	Asteraceae	None	Native	✓	✓	Very uncommon; Section 28 north end.
Achyrachaena mollis	Blow-wives	Asteraceae	None	Native	✓	✓	Common in grasslands throughout PSA.
Agoseris grandiflora	Giant dandelion	Asteraceae	None	Native	✓		Occasional in grasslands in Sections 4 and 5.
Agoseris heterophylla	Annual mountain dandelion	Asteraceae	None	Native	✓	✓	Common in annual grasslands throughout PSA.
Anthemis cotula	Mayweed	Asteraceae	None	Introduced	✓	✓	Occasional along roads and in croplands.
Blepharizonia laxa	Big tarweed	Asteraceae	None	Native	✓		Occasional in Sections 5 and 33. Perry 10-52.
Centaurea melitensis	Tocolote	Asteraceae	None	Introduced	✓	✓	Uncommon in ruderal areas of the PSA.
Centaurea solstitialis	Yellow star-thistle	Asteraceae	None	Introduced	✓	✓	Uncommon in ruderal areas of the PSA.
Centromadia *[=Hemizonia]* ***fitchii***	Fitch's tarweed	Asteraceae	None	Native	✓	✓	Common in annual grasslands throughout PSA.
Centromadia *[=Hemizonia]* ***pungens***	Hayfield tarweed	Asteraceae	None	Native	✓	✓	Occasional in grassland areas of Option A.
Chaenactis glabriuscula	Pincushion	Asteraceae	None	Native	✓	✓	Very uncommon; few plants in north end of Section 16.
Chamomilla suaveolens	Pineapple weed	Asteraceae	None	Introduced	✓	✓	Very common in dirt ranch roads throughout PSA

Scientific Name	Common Name	Family	Status	Origin	Option A	Option B	Notes and Collection Numbers
Chondrilla juncea	Skeleton weed	Asteraceae	None	Introduced	✓		Noxious weed. One infestation in Section 5 cropland.
Conyza bonariensis	Asthmaweed	Asteraceae	None	Introduced	✓	✓	Uncommon along fence lines and other disturbed areas.
Corethrogyne [=*Lessingia*] ***filaginifolia***	California aster	Asteraceae	None	Native	✓	✓	Uncommon in Sections 4 and 5.
Deinandra [=*Hemizonia*] ***pentactis***	Salinas River tarplant	Asteraceae	None	Native	✓	✓	Occasional in grasslands within PSA
Gnaphalium palustre	Marsh cudweed	Asteraceae	None	Native	✓	✓	Wet areas; Section 4
Gutierrezia californica	Snakeweed	Asteraceae	None	Native	✓	✓	Very uncommon; Section 15 north end
Heterotheca sessiliflora ssp. ***echioides***	Goldenaster	Asteraceae	None	Native	✓	✓	Occasional in untilled grasslands in the southern portion of the PSA
Hypochaeris glabra	Smooth cat's-ear	Asteraceae	None	Introduced	✓	✓	Uncommon in annual grasslands throughout PSA
Hypochaeris radicata	Rough cat's ear	Asteraceae	None	Introduced	✓		Uncommon in annual grasslands throughout PSA
Isocoma acradenia	Alkali goldenbush	Asteraceae	None	Native	✓	✓	Very uncommon in untilled grasslands in Sections 8, 15, 16, and notably in Section 4
Lactuca serriola	Prickly lettuce	Asteraceae	None	Introduced	✓	✓	Uncommon in fallow croplands
Lagophylla ramosissima ssp. ***ramosissima***	Slender hare-leaf	Asteraceae	None	Native	✓	✓	Common in annual grasslands throughout PSA
Lasthenia ferrisiae	Ferris' goldfields	Asteraceae	**List 4.2**	Native	✓	✓	Very uncommon, occurs as a wind-blown waif
Lasthenia gracilis	Common goldfields	Asteraceae	None	Native	✓	✓	Abundant in annual grasslands throughout PSA. Notable in Sections 4, 5, 34, 35

Scientific Name	Common Name	Family	Status	Origin	Option A	Option B	Notes and Collection Numbers
Lasthenia minor	Coastal goldfields	Asteraceae	None	Native	✓	✓	Very uncommon in annual grasslands within PSA, usually occurring as a single plant
Layia munzii	Munz's tidy-tips	Asteraceae	**List 1B.1**	Native	✓	✓	Section 5 main population, scattered in Sections 4, 32, 33, 26. Dart 371, 374; Perry 10-23.
Layia pentachaeta ssp. ***albida***	Tidy-tips	Asteraceae	None	Native	✓	✓	Very uncommon; few plants in Section 15. Also observed along Hwy 58 just north of PSA; Dart 362.
Layia platyglossa	Tidy-tips	Asteraceae	None	Native	✓	✓	Abundant and widespread in PSA
Leptosyne [=*Coreopsis*] ***calliopsidea***	Tickseed	Asteraceae	None	Native	✓	✓	Very uncommon; Sections 15, 16, 22
Lessingia glandulifera var. ***pectinata***	Annual lessingia	Asteraceae	None	Native	✓		Locally common in sandy areas of Sections 4, 5, and 32.
Logfia *[=Filago]* ***gallica***	Herba impia	Asteraceae	None	Introduced	✓	✓	Occasional throughout PSA.
Logfia filaginoides *[=Filago californica]*	Cottonrose	Asteraceae	None	Native	✓	✓	Uncommon in grasslands. Dart 366.
Malacothrix californica	California dandelion	Asteraceae	None	Native	✓	✓	Uncommon on hills in Sections 15 and 16.
Malacothrix coulteri	Snake's head	Asteraceae	None	Native	✓	✓	Uncommon in grasslands throughout PSA.
Micropus californicus var. ***californicus***	Slender cottonweed	Asteraceae	None	Native	✓	✓	Common in patches in grasslands throughout PSA; Dart 341.
Microseris douglasii ssp. ***douglasii***	Douglas' silverpuffs	Asteraceae	None	Native	✓	✓	Common in grasslands throughout PSA. Keil 30493, 30744, 30745; Dart 370, 377.

Scientific Name	Common Name	Family	Status	Origin	Option A	Option B	Notes and Collection Numbers
Microseris douglasii ssp. ***tenella***	Douglas' silverpuffs	Asteraceae	None	Native	✓	✓	Common in grasslands throughout PSA
Microseris elegans	Silverpuffs	Asteraceae	None	Native	✓	✓	Occasional in annual grasslands throughout PSA
Monolopia lanceolata	Common hillside daisy	Asteraceae	None	Native	✓	✓	Uncommon as a waif in grasslands.
Psilocarphus brevissimus var. ***brevissimus***	Woolly-heads	Asteraceae	None	Native	✓	✓	Vernal pools in Sections 4, 19, and 20; Dart 363; Perry 10-28; Keil 30703, 30736.
Psilocarphus chilensis *[=P. tenellus* var. *globiferous]*	Round woolly-marbles	Asteraceae	None	Native	✓		Vernal pools in Section 4. Perry 10-27; Keil 30697, 30734.
Psilocarphus oregonus	Oregon woolly-heads	Asteraceae	None	Native	✓	✓	Vernal pools and ephemeral wetland depressions throughout PSA; Keil 30704, 30735.
Senecio vulgaris	Common groundsel	Asteraceae	None	Introduced	✓	✓	Occasional in fallow croplands
Sonchus oleraceus	Common sow-thistle	Asteraceae	None	Introduced	✓	✓	Uncommon in ranch compounds
Stebbinsoseris heterocarpa	Grassland silverpuffs	Asteraceae	None	Native	✓	✓	Common in grasslands throughout PSA; Dart 345.
Stephanomeria pauciflora	Wire lettuce	Asteraceae	None	Native	✓	✓	Common in annual grasslands throughout PSA. Keil 30747.
Stephanomeria elata (Tentative ID based on immature fruits)	Annual wire lettuce	Asteraceae	None	Native	✓	✓	Common in annual grasslands.
Stylocline gnaphalioides	Everlasting nest straw	Asteraceae	None	Native	✓		Occasional in grassland habitat
Uropappus lindleyi	Silver puffs	Asteraceae	None	Native	✓	✓	Common in grasslands throughout PSA; Dart 346.
Xanthium strumarium	Cocklebur	Asteraceae	None	Native	✓		Uncommon in ephemeral drainages.
Amsinckia lycopsoides	Fiddleneck	Boraginaceae	None	Native	✓	✓	Common throughout PSA; Keil 30668.

Scientific Name	Common Name	Family	Status	Origin	Option A	Option B	Notes and Collection Numbers
Amsinckia menziesii ssp. ***intermedia***	Common fiddleneck	Boraginaceae	None	Native	✓	✓	Abundant throughout PSA
Amsinckia menziesii ssp. ***menziesii***	Menzies' fiddleneck	Boraginaceae	None	Native	✓	✓	Common throughout PSA
Amsinckia tessellata ssp. ***gloriosa***	Bristly fiddleneck	Boraginaceae	None	Native	✓	✓	Occasional in PSA, especially in north; Keil 30667.
Amsinckia tessellata ssp. ***tessellata***	Bristly fiddleneck	Boraginaceae	None	Native	✓	✓	Common throughout PSA; Keil 30666.
Cryptantha intermedia	Cryptantha	Boraginaceae	None	Native	✓	✓	Occasional throughout PSA. Perry 10-21; Dart 375.
Heliotropium curassavicum	Salt heliotrope	Boraginaceae	None	Native	✓	✓	Uncommon in seasonally moist areas
Pectocarya linearis ssp. ***ferocula***	Pectocarya	Boraginaceae	None	Native	✓	✓	Common in patches within annual grasslands throughout PSA; Dart 344.
Pectocarya penicillata	Pectocarya	Boraginaceae	None	Native	✓	✓	Common in patches within annual grasslands throughout PSA; Dart 343
Plagiobothrys acanthocarpus	Adobe allocarya	Boraginaceae	None	Native	✓	✓	Common in wet areas throughout PSA. Dart 313; Keil 30691, 30731.
Plagiobothrys canescens	Valley popcorn flower	Boraginaceae	None	Native	✓	✓	Abundant in grasslands throughout PSA.
Plagiobothrys leptocladus	Alkali Plagiobothrys	Boraginaceae	None	Native	✓	✓	Occurs in vernal pools, wetlands in southern regions of the PSA. Keil 30732.
Athysanus pusillus	Common sandweed	Brassicaceae	None	Native	✓		Uncommon in grasslands; Dart 340.
Brassica nigra	Black mustard	Brassicaceae	None	Introduced	✓	✓	Uncommon agricultural weed
Capsella bursa-pastoris	Shepherd's purse	Brassicaceae	None	Introduced	✓	✓	Common in croplands and mesic roadsides throughout PSA.
Descurainia pinnata	Western tansy mustard	Brassicaceae	None	Native	✓		Very uncommon; Section 33

Scientific Name	Common Name	Family	Status	Origin	Option A	Option B	Notes and Collection Numbers
Descurainia sophia	Tansy mustard	Brassicaceae	None	Introduced	✓	✓	Abundant throughout PSA
Guillenia lasiophylla	California mustard	Brassicaceae	None	Native	✓	✓	Common in grasslands
Heterodraba unilateralis	Ladies' tongue mustard	Brassicaceae	None	Native	✓	✓	Uncommon in untilled annual grasslands
Hirschfeldia incana	Field mustard	Brassicaceae	None	Introduced	✓	✓	Common in fallow croplands and annual grasslands throughout PSA.
Lepidium acutidens	Alkali pepperwort	Brassicaceae	None	Native	✓	✓	Very uncommon along dirt ranch roads
Lepidium dictyotum	Peppergrass	Brassicaceae	None	Native	✓	✓	Common on dirt ranch roads. Perry 10-07, 10-10; Dart 347, 376.
Lepidium lasiocarpum var. ***lasiocarpum***	Peppergrass	Brassicaceae	None	Native	✓	✓	Uncommon in PSA, along dirt ranch roads and fence lines
Lepidium latifolium	Perennial peppercress	Brassicaceae	None	Introduced	✓	✓	Uncommon; Section 28, 33.
Lepidium nitidum var. ***nitidum***	Peppergrass	Brassicaceae	None	Native	✓	✓	Common on dirt ranch roads, occasional in croplands and grasslands
Raphanus raphanistrum	Jointed charlock	Brassicaceae	None	Introduced	✓		Uncommon waif
Sisymbrium altissimum	Tumble mustard	Brassicaceae	None	Introduced	✓	✓	Uncommon weed
Sisymbrium irio	London rocket	Brassicaceae	None	Introduced	✓	✓	Very uncommon weed
Sisymbrium orientale	Hedge mustard	Brassicaceae	None	Introduced	✓	✓	Common in fallow fields
Thysanocarpus curvipes	Lace pod	Brassicaceae	None	Native	✓	✓	Commonly in scattered patches within annual grasslands throughout PSA.
Tropidocarpum gracile	Dobie pod	Brassicaceae	None	Native	✓	✓	Very common in grasslands throughout PSA
Cholla sp.	Cholla	Cactaceae	None	Planted		✓	Section 18 ranch compound.

Scientific Name	Common Name	Family	Status	Origin	Option A	Option B	Notes and Collection Numbers
Opuntia sp.	Prickly pear	Cactaceae	None	Planted	✓		Section 4 ranch compound.
Callitriche marginata	Water starwort	Callitrichaceae	None	Native	✓	✓	Vernal and ephemeral pools throughout PSA; Keil 30698.
Sambucus nigra ssp. ***caerulea*** *[=S. mexicana]*	Blue elderberry	Caprifoliaceae	None	Planted	✓		Section 33 ranch compound.
Herniaria hirsuta ssp. ***cinerea***	Rupture wort	Caryophyllaceae	None	Native	✓	✓	Very common in annual grasslands throughout PSA.
Spergularia rubra	Sand spurrey	Caryophyllaceae	None	Introduced	✓	✓	Occasional along Section 19 roadsides.
Stellaria media	Common chickweed	Caryophyllaceae	None	Introduced	✓	✓	Uncommon weed in shady areas of ranch compounds.
Stellaria nitens	Shining starwort	Caryophyllaceae	None	Native	✓		Section 33 ranch compound.
Atriplex serenana var. ***serenana***	Saltbush	Chenopodiaceae	None	Native	✓	✓	Uncommon; Section 4 east fence, Section 19 west fence.
Chenopodium album	Lamb's quarters	Chenopodiaceae	None	Introduced	✓	✓	Common in agricultural fields.
Croton [=*Eremocarpus*] ***setigerus***	Turkey mullein	Chenopodiaceae	None	Native	✓	✓	Occasional in annual grasslands throughout PSA.
Monolepis nuttalliana	Poverty weed	Chenopodiaceae	None	Native		✓	Dirt ranch road at border of Sections 7 and 18; Dart 361.
Salsola tragus	Russian-thistle	Chenopodiaceae	None	Introduced	✓	✓	Common in disturbed areas throughout PSA.
Convolvulus arvensis	Field bindweed	Convolvulaceae	None	Introduced	✓	✓	Abundant in croplands throughout PSA
Cressa truxillensis	Alkali weed	Convolvulaceae	None	Native	✓	✓	Localized in areas of Option A, Sections 33 and 34.

Scientific Name	Common Name	Family	Status	Origin	Option A	Option B	Notes and Collection Numbers
Crassula aquatica	Water pygmy weed	Crassulaceae	None	Native	✓	✓	Occasional in vernal pools and ephemeral depressions; Keil 30700.
Crassula connata	Pygmy weed	Crassulaceae	None	Native	✓	✓	Common throughout PSA
Crassula tillea	Pygmy weed	Crassulaceae	None	Introduced	✓	✓	Uncommon in vernal pools in Section 4.
Elatine rubella	Waterwort	Elatinaceae	None	Native	✓		Vernal pools; Keil 30699.
Chamaesyce ocellata ssp. ***ocellata***	Prostrate spurge	Euphorbiaceae	None	Native	✓		Very uncommon; one location in Option A, Section 4.
Euphorbia spathulata	Spurge	Euphorbiaceae	None	Native	✓		Uncommon; Section 5 west end.
Astragalus didymocarpus var. ***didymocarpus***	Dwarf white milkvetch	Fabaceae	None	Native	✓	✓	Locally common in grasslands throughout PSA. Keil 30741, 30742, 30746.
Astragalus macrodon	Salinas milk-vetch	Fabaceae	**List 4.3**	Native	✓	✓	Occasional throughout PSA. Keil 30743.
Astragalus oxyphysus	Milk-vetch	Fabaceae	None	Native	✓		Uncommon; Section 34 along Hwy 58
Lotus humistratus	Hill lotus	Fabaceae	None	Native	✓	✓	Abundant in annual grasslands throughout PSA.
Lupinus bicolor	Miniature lupine	Fabaceae	None	Native	✓	✓	Abundant in grasslands throughout PSA.
Lupinus microcarpus var. ***microcarpus***	Chick lupine	Fabaceae	None	Native	✓	✓	Common in patches within annual grasslands throughout PSA.
Lupinus succulentus	Succulent lupine	Fabaceae	None	Native	✓	✓	Uncommon; Section 5.
Medicago polymorpha	California bur-clover	Fabaceae	None	Introduced	✓	✓	Occasional in ephemeral drainages throughout PSA.
Medicago sativa	Alfalfa	Fabaceae	None	Introduced	✓	✓	Section 28, roadside waif.
Melilotus indica	Annual sweet-clover	Fabaceae	None	Introduced	✓	✓	Uncommon in ephemeral drainages.

Scientific Name	Common Name	Family	Status	Origin	Option A	Option B	Notes and Collection Numbers
Robinia pseudoacacia	Black locust	Fabaceae	None	Planted	✓	✓	Residential landscape tree; Sections 28 and 33.
Trifolium albopurpureum var. ***albopurpureum***	Dove clover	Fabaceae	None	Native	✓	✓	Common in annual grasslands throughout the PSA.
Trifolium depauperatum var. ***depauperatum***	Cowbag clover	Fabaceae	None	Native	✓	✓	Uncommon in wet areas; Sections 4, 8, 15, 35; Dart 373.
Trifolium gracilentum var. ***gracilentum***	Pinpoint clover	Fabaceae	None	Native	✓	✓	Very common in annual grasslands throughout PSA.
Trifolium hirtum	Rose clover	Fabaceae	None	Introduced	✓	✓	Uncommon to locally common weed in croplands areas of the PSA.
Trifolium microcephalum	Miniature clover	Fabaceae	None	Native	✓	✓	Uncommon in annual grasslands.
Trifolium willdenovii	Tomcat clover	Fabaceae	None	Native	✓		Section 4 roadside ditch. Dart 368.
Vicia hassei	Hasse's vetch	Fabaceae	None	Introduced	✓		Uncommon; Section 5 west end. Dart 378; Keil 30740.
Vicia villosa ssp. ***varia***	Winter vetch	Fabaceae	None	Introduced	✓	✓	Common in fallow croplands and grasslands throughout PSA.
Frankenia salina	Alkali heath	Frankeniaceae	None	Native	✓	✓	Uncommon in seasonal wetlands.
Zeltnera *[=Centaurium]* ***exultata***	Centaury	Gentianaceae	None	Native	✓		Occasional in Section 4 and 5 grasslands. Dart 418.
California macrophylla	Round-leaved filaree	Geraniaceae	**List 1B.1**	Native	✓		Very uncommon; Sections 5 and 33.
Erodium botrys	Storkbill filaree	Geraniaceae	None	Introduced	✓		Uncommon; Section 4.
Erodium cicutarium	Redstem filaree	Geraniaceae	None	Introduced	✓	✓	Extremely abundant throughout PSA.

Scientific Name	Common Name	Family	Status	Origin	Option A	Option B	Notes and Collection Numbers
Phacelia ciliata	Great Valley phacelia	Hydrophyllaceae	None	Native	✓	✓	Common in annual grasslands and fallow croplands throughout PSA.
Lamium amplexicaule	Henbit	Lamiaceae	None	Introduced	✓	✓	Uncommon agricultural weed in Sections 19 and 20.
Marrubium vulgare	Horehound	Lamiaceae	None	Introduced	✓		Uncommon. Section 33 around compound, Section 4 around old equipment.
Trichostema lanceolatum	Vinegar weed	Lamiaceae	None	Native	✓	✓	Abundant in annual grasslands throughout PSA
Mentzelia affinis	Yellowcomet	Loasaceae	None	Native	✓	✓	Occasional in grasslands and fallow croplands throughout PSA.
Lythrum hyssopifolia	Loosestrife	Lythraceae	None	Introduced	✓	✓	Uncommon in wetlands.
Malva nicaeensis	Bull mallow	Malvaceae	None	Introduced	✓	✓	Occasional in weedy areas of the PSA.
Malvella leprosa	Alkali-mallow	Malvaceae	None	Native	✓	✓	Occasional in alkaline or other mesic areas of the PSA.
Calandrinia ciliata	Red maids	Montiaceae	None	Native	✓	✓	Common throughout the PSA.
Morus alba	Mulberry	Moraceae	None	Planted	✓		Section 33 ranch compound .
Syringa sp.	Cultivated lilac	Oleaceae	None	Planted	✓		Section 33 at ranch compound.
Camissonia campestris ssp. ***campestris***	Sun cup	Onagraceae	None	Native	✓	✓	Very uncommon; Section 28.
Camissonia contorta	Sun cup	Onagraceae	None	Native	✓		Locally common in sandy areas of Sections 4 and 5; Keil 30738.
Camissonia strigulosa	Sun cup	Onagraceae	None	Native	✓	✓	Occasional in patches within annual grasslands throughout PSA; Dart 338, 367; Keil 30701, 30739.
Clarkia affinis	Farewell-to-spring	Onagraceae	None	Native	✓	✓	Common in annual grasslands throughout PSA.

Scientific Name	Common Name	Family	Status	Origin	Option A	Option B	Notes and Collection Numbers
Clarkia purpurea	Wine cups	Onagraceae	None	Native	✓	✓	Occasional in annual grasslands in southern portions of the PSA.
Epilobium brachycarpum	Annual willow-herb	Onagraceae	None	Native	✓	✓	Uncommon in ruderal areas of the PSA.
Epilobium pygmaeum	Pygmy willow-herb	Onagraceae	None	Native	✓	✓	Ephemeral aquatic habitats throughout PSA. Keil 30733.
Eschscholzia californica	California poppy	Papaveraceae	None	Native	✓	✓	Locally common in annual grasslands in Sections 28 and 33, uncommon elsewhere.
Eschscholzia rhombipetala	Diamond-petaled California poppy	Papaveraceae	**List 1B.1**	Native	✓		Section 5, west edge, just outside the PSA boundary. Perry 10-03.
Papaver hybridum	Round pricklyhead poppy	Papaveraceae	None	Introduced		✓	Occasional in croplands throughout PSA. Keil 30494.
Platystemon californicus	Cream cups	Papaveraceae	None	Native	✓	✓	Very uncommon; Sections 28 and 32. Dart 339.
Antirrhinum ovatum	Oval-leaved snapdragon	Plantaginaceae	**List 4.2**	Native	✓		Very uncommon, in Section 5 on clay soil with deep vertical cracks. Keil 30907; Dart 421.
Plantago erecta	California plantain	Plantaginaceae	None	Native	✓	✓	Occasional in patches within grassland habitat throughout PSA.
Veronica peregrina ssp. ***xalapensis***	Wandering speedwell	Plantaginaceae	None	Native	✓	✓	Ephemeral pool habitats throughout the PSA. Dart 369; Keil 30730.
Eriastrum pluriflorum	Many-flowered eriastrum	Polemoniaceae	None	Native	✓		One individual observed, in Section 33.
Gilia clivorum	Purple-spot gilia	Polemoniaceae	None	Native	✓	✓	Occasional in scattered patches in annual grasslands throughout the PSA.

Scientific Name	Common Name	Family	Status	Origin	Option A	Option B	Notes and Collection Numbers
Leptosiphon*[=Linanthus]* ***pygmaeus*** ssp. ***continentalis***	Baby-stars	Polemoniaceae	None	Native	✓		Uncommon; Sections 4, 35. Perry 10-22.
Navarretia atractyloides	Navarretia	Polemoniaceae	None	Native	✓		Uncommon; Section 4 south fence.
Navarretia jaredii	Paso Robles navarretia	Polemoniaceae	**List 4.3**	Native	✓	✓	Occasional in local patches within the PSA. Dart 416, 417, 420.
Navarretia nigelliformis ssp. ***radians***	Shining navarretia	Polemoniaceae	**List 1B.2**	Native	✓		Very uncommon; one patch in Section 5, southeast corner. Perry 10-49.
Phlox gracilis	Slender phlox	Polemoniaceae	None	Native	✓	✓	Common in annual grasslands throughout the PSA.
Chorizanthe obovata	Spoon-sepal spineflower	Polygonaceae	None	Native	✓		Very uncommon; one plant found in Section 4.
Chorizanthe uniaristata	One-awn spineflower	Polygonaceae	None	Native	✓	✓	Uncommon; Sections 4, 28, and 33. Perry 10-44.
Chorizanthe xanti	Turkish rugging	Polygonaceae	None	Native	✓	✓	Very uncommon; one plant found in Section 4, one plant in Section 28.
Eriogonum angulosum	Angle-stem buckwheat	Polygonaceae	None	Native	✓		Uncommon, scattered in Sections 5 and 34.
Eriogonum baileyi var. ***baileyi***	Bailey's buckwheat	Polygonaceae	None	Native	✓	✓	Very uncommon, in sandy wash in Section 4; also in Section 29 prior to plowing. Keil 30908.
Eriogonum gracillimum	Rose-and-white buckwheat	Polygonaceae	None	Native	✓	✓	Occasional in dry areas of the PSA.
Polygonum aviculare ssp. ***depressum*** *[= P. arenastrum]*	Knotweed	Polygonaceae	None	Introduced	✓	✓	Common weed of croplands, roadsides, and mesic areas.
Rumex crispus	Dock	Polygonaceae	None	Introduced	✓	✓	Very uncommon; Section 28.
Claytonia parviflora ssp. ***parviflora***	Miner's lettuce	Portulacaceae	None	Native	✓		Occasional in ranch compounds; Sections 28 and 33.

Scientific Name	Common Name	Family	Status	Origin	Option A	Option B	Notes and Collection Numbers
Anagallis arvensis	Scarlet pimpernel	Primulaceae	None	Introduced	✓	✓	Very uncommon weed in anthropogenic areas.
Dodecatheon clevelandii	Shooting star	Primulaceae	None	Native	✓		Very uncommon; Section 5.
Delphinium parryi ssp. ***parryi***	Larkspur	Ranunculaceae	None	Native	✓	✓	Very uncommon; Sections 5 and 8.
Myosurus minimus	Mousetails	Ranunculaceae	None	Native	✓	✓	Section 20 vernal pool. Perry 10-08, 10-29.
Myosurus sessilis	Mousetails	Ranunculaceae	None	Native	✓		Section 4 vernal pools. Perry 10-11; Keil 30689.
Cotoneaster lacteus	Cotoneaster	Rosaceae	None	Planted	✓		Section 33 ranch compound.
Photinia fraseri	Photinia	Rosaceae	None	Planted	✓		Section 33 ranch compound.
Prunus sp.	Cherry	Rosaceae	None	Planted	✓		Section 33 ranch compound.
Populus fremontii ssp. ***fremontii***	Fremont cottonwood	Salicaceae	None	Native	✓		Section 33 drainage, one tree.
Salix laevigata	Red willow	Salicaceae	None	Native	✓		Section 33 drainage, very uncommon, heavily grazed.
Castilleja attenuata	Valley tassels	Scrophulariaceae	None	Native	✓	✓	Uncommon in annual grasslands throughout PSA; Dart 365.
Castilleja brevistyla	Owl's clover	Scrophulariaceae	None	Native	✓	✓	Common in annual grasslands throughout PSA. Dart 364; Perry 10-13, 10-26; Keil 30695 (Determined by Margriet Weatherwax).
Castilleja brevistyla *x* ***densiflora***	Hybrid owl's clover	Scrophulariaceae	None	Native	✓		Common in Section 4; Keil 30694, 30696 (Determined by Margriet Weatherwax).
Castilleja densiflora ssp. ***densiflora***	Owl's clover	Scrophulariaceae	None	Native	✓		Uncommon in Section 4. Perry 10-14, 10-25; Keil 30693 (Determined by Margriet Weatherwax).

Scientific Name	Common Name	Family	Status	Origin	Option A	Option B	Notes and Collection Numbers
Castilleja densiflora ssp. ***gracilis***	Owl's clover	Scrophulariaceae	None	Native	✓		Occasional in patches in Sections 4 and 5. Perry 10-24;
Castilleja exserta ssp. ***exserta***	Purple owl's clover	Scrophulariaceae	None	Native	✓	✓	Common to locally abundant in untilled grasslands throughout PSA
Ailanthus altissima	Tree of Heaven	Simaroubaceae	None	Planted	✓	✓	Ranch compounds in Sections 28, 33.
Datura wrightii	Jimson weed	Solanaceae	None	Native	✓	✓	Common in fallow and bare croplands throughout PSA. Keil 30909.
Nicotiana quadrivalvis	Tobacco	Solanaceae	None	Native	✓	✓	Occasional in croplands throughout PSA.
Solanum elaeagnifolium	Horse nettle	Solanaceae	None	Introduced	✓		A few individuals along roadside at Highway 58 in Section 34. Noxious weed. Perry 10-53.
Tamarix parviflora	Tamarisk	Tamaricaceae	None	Planted	✓	✓	Section 28.
Ulmus sp.	Elm	Ulmaceae	None	Planted	✓	✓	Sections 18, 28, 33.
Verbena lasiostachys	Verbena	Verbenaceae	None	Native	✓		Very uncommon. Section 33.
Parthenocissus vitacea	Virginia creeper	Vitaceae	None	Planted	✓	✓	Section 28 ranch compound.
Tribulus terrestris	Puncture vine	Zygophyllaceae	None	Introduced	✓	✓	Along Bitterwater road in section 19.

Angiosperms, Monocotyledons – 41 species

Scientific Name	Common Name	Family	Status	Origin	Option A	Option B	Notes and Collection Numbers
Agave sp.	Agave	Agavaceae	None	Planted	✓	✓	Section 15 near water trough
Juncus bufonius var. ***bufonius***	Toad rush	Juncaceae	None	Native	✓	✓	Vernal pools and ephemeral wetlands throughout PSA; Keil 30727.
Juncus luciensis	Santa Lucia dwarf rush	Juncaceae	**List 1B.2**	Native	✓		Vernal pools in Section 4; Keil 30728.
Juncus mexicanus	Mexican rush	Juncaceae	None	Native	✓		Uncommon; seasonal wetlands in ephemeral drainages
Juncus uncialis	Inch-high rush	Juncaceae	None	Native	✓		Section 4 vernal pools. Perry 10-09; Dart 360; Keil 30688.
Aegilops triuncialis	Barbed oatgrass	Poaceae	None	Introduced	✓	✓	Very uncommon in PSA. One stand identified in Section 16 in 2008.
Avena fatua	Slender wild oat	Poaceae	None	Introduced	✓	✓	Common in grasslands and croplands throughout PSA.
Bromus catharticus	Rescue grass	Poaceae	None	Introduced	✓	✓	Very uncommon. Observed in southern Section 15.
Bromus diandrus	Ripgut brome	Poaceae	None	Introduced	✓	✓	Common along fence lines throughout PSA.
Bromus hordeaceus	Soft chess brome	Poaceae	None	Introduced	✓	✓	Abundant in annual grasslands throughout PSA
Bromus madritensis ssp. ***rubens***	Red top brome	Poaceae	None	Introduced	✓	✓	Abundant in annual grasslands throughout PSA
Bromus tectorum	Cheat grass	Poaceae	None	Introduced	✓	✓	Uncommon in annual grasslands throughout PSA.
Crypsis schoenoides	Swamp pricklegrass	Poaceae	None	Introduced	✓		Very uncommon; Section 33 main drainage.
Cynodon dactylon	Bermuda grass	Poaceae	None	Introduced	✓	✓	Along Highway 58, and other anthropogenic habitats.

Scientific Name	Common Name	Family	Status	Origin	Option A	Option B	Notes and Collection Numbers
Deschampsia danthonioides	Hairgrass	Poaceae	None	Native	✓		Vernal pools; Keil 30690, 30737.
Distichlis spicata	Salt grass	Poaceae	None	Native	✓	✓	Locally common in seasonal wetlands.
Elymus elymoides	Squirrel-tail	Poaceae	None	Native		✓	Very uncommon; Section 8.
Hordeum depressum	Alkali barley	Poaceae	None	Native	✓		Very uncommon; vernal pools in Section 4. Perry 10-30; Keil 30725.
Hordeum marinum ssp. ***gussoneanum***	Mediterranean barley	Poaceae	None	Introduced	✓	✓	Very uncommon; vernal pools in Section 4; Dart 335; Perry 10-12.
Hordeum murinum ssp. ***murinum***	Foxtail barley	Poaceae	None	Introduced	✓	✓	Common in grasslands, roadsides, and fence lines throughout PSA. Dart 342.
Hordeum murinum ssp. ***leporinum***	Foxtail barley	Poaceae	None	Introduced	✓	✓	Common in grasslands, roadsides, and fence lines throughout PSA.
Hordeum vulgare	Cultivated barley	Poaceae	None	Introduced	✓	✓	Primary grain crop in agricultural lands, occasional in grasslands.
Koeleria phleoides	Annual June grass	Poaceae	None	Introduced		✓	Uncommon; Section 8.
Leymus triticoides	Creeping wildrye	Poaceae	None	Native	✓	✓	Uncommon; Sections 5, 28, 29.
Lolium multiflorum	Italian ryegrass	Poaceae	None	Introduced	✓	✓	Uncommon around pool in Section 19; scattered individuals in Sections 15 and 16.
Nassella cernua	Slender needlegrass	Poaceae	None	Native	✓	✓	Very uncommon; Sections 27 and 28, and along Highway 58 near Section 34.
Poa annua	Annual bluegrass	Poaceae	None	Introduced	✓	✓	Occasional agricultural weed.
Poa bulbosa	Bulbous bluegrass	Poaceae	None	Introduced	✓		Uncommon in grasslands in southern end of PSA.

Scientific Name	Common Name	Family	Status	Origin	Option A	Option B	Notes and Collection Numbers
Poa secunda ssp. ***secunda***	One-sided bluegrass	Poaceae	None	Native	✓	✓	Very uncommon in grasslands throughout PSA.
Polypogon monspeliensis	Annual beardgrass	Poaceae	None	Introduced	✓	✓	Section 32, near water tank .
Schismus arabicus	Mediterranean grass	Poaceae	None	Introduced	✓	✓	Abundant in dry grasslands and croplands throughout PSA
Secale cereale	Merced Rye	Poaceae	None	Introduced	✓	✓	Uncommon in croplands throughout PSA.
Triticum aestivum	Cultivated wheat	Poaceae	None	Planted	✓	✓	Occasional in croplands throughout PSA.
Vulpia microstachys ssp. ***ciliata***	Annual fescue	Poaceae	None	Native	✓	✓	Common in untilled annual grasslands.
Vulpia microstachys ssp. ***pauciflora***	Annual fescue	Poaceae	None	Native	✓	✓	Common in untilled annual grasslands.
Vulpia myuros ssp. ***hirsuta***	Annual fescue	Poaceae	None	Introduced	✓	✓	Common in disturbed grasslands and fallow croplands.
Vulpia myuros ssp. ***myuros***	Annual fescue	Poaceae	None	Introduced	✓	✓	Common in disturbed grasslands and fallow croplands.
Bloomeria crocea	Common goldenstar	Themidaceae	None	Native	✓	✓	Very uncommon; Section 8.
Brodiaea terrestris ssp**.** ***kernensis***	Brodiaea	Themidaceae	None	Native	✓		Locally common in Section 4; Keil 30726.
Dichelostemma capitatum	Blue dicks	Themidaceae	None	Native	✓	✓	Occasional in untilled annual grasslands.
Muilla maritima	Common Muilla	Themidaceae	None	Native	✓		Uncommon in untilled annual grasslands.

6.3.1 Botanical data

Data collected during our transect and focused botanical surveys conducted from March through July 2010 was compiled according to USGS land Section (Table 11). With data compiled in this manner we then calculated species richness (the total number of taxa in a given area) within each Project Option (Table 12). Table 13 provides a comparison of the overall botanical data by Project Option.

Species richness varies by land Section, and is loosely correlated to the number of habitats and dominant habitat type within each Section. Sections with more habitats, particularly when habitats are of higher quality such as vernal pools, tended to support a greater number of plant species.

The dominant habitat types, by size, within the PSA are cropland and annual grassland. Annual grassland within the PSA contains a higher botanical diversity than cropland. Proposed Option A, comprised of the southerly land Sections of the PSA, contains a greater percent cover of annual grassland than Option B, and therefore supports a higher species richness; 242 species versus 185 species. Additionally, the higher quality of habitat within Option A supports a higher number of special status plant species; 9 species versus 4 species in Option B (Tables 12 and 13).

TABLE 11. SPECIES RICHNESS BY SECTION. Species richness data is presented for all land Sections within the PSA. The list is organized in descending order of total number of species.

Section	Species Richness	Percent of Total Species in PSA	Percent Native	Percent Introduced	Number of Plant Families	Vernal Pools Present?
4	147	60	73	27	35	✓
33	141	57	63	37	37	✓
28	122	49	66	34	31	
5	121	49	74	26	30	
34	119	48	71	29	26	✓
35	100	40	72	28	23	
16	97	39	62	38	27	
15	93	38	67	33	24	
8	88	36	64	36	22	
29	73	30	64	36	19	
22	73	30	70	30	21	
27	73	30	75	25	23	
26	72	29	74	26	20	
32	70	28	76	24	24	✓
21	67	27	55	45	20	
17	55	22	53	47	16	
18	52	21	52	48	22	
20	47	19	57	43	23	✓
19	46	19	57	43	22	✓
7	40	16	48	53	13	

TABLE 12. SPECIES RICHNESS BY PROJECT OPTION. Botanical species richness data is presented for Options A and B.

Option	Species Richness (Total No. Taxa)	Percent of Total Taxa in PSA	Percent of Option is Cropland Habitat	Percent of Option is Grassland Habitat
A	243	98	56% (4,380 acres)	43% (3,356 acres)
B	185	75	74% (4,712 acres)	26% (1,689 acres)

TABLE 13. BOTANICAL DATA PROJECT OPTION COMPARISON. Botanical data is provided for both proposed project Options.

Category	Option A	Option B
Total Number of Plant Species (Species Richness)	243	185
Percent of Total PSA List	98%	75%
Number of Species by Life Form	1 Fern 5 Gymnosperms 198 Dicot Angiosperms 39 Monocot Angiosperms	1 Fern 1 Gymnosperm 151 Dicot Angiosperms 32 Monocot Angiosperms
Origin	158 Native 66 Introduced 19 Planted (complete landscape list not compiled)[3]	117 Native 59 Introduced 9 Planted (complete landscape list not compiled)[3]
Number of Plant Families	52 Families	41 Families
FESA or CESA species	None	None

[3] Landscape plants that have persisted in areas of the PSA that are not currently inhabited were included. Landscape plants in currently maintained landscaped areas surrounding existing inhabited residences were not included.

Category	Option A	Option B
CNPS List 1B species	**5 Species** Round-leaved Filaree CNPS List 1B.1 Spiny-sepaled Button Celery CNPS List 1B.2 Santa Lucia Dwarf Rush CNPS List 1B.2 Munz's Tidy-tips CNPS List 1B.2 Shining Navarretia CNPS List 1B.2	**1 Species** Munz's Tidy-tips CNPS List 1B.2
CNPS List 4 species	**4 Species** Oval-leaved Snapdragon CNPS List 4.2 Salinas Milk-vetch CNPS List 4.3 Ferris' Goldfields CNPS List 4.2 Paso Robles Navarretia CNPS List 4.3	**3 Species** Salinas Milk-vetch CNPS List 4.3 Ferris' Goldfields CNPS List 4.2 Paso Robles Navarretia CNPS List 4.3

6.3.2 Special status plants identified within and adjacent to the PSA

We identified nine special status plant species within the PSA boundaries and one additional special status plant species just outside the PSA boundary. The locations of special status plants identified within and adjacent to the PSA are indicated on BR Map 12 in Section 13.0. Detailed results of special status plant occurrences within the PSA, including separate listings for Option A and Option B, are provided below (subsections A through J, and Table 14).

A. Oval-leaved Snapdragon (*Antirrhinum ovatum*) is a CNPS List 4.2 species that occurs in one area of cropland habitat in the east end of Section 5, Option A. It was first located during a botanical survey conducted by J. Dart and M. Perry in cropland areas of Option A, Section 5, on June 30, 2010. Continued focused surveys for *A. ovatum* were conducted on July 5 with Dr. David J. Keil to determine the extent of the occurrence and to search for additional localities. A total of approximately 35 individuals were located over an area of 0.8 acres (Table 14). The plants were widely scattered in a cropland field planted to grain. Clay soils with deep vertical cracks characteristic of Vertisol soils were typical of the occurrence area. Soils observed at this location were consistent with the soil map unit depicted by the NRCS Carrizo soil survey for this location. This Vertisol soil does not occur on NRCS maps anywhere else in the PSA, and characteristic heavy clay content and deep soil cracks have not been observed elsewhere in the PSA during our extensive site surveys. West of the

occurrence the adjacent cropland field was plowed bare at the time oval-leaved snapdragon was blooming in June. Soils in a portion of this area may be suitable for oval-leaved snapdragon, and a viable seed bank may be present. We expect this occurrence is localized where found, with a possible extension to the west if farming practices were eliminated.

B. Salinas Milk-vetch (*Astragalus macrodon*) is a CNPS List 4.3 species that occurs in scattered patches throughout the PSA, in both TSF Project Options. It is much more common in southern areas of the PSA, in Option A, where approximately 646 plants were counted. In Option B, a total of approximately 139 plants were counted. Salinas milk-vetch occurs over an area of approximately 14,575 square feet (0.33 acre) in Option A, and 5,825 square feet (0.1 acres) in Option B.

C. Round-leaved Filaree (*California macrophylla*) is a CNPS List 1B.1 species that occurs in two locations within the PSA, in Sections 5 and 33 of Option A. It does not occur in Option B. A total of approximately 200 plants are present, 100 in each occurrence. In all, round-leaved filaree occurs over an area of approximately 59,661 square feet (1.4 acres). In Section 5, round-leaved filaree was located along the west edge of Option A, just uphill from a recently cultivated field, occurring as scattered individuals within an approximately 1,500 square foot area. In Section 33, approximately 100 individuals are widely scattered over 1.3 acres (58,161 square feet).

D. Spiny-sepaled Button-celery (*Eryngium spinosepalum*) is a CNPS List 1B.2 species that occurs in one large vernal pool in the northern part of Section 4, Option A. Five individuals were present. This species was not located in any other vernal pools within the PSA.

E. Diamond-petaled California Poppy (*Eschscholzia rhombipetala*) is a CNPS List 1B.1 species that occurs in a small isolated population just outside and southwest of the Option A boundary in Section 5. The locality is in a recently plowed strip of land, adjacent to a barley field. This occurrence represents a new locality for the species, and is currently the second verified extant population in San Luis Obispo County. This population was visited three times in spring 2010 to estimate population size, map the occurrence, photo-document the occurrence with photos of key features for the taxon, and watch for seed set. Diamond-petaled California poppy was first detected on March 19, when a single individual was observed, and the occurrence was estimated at less than 20 individuals in a 20-foot by 10-foot area. Dr. David J. Keil visited the population with M. Perry and J. Dart on March 22 to get a photographic record, population count, and a description of the site characteristics. The population consisted of 33 plants in an area less than 1,000 square feet in size. Dr. Keil, Perry and Dart revisited the site on April 27 and found only 13 plants, some in bloom and some in fruit.

F. Santa Lucia Dwarf Rush (*Juncus luciensis*) is a CNPS List 1B.2 species that is locally abundant in two vernal pools in Section 4, Option A. This species was identified during a site visit with Dr. David J. Keil on April 27, 2010 during which this species was distinguished from the common inch-high rush (*Juncus uncialis*) that is also abundant in the vernal pools. The area of occurrence is estimated at 1,000 square feet in each of two pools. Santa Lucia dwarf rush was not identified in any

other habitat type, but the population in Section 4 is presumed stable and this species is expected to occur regularly in those years in which the vernal pools receive adequate rainfall for plants to germinate.

G. Ferris' Goldfields (*Lasthenia ferrisiae*) is a CNPS List 4.2 species that occurs only as scattered individuals within the Option A and Option B, Sections 28, 33, and 5, with no locations having more than one individual. The low number of plants at each occurrence suggests habitat within the PSA is marginal at best for this species. These waif-like occurrences likely represent germination of windblown seed from large populations in California Valley south and east of the PSA.

H. Munz's tidy-tips (*Layia munzii*) is a CNPS List 1B.2 species that occurs as scattered individuals or small patches in Sections 26, 28, 32, 33, 34, and 35, with larger, more stable patches occurring in Sections 4 and 5. Approximately 630 plants were counted in Option A, spread out over 39.8 acres of land. Only 12 plants were counted in Option B, within an area of approximately 220 square feet. Most of the suitable habitat within the PSA is highly disturbed from farming and grazing, which reduces the quality of the habitats for Munz's tidy-tips. In Section 26, three scattered individuals were found; in Section 28 the species was observed in two patches, consisting of 1 and approximately 10 individuals; four individuals were located in Section 32, at three distinct locations; Section 33 had four individuals, in four distinct locations. Two individual plants were located just outside the PSA boundary in Section 34, and only one individual was observed in Section 35. These patches and scattered individuals have a population density of only a few plants per square mile.

Section 4 supports one occurrence estimated at 200 plants in an area of approximately 9.7 acres. Only 2.4 acres of this area is within the PSA boundary. Section 5 has the highest density of Munz's tidy-tips, which occurs as a common, consistent member of an annual grassland community that occupies an area adjacent to barley fields at the west and southwest edges of the Option A, with additional scattered individuals and small patches occurring west of the Option A in CRP grasslands with scattered junipers. Munz's layia is expected to be a stable component of annual grassland habitat in Option A, with a high probability of occurring in Sections 4 and 5 annually. All other localities of Munz's tidy-tips are of one or a few plants which we consider accidental introductions subject to annual variability in terms of location and abundance.

I. Paso Robles Navarretia (*Navarretia jaredii*) is a CNPS List 4.3 species that occurs as scattered patches throughout the southern areas of the PSA. Where present, it can be locally abundant in small areas of suitable soil. A total of approximately 2,918 plants were estimated in Option A, over an area of 23,150 square feet (0.5 acre). In Option B, a total of 1,000 plants were estimated occurring in an area of approximately 1,500 square feet.

J. Shining Navarretia (*Navarretia nigelliformis* ssp. *radians*) is a CNPS List 1B.2 species that occurs in one isolated occurrence in Option A, Section 5. The occurrence consists of approximately 100 plants over an area of about 800 square feet. Most of the plants are clustered in the bottom of an ephemeral swale. Shining navarretia was not detected in any other locations within the PSA.

TABLE 14. SPECIAL STATUS PLANT OCCURRENCE DATA. Data is provided for all special status plant locations within and immediately adjacent to the PSA. Totals are provided for Option A and Option B separately.

Common Name	Scientific Name	Status	Topaz Solar Farm Project Option	USGS Land Section	Date Observed	Latitude (WGS 84)	Longitude (WGS 84)	Approx. Number of Plants	Size of Occurrence (sq. ft.) (Minimum size 10 sq. ft.)
Oval-leaved Snapdragon	*Antirrhinum ovatum*	CNPS List 4.2	A	5	6/30/10 7/5/2010	35.34943	-120.05766	35	34,072 (0.8 acre)
Oval-leaved Snapdragon Total			A					~35 plants	34,072 (0.8 acre)
Oval-leaved Snapdragon Total			B					0 plants	0
Salinas Milk-vetch	*Astragalus macrodon*	CNPS List 4.3	A	4	5/5/2010	35.349610	-120.042740	1	10
Salinas Milk-vetch	*Astragalus macrodon*	CNPS List 4.3	A	5	5/28/2010	35.337580	-120.066010	250	2,500
Salinas Milk-vetch	*Astragalus macrodon*	CNPS List 4.3	A	5	5/28/2010	35.347310	-120.070560	1	100
Salinas Milk-vetch	*Astragalus macrodon*	CNPS List 4.3	A	33	6/11/2010	35.358180	-120.057170	100	750
Salinas Milk-vetch	*Astragalus macrodon*	CNPS List 4.3	Out	33	6/11/2010	35.351756	-120.043260	3	100
Salinas Milk-vetch	*Astragalus macrodon*	CNPS List 4.3	Out	33	6/11/2010	35.353317	-120.043699	30	1,000
Salinas Milk-vetch	*Astragalus macrodon*	CNPS List 4.3	A	33	6/11/2010	35.356080	-120.054810	35	100
Salinas Milk-vetch	*Astragalus macrodon*	CNPS List 4.3	A	33	6/11/2010	35.356450	-120.055140	25	100
Salinas Milk-vetch	*Astragalus macrodon*	CNPS List 4.3	A	33	6/11/2010	35.356910	-120.055400	3	100
Salinas Milk-vetch	*Astragalus macrodon*	CNPS List 4.3	A	33	6/11/2010	35.357480	-120.055930	25	800
Salinas Milk-vetch	*Astragalus macrodon*	CNPS List 4.3	A	33	6/11/2010	35.358530	-120.056810	4	100
Salinas Milk-vetch	*Astragalus macrodon*	CNPS List 4.3	A	33	6/11/2010	35.358830	-120.057040	40	3,000

Common Name	Scientific Name	Status	Topaz Solar Farm Project Option	USGS Land Section	Date Observed	Latitude (WGS 84)	Longitude (WGS 84)	Approx. Number of Plants	Size of Occurrence (sq. ft.) (Minimum size 10 sq. ft.)
Salinas Milk-vetch	*Astragalus macrodon*	CNPS List 4.3	A	33	6/11/2010	35.364480	-120.056430	5	100
Salinas Milk-vetch	*Astragalus macrodon*	CNPS List 4.3	A/B	15	6/15/2010	35.399550	-120.040250	130	5,600
Salinas Milk-vetch	*Astragalus macrodon*	CNPS List 4.3	A/B	16	6/15/2010	35.409810	-120.043700	9	225
Salinas Milk-vetch	*Astragalus macrodon*	CNPS List 4.3	Out	4	6/30/10	35.351593	-120.042540	25	34,948 (0.8 acre)
Salinas Milk-vetch	*Astragalus macrodon*	CNPS List 4.3	A	5	7/5/2010	35.351010	-120.056980	13	1000
Salinas Milk-vetch Total			A					~646 plants	14,485 (0.33 acre)
Salinas Milk-vetch Total			B					~139 plants	5,825 (0.1 acre)
Round-leaved Filaree	*California macrophylla*	CNPS List 1B.1	A	5	4/16/2010	35.349620	-120.070400	100	1,500
Round-leaved Filaree	*California macrophylla*	CNPS List 1B.1	A	33	4/16/2010 4/27/2010 5/24/2010	35.352310	-120.049460	100	58,161 (1.3 acre)
Round-leaved Filaree Total			A					~200 plants	59,661 (1.4 acre)
Round-leaved Filaree Total			B					0 plants	0
Spiny-sepaled Button Celery	*Eryngium spinosepalum*	CNPS List 1B.2	A	4	4/23/2010	35.347670	-120.047520	5	100
Spiny-sepaled Button Celery Total			A					5 plants	100
Spiny-sepaled Button Celery Total			B					0 plants	0

Common Name	Scientific Name	Status	Topaz Solar Farm Project Option	USGS Land Section	Date Observed	Latitude (WGS 84)	Longitude (WGS 84)	Approx. Number of Plants	Size of Occurrence (sq. ft.) (Minimum size 10 sq. ft.)
Diamond-petaled California Poppy	*Eschscholzia rhombipetala*	CNPS List 1B.1	Out	5	3/19/2010 4/27/2010	35.339780	-120.067210	34	500
Diamond-petaled California Poppy Total			A					0 plants	0
Diamond-petaled California Poppy Total			B					0 plants	0
Santa Lucia Dwarf Rush	*Juncus luciensis*	CNPS List 1B.2	A	4	4/27/2010	35.347670	-120.047520	500	1,000
Santa Lucia Dwarf Rush	*Juncus luciensis*	CNPS List 1B.2	A	4	4/27/2010	35.346144	-120.045636	500	1,000
Santa Lucia Dwarf Rush Total			A					~1,000 plants	2,000
Santa Lucia Dwarf Rush Total			B					0 plants	0
Ferris' Goldfields	*Lasthenia ferrisiae*	CNPS List 4.2	A/B	28	3/18/2010	35.372228	-120.046375	1	10
Ferris' Goldfields	*Lasthenia ferrisiae*	CNPS List 4.2	A/B	28	3/18/2010	35.377983	-120.051327	1	10
Ferris' Goldfields	*Lasthenia ferrisiae*	CNPS List 4.2	A	33	3/22/2010	35.356633	-120.048619	1	10
Ferris' Goldfields	*Lasthenia ferrisiae*	CNPS List 4.2	A	5	4/16/2010	35.349460	-120.070370	1	10
Ferris' Goldfields Total			A					4 plants	40
Ferris' Goldfields Total			B					2 plants	20

Common Name	Scientific Name	Status	Topaz Solar Farm Project Option	USGS Land Section	Date Observed	Latitude (WGS 84)	Longitude (WGS 84)	Approx. Number of Plants	Size of Occurrence (sq. ft.) (Minimum size 10 sq. ft.)
Munz's Tidy-tips	*Layia munzii*	CNPS List 1B.2	A (Occurrence extends outside project area)	4	4/23/2010	35.348990	-120.043600	200	102,517 (2.4 acres) (area within Option A)
Munz's Tidy-tips	*Layia munzii*	CNPS List 1B.2	A	5	3/19/2010	35.341164	-120.061276	250	841,206 (19.3 acres)
Munz's Tidy-tips	*Layia munzii*	CNPS List 1B.2	A	5	3/19/2010	35.348400	-120.070500	100	789,108 (18.1 acres)
Munz's Tidy-tips	*Layia munzii*	CNPS List 1B.2	A	5	4/23/2010	35.339600	-120.066700	5	100
Munz's Tidy-tips	*Layia munzii*	CNPS List 1B.2	A	5	4/23/2010	35.340630	-120.068590	50	31,002 (0.7 acres)
Munz's Tidy-tips	*Layia munzii*	CNPS List 1B.2	A	26	3/25/2010	35.366230	-120.016830	1	10
Munz's Tidy-tips	*Layia munzii*	CNPS List 1B.2	A	26	3/25/2010	35.366300	-120.020600	1	10
Munz's Tidy-tips	*Layia munzii*	CNPS List 1B.2	A	26	3/25/2010	35.368640	-120.020200	1	10
Munz's Tidy-tips	*Layia munzii*	CNPS List 1B.2	A/B	28	3/18/2010	35.370370	-120.051560	10	100
Munz's Tidy-tips	*Layia munzii*	CNPS List 1B.2	A/B	28	4/26/2010	35.366970	-120.058550	1	10
Munz's Tidy-tips	*Layia munzii*	CNPS List 1B.2	A	32	3/22/2010	35.353200	-120.060850	1	10
Munz's Tidy-tips	*Layia munzii*	CNPS List 1B.2	A	32	3/22/2010	35.352250	-120.063930	1	10
Munz's Tidy-tips	*Layia munzii*	CNPS List 1B.2	A	32	4/2/2010	35.352840	-120.077030	1	10
Munz's Tidy-tips	*Layia munzii*	CNPS List 1B.2	A	32	4/2/2010	35.352900	-120.076810	1	10
Munz's Tidy-tips	*Layia munzii*	CNPS List 1B.2	A/B	33	3/22/2010	35.364450	-120.049120	1	10

Common Name	Scientific Name	Status	Topaz Solar Farm Project Option	USGS Land Section	Date Observed	Latitude (WGS 84)	Longitude (WGS 84)	Approx. Number of Plants	Size of Occurrence (sq. ft.) (Minimum size 10 sq. ft.)
Munz's Tidy-tips	*Layia munzii*	CNPS List 1B.2	A	33	3/22/2010	35.360550	-120.051670	1	10
Munz's Tidy-tips	*Layia munzii*	CNPS List 1B.2	A	33	4/16/2010	35.358610	-120.056410	1	10
Munz's Tidy-tips	*Layia munzii*	CNPS List 1B.2	A	33	4/16/2010	35.351970	-120.053260	1	10
Munz's Tidy-tips	*Layia munzii*	CNPS List 1B.2	A	34	4/16/2010	35.354090	-120.037480	1	10
Munz's Tidy-tips	*Layia munzii*	CNPS List 1B.2	A	34	4/16/2010	35.355650	-120.037840	1	10
Munz's Tidy-tips	*Layia munzii*	CNPS List 1B.2	A	35	4/15/2010	35.364050	-120.007710	1	10
Munz's Tidy-tips Total			A					~630 plants	1,733,181 (39.8 acres)
Munz's Tidy-tips Total			B					~12 plants	120
Paso Robles Navarretia	*Navarretia jaredii*	CNPS List 4.3	A	4	5/25/2010	35.337520	-120.045920	3	100
Paso Robles Navarretia	*Navarretia jaredii*	CNPS List 4.3	A	4	5/25/2010	35.338210	-120.046300	4	100
Paso Robles Navarretia	*Navarretia jaredii*	CNPS List 4.3	A	4	5/28/2010	35.339050	-120.046350	1	10
Paso Robles Navarretia	*Navarretia jaredii*	CNPS List 4.3	A	4	5/28/2010	35.344280	-120.049560	10	100
Paso Robles Navarretia	*Navarretia jaredii*	CNPS List 4.3	A	4	5/28/2010	35.341840	-120.052550	800	17,250
Paso Robles Navarretia	*Navarretia jaredii*	CNPS List 4.3	A	5	5/28/2010	35.351070	-120.070860	25	100
Paso Robles Navarretia	*Navarretia jaredii*	CNPS List 4.3	A	5	6/30/2010	35.338570	-120.057360	250	400
Paso Robles Navarretia	*Navarretia jaredii*	CNPS List 4.3	A/B	28	6/2/2010	35.371580	-120.050480	500	600

Common Name	Scientific Name	Status	Topaz Solar Farm Project Option	USGS Land Section	Date Observed	Latitude (WGS 84)	Longitude (WGS 84)	Approx. Number of Plants	Size of Occurrence (sq. ft.) (Minimum size 10 sq. ft.)
Paso Robles Navarretia	*Navarretia jaredii*	CNPS List 4.3	A/B	28	6/11/2010	35.373220	-120.053200	500	900
Paso Robles Navarretia	*Navarretia jaredii*	CNPS List 4.3	A	32	6/29/2010	35.352921	-120.077005	50	100
Paso Robles Navarretia	*Navarretia jaredii*	CNPS List 4.3	A	33	6/11/2010	35.358782	-120.051137	700	3000
Paso Robles Navarretia	*Navarretia jaredii*	CNPS List 4.3	A	34	4/15/2010	35.365310	-120.024380	75	400
Paso Robles Navarretia Total			A					~2,918plants	23,060 (0.5 acre)
Paso Robles Navarretia Total			B					~1,000 plants	1,500
Shining Navarretia	*Navarretia nigelliformis* ssp. *radians*	CNPS List 1B.2	A	5	6/29/2010	35.337449	-120.061354	100	800
Shining Navarretia Total			A					~100 plants	800
Shining Navarretia Total			B					0 plants	0

7.0 Wildlife Inventory

7.1 Specialized Wildlife Surveys Conducted for the Topaz Solar Farm

Specialized wildlife surveys were conducted within the PSA for Blunt-nosed leopard lizard, small mammals, fairy shrimp, San Joaquin kit fox, Kern primrose sphinx moth, and golden eagle. Most of the specialized wildlife surveys are complete (Section 7.1.1); however the 2010 blunt-nosed leopard lizard protocol survey will continue until September 2010.

7.1.1 Completed specialized wildlife surveys

Blunt-nosed Leopard Lizard

- 2007 Partial Protocol BNLL Survey; Sections 28 and north half 33 (URS 2008a, included in Technical Appendix, Volume 3)
- 2008 Protocol BNLL Survey; Sections 28 and 33 (URS 2008a, included in Technical Appendix, Volume 3)
- 2008 Protocol BNLL Survey; Sections 1 and 6 (not part of current PSA), 8, 15, 16, 21, 22, 29 (Althouse and Meade, Inc. 2009a, included in Technical Appendix, Volume 1)
- 2009 Protocol BNLL Survey; Sections 19, 21, 22 and 27 (Althouse and Meade, Inc. 2010c, included in Technical Appendix, Volume 1)
- 2010 Protocol BNLL Survey, Adult Period; all or portions of Sections 4, 5, 26, 32, 34 and 35 (Althouse and Meade, Inc. 2010, included in this report, Section 7.3.7)

Small Mammal Trapping

- 2008 Small Mammal Trapping Survey, Sections 28 and north half 33 (URS 2008b, included in Technical Appendix, Volume 3)
- 2008 Small Mammal Trapping Survey, Sections 1, 6, 8, 15, 16, and 23 (Vanherweg 2008, included in Technical Appendix, Volume 3)
- 2009 Small Mammal Trapping Survey, Sections 19, 21, 22, and 27 (Collins 2009, included in Technical Appendix, Volume 3)
- 2010 Small Mammal Trapping Survey, Sections 4, 5, 15, 26, 28, and 32-35 (Collins 2010, included in Technical Appendix, Volume 3)

Giant Kangaroo Rat

- 2010 Giant Kangaroo Rat Burrow and Scat Measurement Study (Althouse and Meade, Inc. with Paul Collins and Tom Olson, included in this report, Section 7.3.3)

Fairy Shrimp

- 2008 Dry Season Protocol Fairy Shrimp Survey (Helm 2008, included in Technical Appendix, Volume 2)
- 2009 Dry Season Protocol Fairy Shrimp Survey (Helm 2009, included in Technical Appendix, Volume 2)
- 2009 Wet Season Protocol Fairy Shrimp Survey (AEC 2009, included in Technical Appendix, Volume 2)
- 2010 Wet Season Protocol Fairy Shrimp Survey (AEC 2010, included in Technical Appendix, Volume 2)
- 2010 Dry Season Protocol Fairy Shrimp Survey (Helm 2010, included in this report, Appendix A)

San Joaquin Kit Fox

- 2009 Scat Detection Dog Surveys for San Joaquin Kit Fox (Smith 2010, included in Technical Appendix, Volume 1)
- 2010 San Joaquin Kit Fox Genetic Study (Henry and Maldonado 2010)[4]
- 2010 San Joaquin Kit Fox Natal Den Location Survey (Althouse and Meade, Inc., included in this report, Section 7.3.1)

Golden Eagle

- 2010 Aerial Protocol Survey for Golden Eagles (Latta 2010, included in Technical Appendix, Volume 2)

Kern Primrose Sphinx Moth

- 2010 Habitat Assessment and Limited Presence-Absence Survey (Arnold 2010, included in Technical Appendix, Volume 3)

Pronghorn Antelope and Tule Elk

- 2010 Movement and Fence Crossing Survey (Althouse and Meade, Inc., included in this report, Section 7.3.9 and BR Map 13 in Section 13.0)

7.1.2 On-going specialized wildlife surveys

Blunt-nosed Leopard Lizard

- 2010 Protocol BNLL Survey, Juvenile Period; Sections 4, 5, 26, 32, 34 and 35 (Althouse and Meade, Inc., expected completion in September 2010)

[4] The kit fox genetic study report was not completed at the time this biological report was submitted. The final kit fox genetic report will be distributed in September 2010 within the Biological Report Technical Appendix, Volume 4.

7.2 Wildlife Survey Methods

Documentation of wildlife within the PSA utilized general observation data in combination with highly specialized sampling techniques for detecting and determining the identification of difficult to locate or rare taxa. Wildlife surveys conducted within the PSA were designed by experts to be scientifically valid methods of detection and identification, and simultaneously were conducted according to rigors of published survey protocols (CDFG May 1994, USFWS 1996a, Pagel 2010) and standard survey methodologies.

Wildlife documentation included direct observations of animal presence, nests, tracks, and other wildlife sign. Additionally we used motion-detecting cameras (Cuddeback® Digital Expert 2006) installed at various locations within the PSA to detect animal movements. Observations of wildlife were recorded during field surveys in all areas of the PSA. Birds were identified by sight, using 10 power binoculars, or by vocalizations. Reptiles and amphibians were identified by sight, often using binoculars, and by hand-captures or dip-net surveys; traps were not used. Mammals recorded at the site were identified by sight, tracks, motion-detecting cameras, and Sherman live traps. Most mammal species recorded were observed alive while utilizing habitats within the PSA. Carcasses, skulls, and bones were also examined.

Biologists conducting surveys within the PSA maintained daily wildlife data sheets on which all species observed were recorded. Coordinates and notes for special status species detections or other observations of interest were also recorded. Biological resource maps indicating the locations of special status species within the PSA are provided in Section 13.0. Many of the specialized wildlife surveys conducted within the PSA were published as independent reports. All independent reports completed as of June 2010 were bound in a three volume technical appendix that supports this final biological report (Althouse and Meade, Inc. 2010b).

7.2.1 San Joaquin kit fox survey methods

Kit fox surveys on the Topaz Solar Farm PSA were designed and conducted to achieve two primary goals:

1) Determine how many kit foxes utilize habitats within the PSA
2) Determine locations of all natal dens within the PSA

In order to determine how many kit foxes utilize habitats within the PSA, we conducted a genetic analysis of kit fox scats collected on the site. Scat detection dog surveys were conducted by Deborah A. Smith, Ph.D. and Alice Whitelaw of Working Dogs for Conservation Foundation (Smith 2010). All fresh scats detected were collected for genetic analysis. A detailed methodology of this study is included in Smith 2010 (appended in the Biological Report Technical Addendum, Volume 1). Fresh scats collected were sent to the genetics laboratory at the Smithsonian Institution/National Zoological Park in Washington D.C. for analysis by Dr. Jesus Maldonado. Genetic analysis determined the number of individual foxes represented by the scat collection, sex, and familial relationship (Henry and Maldonado 2010).

Daytime visual surveys were conducted concurrently with other biological surveys, and primarily consisted of gathering information on recent signs of kit fox activity. Occupied

dens or dens showing sign of recent activity were mapped in the field using hand-held Garmin GPS units. Data gathered on areas of kit fox use during other biological surveys were used to direct focused surveys for natal dens. Kit fox dens identified in the field were categorized as either "Known Den" or "Natal Den". Known dens are defined as those where a kit fox was observed at the den, or the kit fox sign at the den was distinct and fresh, suggesting the den was occupied at the time of observation. Natal dens are defined as those dens used specifically for the purpose of raising puppies. In one instance we identified a natal den, then found the fox family at another den, which was subsequently labeled a "Post-natal Den". Where our observations of the foxes were insufficient to determine natal versus post-natal, we identify it as a natal den. All kit fox known dens and natal dens are indicated on the biological resource map (BR Map 14, Section 13.0).

7.2.2 Kern primrose sphinx moth

A habitat assessment and limited presence-absence survey for the Kern primrose sphinx moth, a federally listed threatened species, was conducted on April 2, 2010 by Richard A. Arnold, Ph.D. of Entomological Consulting Services, Ltd. (Arnold 2010, in the Biological Report Technical Addendum, Volume 3). Althouse and Meade, Inc. mapped 45 locations of *Camissonia strigulosa*, a potential larval food plant for the sphinx moth, within the PSA during botanical transect surveys in April 2010. Dr. Arnold reviewed the *Camissonia strigulosa* locations and Natural Resource Conservation Service (NRCS) soil maps prior to conducting the April 2 site visit to determine which locations were situated on soils potentially suitable to the sphinx moth larval life stage. Dr. Daniel E. Meade from Althouse and Meade, Inc. accompanied Dr. Arnold on the April 2 site visit. Each location was surveyed for larvae and signs of larval feeding damage.

7.2.3 Small mammal survey methods

Small mammal taxa in the PSA were inventoried during four trapping studies (URS 2008, Vanherweg 2008, Collins 2009, and Collins 2010, in the Biological Report Technical Addendum, Volume 3), three visual detection transect surveys (Althouse and Meade, Inc. 2009a, 2010b), a barn owl pellet analysis (Collins 2009), a kangaroo rat burrow and scat measurement study, and during focused wildlife surveys of the PSA. The trapping studies each focused on different areas of the PSA, resulting in a comprehensive sample of small mammals (primarily nocturnal) occurring across the 10,000 acre PSA.

Visual detection transect surveys were conducted for the Nelson's antelope squirrel concurrently with surveys for BNLL in 2008, 2009 and 2010. Specific methods for each survey are provided in the original reports.

Thirty barn owl pellets were collected and the bone contents were identified to species by Paul Collins, Curator of Vertebrate Zoology at the Santa Barbara Museum of natural History (Collins 2009).

Giant kangaroo rat focused visual detection surveys were conducted in suitable habitats within the PSA in 2008 and 2009 (Althouse and Meade, Inc. 2009b) and in 2010 concurrently with the 12 BNLL full-coverage passes for the adult period. These surveys were preceded by visits to known reference sites in the Carrizo Plain National Monument (Panorama Road). Additionally, all 2010 BNLL surveyors attended a giant kangaroo rat field training on May 14, 2010 given by Paul Collins.

Biologists conducting focused surveys for giant kangaroo rat walked transects through suitable habitat looking for kangaroo rat precincts. All precincts identified were mapped and carefully examined for the diagnostic sign of the giant kangaroo rat (vegetation clearing, haystacks, pit caches, etc.). On June 18, 2010, Paul Collins and Tom Olson (Thomas E. Olson Biological Consulting) conducted a kangaroo rat burrow and scat measurement study within the PSA. Althouse and Meade, Inc. biologist Jason Dart assisted with the survey. Each potential kangaroo rat precinct was surveyed for horizontal and vertical burrows, and other diagnostic sign. Where rodent burrows and sign were positively identified as that of a kangaroo rat, vertical and horizontal measurements were taken of all burrows, and scat was collected where available for later evaluation in the lab (Table 18). Burrow and scat morphometrics were compared to those presented in the published literature (Williams 1992).

7.2.4 Fairy shrimp survey methods

Protocol surveys for listed vernal pool branchiopods began in the 2008 dry season (Helm Biological Consulting, LLC December 2008). Wet season surveys were conducted during the 2008-2009 wet season by Advantage Environmental Consultants, LLC (AEC August 2009). A second dry season survey conducted in 2009 covered additional lands added to the PSA since the 2008 survey (Helm Biological Consulting, LLC August 2009). An additional wet season survey was conducted in 2009-2010 by Advantage Environmental Consultants, and a 2010 dry season survey was conducted by Helm Biological Consulting, LLC. Specific methods for each survey are provided in the original reports, which are included in the 2010 Biological Report Technical Appendix, Volume 2 (Althouse and Meade, Inc. 2010b) and Appendix A of this report.

7.2.5 Special status bird survey methods

Winter bird surveys conducted November 2009 through January 2010 utilized a focused survey method in which surveyors walked representative habitat types, and also inspected homesteads, powerlines, and fencelines within the PSA.

Winter bird surveys conducted in February 2010 utilized a non-random transect survey method in which biologists covered parallel belts of land in north-south orientation across all 3,769 acres of annual grasslands and approximately 3,500 acres of croplands within the PSA. Each transect belt was 800 feet wide and up to 5,280 feet long (one mile). Transect spacing was set at 660 feet (one-eighth mile) so that transects overlapped each other for greater than 100 percent visual cover. Each one mile long transect belt was covered in approximately 50 minutes, including three five minute stationary observation points. Each transect was surveyed twice between February 11 and February 25. Surveyors walked the center line of the transect belt, but could meander throughout the transect belt to make positive identifications of bird species. Surveyors tallied the number of each species observed during each transect, and the resulting data provided a count of species (species richness) per transect and a total bird abundance per transect.

Prior to initiating the surveys, tests were done in the field to determine a suitable transect width. With vegetation in most areas less than four inches in height during the winter period, we were able to identify horned larks and savannah sparrows (small ground-dwelling species) at a distance of 400 feet.

To aid in our surveys, transect lines were overlaid on a high resolution aerial photograph for use in the field, and flagging was set out along fence lines to indicate the boundaries. All surveyors used 10 power binoculars, and carried a Garmin GPS to record coordinates for special status species observations. For burrowing owls, coordinates were taken for all den sites showing signs of recent use (pellets, feathers, prey remains and urea).

Nesting bird surveys conducted in 2010 utilized a focused survey method in which surveyors targeted special status birds expected to nest within the PSA. Burrowing owls are the most sensitive nesting species at the site, and consequently a focused burrowing owl nesting survey was conducted by J. Dart and Peter Gaede on June 2 and 3, 2010. The surveyors searched for burrowing owls and visited all den sites previously observed in use by burrowing owls or that were documented as exhibiting burrowing owl sign during previous wildlife surveys. The condition of each den was noted, and locations of burrowing owls and new dens were mapped. When burrowing owls were located, they were observed from a distance to determine their breeding status.

7.2.6 Golden eagle aerial nest survey methods

An aerial survey for golden eagle nests was conducted by Brian Latta, Executive Director, The Bird Group (Latta 2010). Methods of the survey conform to the newly published Interim Golden Eagle Technical Guidance (Pagel 2010). In one location, the Beartrap Condor critical habitat area, aerial survey is not permitted and nest searches were conducted on foot. The golden eagle nest survey included coverage for both the proposed Topaz Solar Farm and the proposed California Valley Solar Ranch. The survey area included a ten mile radius area around both the project sites, totaling approximately 448,647 acres. Detailed methods are provided in the original report, included in the 2010 Biological Report Technical Appendix, Volume 2 (Althouse and Meade, Inc. 2010b).

7.2.7 Reptile and amphibian survey methods

Protocol surveys for the blunt-nosed leopard lizard (BNLL) were conducted throughout the PSA (URS 2007, URS 2008, Althouse and Meade, Inc. 2009a, Althouse and Meade, Inc. 2010a). One additional full protocol survey for 2010 is in progress. The 12 full-coverage passes for the adult period were completed by July 15, with no detections of BNLL, which suggests greater than 95 percent certainty that BNLL do not occur in the survey area (Germano 2009). Five full-coverage passes will be completed between August 1 and September 15 for the juvenile period. Methods of the BNLL protocol surveys were consistent with published protocol (CDFG 1994).

Western spadefoot toad breeding pools were documented by Advantage Environmental Consultants concurrently with protocol surveys for listed fairy shrimp, and by Althouse and Meade, Inc. We visually confirmed presence of tadpole larvae in ephemeral pools without use of dip-nets or other invasive sampling techniques (refer to Photo Collection 5, Section 14.0. Aquatic amphibian dip-net surveys were conducted in two agricultural reservoirs, one in Section 20 and one in Section 28.

7.2.8 Bat roost survey methods

Abandoned buildings within the PSA were surveyed for roosting bats in 2010 during the winter and spring by Althouse and Meade, Inc. biologists. Paul Collins examined the

buildings in Section 33. The exterior of each building was examined for potential openings which could be used by bats to access roosting sites. Any potential opening was further examined for signs of bat entry, such as wear marks and feces. Surveyors used flashlights and binoculars where needed. Interior visual surveys were conducted at most of the barns and abandoned homes. Interior surveys examined attics and other potential roost locations for bats or their sign. Occupied residences in Sections 16 and 18 were not surveyed.

7.3 Final Wildlife Survey Results

One hundred forty-four (144) animal species are listed that could potentially occur within the PSA (Table 15). These include at least 6 aquatic arthropods, 3 amphibians, 17 reptiles, 78 birds, and 36 mammals. Numerous invertebrates are known or expected to occur, but are not included. We provide this list as a guide to the wildlife observed on the PSA and to the species that could potentially be present at least seasonally. Other species could occur as transients, particularly avian fauna. A large number of migrant bird species are known to move through the Carrizo Plain region seasonally. We include some migrants in the list that were observed or are expected. Wildlife detected on the site includes 6 aquatic invertebrates, 3 amphibians, 5 reptiles, 58 birds, and 21 mammals.

Motion-detecting cameras (Cuddeback® Expert) were installed at various locations within the PSA to identify and document wildlife. Eleven cameras were placed at 33 locations within the PSA in 2009 and 2010. Cameras were active from April 2 to July 20, 2009. Cameras for the 2010 season were installed on January 15 and were in place through July 8. Motion-detecting cameras captured images of nineteen wildlife species within the PSA including American badger, burrowing owl, golden eagle, tule elk, pronghorn, and San Joaquin kit fox. Badgers were photographed three times at three locations. Burrowing owl and golden eagle were both photographed once. Tule elk were photographed thirty-five times at six locations and pronghorn were photographed one hundred-eight times at fifteen locations. The primary target was San Joaquin kit fox, which was photographed twenty-three times, with detections at six locations. Other wildlife species captured on the motion-detecting cameras include American kestrel, Brewer's blackbird, horned lark, Western meadowlark, raven, red-tailed hawk, red-winged blackbird, savanna sparrow, cottontail rabbit, black-tailed jackrabbit, coyote, California ground squirrel, and wild boar.

TABLE 15. FINAL WILDLIFE LIST. At least 144 animal species have the potential to occur within the PSA. The Special Status column indicates listing status of the organism under the Federal Endangered Species Act, the California Endangered Species Act, or by CDFG (see Appendix A for status definitions). Species observed at the site during our surveys are designated by the check symbol (✓) in the fourth column.

Common Name	Scientific Name	Special Status	Observed Within PSA?	General Habitat Preference
Aquatic Invertebrates– 6 species				
Versatile Fairy Shrimp	*Branchinecta lindahli*	None	✓	Ephemeral pools in a variety of habitat types
Longhorn Fairy Shrimp	*Branchinecta longiantenna*	FE[5]	✓	Seasonally astatic grassland vernal pools
Vernal Pool Fairy Shrimp	*Branchinecta lynchi*	FT[6]	✓	Vernal pools, ephemeral wetlands with no flow
Water Flea	Order *Cladocera*	None	✓	Aquatic
Water Boatmen	Order *Corixidae*	None	✓	Aquatic
Seed Shrimp	Class *Ostracoda*	None	✓	Aquatic
Amphibians – 3 species				
California (Western) Toad	*Bufo boreas halophilus*	None	✓	Grassland, woodland
Pacific Chorus Frog	*Pseudacris regilla*	None	✓	Many habitats near water
Western Spadefoot Toad	*Spea hammondii*	SSC[7]	✓	Grassland habitat with seasonal pools
Reptiles – 17 species				
California Glossy Snake	*Arizona elegans occidentalis*	None		Arid scrub, rocky areas, grasslands, chaparral
California Whiptail	*Aspidoscelis tigris munda*	None		Dry, rocky areas
Western Yellow-bellied Racer	*Coluber constrictor mormon*	None		Grasslands, open areas
Northern Pacific Rattlesnake	*Crotalus oreganus oreganus*	None	✓	Dry, rocky habitats
California Alligator Lizard	*Elgaria multicarinata multicarinata*	None		Open grassland, woodland, chaparral
Blunt-nosed Leopard Lizard	*Gambelia sila*	FE		Alkali and desert scrub habitats
California Nightsnake	*Hypsiglena ochrorhyncha nuchalata*	None		Chaparral, grassland
California Kingsnake	*Lampropeltis getula californiae*	None		Woodland, grassland, streams

[5]FE = Federally listed Endangered

[6] FT = Federally listed Threatened

[7] SSC = CDFG designation for Species of Special Concern

Common Name	Scientific Name	Special Status	Observed Within PSA?	General Habitat Preference
San Joaquin Whipsnake	*Masticophis flagellum ruducki*	SSC	✓	Open, dry habitats with no trees. Needs burrows.
Blainville's (Coast) Horned Lizard	*Phrynosoma blainvillii*	SSC		Dune scrub, alkali scrub, chaparral, grasslands
Pacific Gopher Snake	*Pituophis catenifer catenifer*	None	✓	Woodland, grassland, rural
Western Red-tailed [=Gilbert's] Skink	*Plestiodon [=Eumeces] gilberti rubricaudatus*	None		Woodland, grassland, chaparral; inland areas
Skilton's [=Western] Skink	*Plestiodon [=Eumeces] skiltonianus skiltonianus*	None		Woodland, grassland, chaparral, inland and coastal
Long-nosed Snake	*Rhinocheilus lecontei*	None	✓	Arid and semi-arid deserts, grasslands, shrublands
Coast Range Fence Lizard	*Sceloporus occidentalis bocourtii*	None		Wide range
Valley Garter Snake	*Thamnophis sirtalis fitchii*	None		Many habitats near water
Side-blotched Lizard	*Uta stansburiana*	None	✓	Dry habitats
Birds – 83 species				
Cooper's Hawk	*Accipiter cooperii*	Special Animal[8]	✓	Oak, riparian woodland
Sharp-shinned Hawk	*Accipiter striatus*	Special Animal	✓	Oak, riparian woodland
White-throated Swift	*Aeronautes saxatilis*	None		Nests in cliffs
Red-winged Blackbird	*Agelaius phoeniceus*	None	✓	Marshes, fields
Tricolored Blackbird	*Agelaius tricolor*	SSC (Nesting Colony)	✓ (not nesting)	Marshes, fields
Grasshopper Sparrow	*Ammodramus savannarum*	SSC (Nesting)	✓	Grassland hillsides
American Pipit	*Anthus rubescens*	None	✓	Fields, beaches, etc.
Western Scrub Jay	*Aphelocoma californica*	None		Oak, riparian woodlands
Golden Eagle	*Aquila chrysaetos*	Fully Protected[9] BGEPA	✓	Open or mountainous areas
Great Egret	*Ardea alba*	SSC (Rookery Site)		Water habitats, grasslands

[8] Special Animal refers to all of the animal taxa inventoried by the CNDDB, regardless of their legal or protection status. Refer to discussion of Special Animals in Section 4.1.2.

[9] Refer to Section 4.1.2 for a discussion of Fully Protected species.

Common Name	Scientific Name	Special Status	Observed Within PSA?	General Habitat Preference
Great Blue Heron	*Ardea herodias*	SSC (Rookery Site)		Water habitats, grasslands
Short-eared Owl	*Asio flammeus*	SSC (Nesting)		Swamp, lowland meadows
Long-eared Owl	*Asio otus*	SSC (Nesting)		Riparian bottomlands with adjacent open lands
Burrowing Owl	*Athene cunicularia*	SSC	✓	Grasslands with ground squirrel burrows
Great Horned Owl	*Bubo virginianus*	None		Woodland, grassland
Red-tailed Hawk	*Buteo jamaicensis*	None	✓	Open, semi-open country
Rough-legged Hawk	*Buteo lagopus*	None		Variety of open habitats
Ferruginous Hawk	*Buteo regalis*	Special Animal (Wintering)	✓	Grasslands, open fields
Swainson's Hawk	*Buteo swainsoni*	ST[10]	✓	Grasslands or agricultural with trees, riparian
Anna's Hummingbird	*Calypte anna*	None	✓	Many habitats
Costa's Hummingbird	*Calypte costae*	SSC (Nesting)	✓	Desert riparian, scrub
Lesser Goldfinch	*Carduelis psaltria*	None		Riparian, oak woodlands
American Goldfinch	*Carduelis tristis*	None		Weedy fields, woodlands
Lawrence's Goldfinch	*Carduelis lawrencei*	Special Animal (Nesting)	✓	Oak woodlands, savanna
House Finch	*Carpodacus mexicanus*	None	✓	Riparian, grasslands, chaparral, and woodlands
Turkey Vulture	*Cathartes aura*	None	✓	Open country
Mountain Plover	*Charadrius montanus*	SSC (Wintering)	✓	Winters in grasslands, agricultural fields
Killdeer	*Charadrius vociferous*	None	✓	Mud flats, stream banks
Lark Sparrow	*Chondestes grammacus*	Special Animal (Nesting)	✓	Woodland edges, grasslands
Northern Harrier	*Circus cyaneus*	SSC (Nesting)	✓	Nest on ground in tall reeds or grasses
Northern Flicker	*Colaptes auratus*	None		Woodlands
Band-tailed Pigeon	*Columba fasciata*	None		Woodlands, urban trees
Rock Dove	*Columba livia*	None	✓	Urban areas
American Crow	*Corvus brachyrhynchos*	None	✓	Many habitats, esp. urban
Common Raven	*Corvus corax*	None	✓	Riparian, chaparral and woodlands

[10] ST = State listed Threatened

Common Name	Scientific Name	Special Status	Observed Within PSA?	General Habitat Preference
Yellow-rumped Warbler	*Dendroica coronata*	None	✓	Woodlands, brush, open country
Black-throated Grey Warbler	*Dendroica nigrescens*	None	✓	Woodlands
White-tailed Kite	*Elanus leucurus*	Fully Protected		Nests in dense live oaks
Horned Lark	*Eremophila alpestris*	None	✓	Grassland, oak savanna
Brewer's Blackbird	*Euphagus cyanocephalus*	None	✓	Open habitats
Merlin	*Falco columbarius*	Special Animal	✓	Open country with adjacent woodlands
Prairie Falcon	*Falco mexicanus*	Special Animal	✓	Open country, nests on cliffs
American Kestrel	*Falco sparverius*	None	✓	Open, semi-open country
Greater Roadrunner	*Geococcyx californianus*	None		Open habitats
California Condor	*Gymnogyps californianus*	FE		Large expanses of mountainous terrain
Bald Eagle	*Haliaeetus leucocephalus*	Delisted/ SE BGEPA	✓	Forested areas near water for breeding. Wintering in variety of habitats with suitable prey
Barn Swallow	*Hirundo rustica*	None	✓	Riparian, grasslands, lakes
Bullock's Oriole	*Icterus bullockii*	None	✓	Oak, riparian woodlands
Loggerhead Shrike	*Lanius ludovicianus*	SSC (Nesting)	✓	Nests in shrubs, trees near open areas
Northern Mockingbird	*Mimus polyglottos*	None		Riparian, chaparral and woodlands. Also urban
Brown-headed Cowbird	*Molothrus ater*	None		Rural areas, ranches
Ash-throated Flycatcher	*Myiarchus cinerascens*	None	✓	Open, arid habitats
Long-billed Curlew	*Numenius americanus*	Special Animal (Nesting)	✓ (Wintering only)	Winters in meadows, fields
Whimbrel	*Numenius phaeopus*	None		Winters in meadows, fields
MacGillivrays Warbler	*Oporornis tolmiei*	None	✓	Forests, woodlands
Western Screech Owl	*Otus kennicottii*	None		Oak woodland
Osprey	*Pandion haliaetus*	Special Animal	✓	Aquatic areas
House Sparrow	*Passer domesticus*	None	✓	Urban
Savannah Sparrow	*Passerculus sandwichensis*	None	✓	Open habitats, marshes, grasslands
Cliff Swallow	*Petrochelidon pyrrhonota*	None	✓	Urban; open areas near water
Phainopepla	*Phainopepla nitens*	None		Oak, riparian, scrub

Common Name	Scientific Name	Special Status	Observed Within PSA?	General Habitat Preference
Western Tanager	*Piranga ludoviciana*	None	✓	Woodlands
Oregon Vesper Sparrow	*Pooecetes gramineus affinis*	SSC (Wintering)	✓	Open habitats, often with scattered shrubs
Black Phoebe	*Sayornis nigricans*	None		Near water
Say's Phoebe	*Sayornis saya*	None	✓	Open country, grassland
Mountain Bluebird	*Sialia currucoides*	None	✓	Open areas with scattered trees
Western Bluebird	*Sialia mexicana*	None		Woodland near open areas
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	None		Riparian, lakes, open areas
Eurasian Collared Dove	*Streptopelia decaocto*	None	✓	Urban areas
Western Meadowlark	*Sturnella neglecta*	None	✓	Open habitats, grasslands
European Starling	*Sturnus vulgaris*	None	✓	Agricultural, livestock areas
Tree Swallow	*Tachycineta bicolor*	None	✓	Oak, riparian woodlands, open areas near water
Violet-green Swallow	*Tachycineta thalassina*	None	✓	Oak, riparian woodlands, open areas near water
Bewick's Wren	*Thryomanes bewickii*	None		Riparian woodland, scrub
House Wren	*Troglodytes aedon*	None	✓	Shrubby areas
American Robin	*Turdus migratorius*	None	✓	Streamsides, woodlands
Western Kingbird	*Tyrannus verticalis*	None	✓	Grasslands, savanna
Cassin's Kingbird	*Tyrannus vociferans*	None	✓	Grasslands, savanna
Barn Owl	*Tyto alba*	None	✓	Agricultural, woodlands
Warbling Vireo	*Vireo gilvus*	None		Riparian, oak woodlands
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*	SSC (Nesting)	✓ (Spring transient)	Freshwater emergent wetlands, winters in open habitats
Mourning Dove	*Zenaida macroura*	None	✓	Open and semi-open habitats
White-crowned Sparrow	*Zonotrichia leucophrys*	None	✓	Oak, riparian woodlands
Mammals - 36 species				
Nelson's Antelope Squirrel	*Ammospermophilus nelsoni*	ST		Arid habitats with scattered shrubs and washes
Pronghorn Antelope	*Antilocapra americana*	None	✓	Grasslands, prairie
Pallid Bat	*Antrozous pallidus*	SSC		Structures, woodlands
Coyote	*Canus latrans*	None	✓	Open woodlands, prairies, brushy areas, wide ranging.
Tule Elk	*Cervus elaphus nannodes*	None	✓	Grasslands, woodlands

Common Name	Scientific Name	Special Status	Observed Within PSA?	General Habitat Preference
California Pocket Mouse	*Chaetodipus californicus ochrus*	None	✓	Chaparral, grassland edges
Townsend's Big-eared Bat	*Corynorhinus townsendii*	SSC		Structures, caves, open areas
Heermann's Kangaroo Rat	*Dipodomys heermanni swarthi*	None	✓	Dry grasslands with few shrubs
Giant Kangaroo Rat	*Dipodomys ingens*	FE		Arid habitats
Short-nosed Kangaroo Rat	*Dipodomys nitratoides brevinasus*	SSC		Saltbush scrub and sink communities with friable soils.
Big Brown Bat	*Eptesicus fuscus*	None		Structures, trees, caves
Feral Cat	*Felis catus*	None	✓	Varied
Black-tailed Jackrabbit	*Lepus californicus*	None	✓	Grasslands
Bobcat	*Lynx rufus*	None	✓	Chaparral and woodlands
Striped Skunk	*Mephitis mephitis*	None	✓	Mixed woods, brush, semi-open country
California Vole	*Microtus californicus*	None		Grassland meadows
Long-tailed Weasel	*Mustela frenata*	None		Grasslands
California Myotis	*Myotis californicus*	None		Structures, trees, caves
Western Small-footed Myotis	*Myotis ciliolabrum*	Special Animal		Structures, trees, caves
Long-eared Myotis	*Myotis evotis*	Special Animal		Structures, trees, caves
Mule Deer	*Odocoileus hemionus*	None		Many habitats
Tulare Grasshopper Mouse	*Onychomys torridus tularensis*	SSC	✓	Hot, arid, valleys and scrub deserts
McKittrick Pocket Mouse	*Perognathus inornatus neglectus*	Special Animal	✓	Annual grasslands, saltbush scrub, and oak savanna habitats
Deer Mouse	*Peromyscus maniculatus gambelii*	None	✓	All dry land habitats
Raccoon	*Procyon lotor*	None		Streams, lakes, rock cliffs, dens in trees
Western Harvest Mouse	*Reithrodontomys megalotis*	None	✓	Grassland, dense vegetation near water
Broad-footed Mole	*Scapanus latimanus*	None		Grasslands, agricultural, in moist soils
Ornate Shrew	*Sorex ornatus*	None	✓	Riparian, woodland, grassland, and shrubland
California Ground Squirrel	*Spermophilus beecheyi*	None	✓	Grasslands
Wild Boar	*Sus scrofa*	None	✓	Woodlands

Common Name	Scientific Name	Special Status	Observed Within PSA?	General Habitat Preference
Desert Cottontail	*Sylvilagus audubonii*	None	✓	Brushy habitats
Brazilian Free-tailed Bat	*Tadarida brasiliensis*	None		Structures
American Badger	*Taxidea taxus*	SSC	✓	Open country
Valley Pocket Gopher	*Thomomys bottae*	None	✓	Variety of habitats
Red Fox	*Vulpes fulva*	None	✓	Forest and open country
San Joaquin Kit Fox	*Vulpes macrotis mutica*	FE	✓	Open grasslands, scrub

7.3.1 San Joaquin kit fox survey results

The federally endangered San Joaquin kit fox (SJKF) occurs within and adjacent to the PSA (Althouse and Meade, Inc. 2009; Smith 2010). SJKF were detected by direct observation, DNA analysis of scats, remote camera traps, and by tracks and other sign. Biological Resource Maps 2 and 5 in Section 13.0 indicate the locations of kit fox detections within the PSA.

Working Dogs for Conservation Foundation (Debbie Smith, Ph.D. and Alice Whitelaw) conducted scat detection surveys with trained scent dogs along 103.31 kilometers (64.5 linear miles) of non-random transects throughout the PSA during two survey periods in 2009. The transects were primarily along existing roads where kit fox, like other canines, frequently travel and defecate (Smith 2010). A total of four-hundred-fourteen (414) kit fox scats were detected. One hundred fifty-three (153) fresh scats (8 days old or less) were collected and sent to the genetics laboratory at the Smithsonian Institution/National Zoological Park in Washington D.C. for analysis (Henry and Maldonado 2010). Because only fresh scats were collected for DNA analysis, this study provides an accurate number of individual kit foxes that were using the PSA during the August to November 2009 period.

Genetic analysis of scats collected by D. Smith in 2009 successfully and confidently identified 19 individual kit foxes. Eighteen of these foxes were represented by at least two scat samples. The one individual identified by a single scat sample was confidently identified as a distinct individual based on its unique microsatellite genotype and a new mitochondrial DNA (mtDNA) haplotype[11] not detected in other scat samples and not previously identified in Carrizo Plain kit fox populations. This individual was still highly related to other individuals in the survey area. The 19 kit foxes are represented by ten males and nine females (Henry and Maldonado 2010).

Of the 19 kit foxes detected, 18 were detected by scat collections from within the currently defined PSA. Of these 18 kit foxes, 7 are represented by 1 to 4 scat detections, eight kit foxes are represented by 5 to 9 scat detections, and 3 kit foxes are represented by

[11]Haplotype is a genetics term that means a combination of alleles (for different genes) that are located closely together on the same chromosome and that tend to be inherited together (Princeton University 2010).

10 or more scat detections (Table 16). Kit foxes represented by higher number of scat detections presumably spend more time within the PSA.

TABLE 16. KIT FOX SCAT DETECTIONS. Kit fox detections are divided into three categories of different scat detection ranges that indicate the general level of presence within the PSA.

Scat Detections	Number of Individual Kit Foxes (18)
1-4	7 foxes
5-9	8 foxes
10+	3 foxes

Kit fox scats were collected in August and November 2009, which would result in a high detection of young foxes born in the spring that had not yet dispersed, and may also detect young from the previous year that remain in their parents territory as "helpers". The genetic work also may have detected visitors from adjacent home ranges (B. Cypher, pers. comm.).

We plotted the location of all fresh scat collections on an aerial photograph of the PSA using Arc GIS software, and overlaid a color-coded symbology representing confirmed locations of each of the 19 individual kit foxes (BR Map 2, Section 13.0). This map indicates approximate territory areas within and near the PSA for each of the foxes.

Genetic analysis found that all 19 foxes were significantly related to other foxes in the Option. The genetic analysis allows potential family groups to be described. A potential family group was found centered near Section 22 that consisted of eight individuals (two parents and six offspring). We observed this family during the spring and summer surveys, and observed at least three pups with parents in 2009. Local residents said there were four pups with this family in 2009, although we observed only three. Kit fox can have up to nine pups in a litter, however, the additional individuals could have been previous year pups, including a helper offspring that is still part of the family group assisting with pups. A second family group was detected in the southern portion of the property. This group has nine related individuals with two different matings by one male fox. Three of these individuals are also strongly related to the first family group. One mother was detected in Section 26, and another mother in Section 5. Offspring are likely from the same father, who was detected in Section 4. Another group of four individuals was related to the second family group through a male fox. The high degree of relatedness suggests that the number of foxes detected in the PSA includes offspring prior to dispersal.

Natal den territories were identified in three areas of the PSA during surveys in 2009 and 2010 (Refer to BR-14, Section 13.0). One territory was located in spring 2009, within Section 22, an area that occurs along the east boundary of the current Option A and Option B layouts. Two dens were identified within this territory that were determined to be used for raising puppies. One den was the primary natal den, and the three (possibly four) puppies were later moved to a post-natal den one-third of a mile to the south. Natal

dens were not identified in the northern and western regions of Option B, which is consistent with the lack of data gathered from remote camera, scat detection, and other wildlife surveys.

Option A contains two additional kit fox natal den territories. These two territories were the only natal den territories identified in Option A in 2010 (active natal den territories were not identified in Option B in 2010). One territory is located near the boundary of Sections 4 and 5 in the far south end of Option A. Here, a cluster of den complexes were observed throughout the 2010 spring season in proximity to a significant Heermann's kangaroo rat precinct. Presence of recent kit fox puppy scat verified one of the dens as the 2010 natal den. Surrounding this are other dens mapped as "known dens" where either a kit fox was observed at the den or kit fox sign at the den was distinct and recent. A post-natal den was identified for this territory in the northeast corner of Section 4, approximately one mile from the natal den, where a young kit fox puppy was observed at the mouth of the den on June 25. The second kit fox territory in Option A is located in the northeast corner of Section 35. This area was documented by remote camera, scat survey, den survey, and visual detection of foxes and fresh tracks to be consistently used by kit fox from August 2009 into summer 2010. The natal den is surrounded by numerous known dens, one in which an adult kit fox was observed. A remote camera trap nearby captured foxes on several occasions, including one photograph on June 16 of a kit fox puppy.

Other known kit fox dens were detected in Options A and B, Sections 4, 5, 21, 26, 33, 34 and 35 that were determined not to be natal dens. These findings are consistent with occasional detection of kit fox scat and tracks within non-natal den territory areas of the PSA, as well as the habitat of kit fox to utilize a large number of dens throughout their range. Kit fox sign was observed frequently during our surveys in 2010. In 2008 and 2009, the PSA included only the more northerly parcels, and kit fox sign was observed less frequently. The PSA includes lands that are of varying quality for San Joaquin kit fox. Kit fox detections were lowest in active agricultural fields (croplands), and highest in annual grasslands that had not been cropped in over 20 years. All or portions of Sections 7, 8, 17, 18, 19, 20, and 21 in the northwest portion of the PSA are actively cropped; very few kit fox detections were made in these areas. Where kit foxes were detected occasionally or regularly in cropland habitats such as in Sections 4, 5, 27, 32, the lands were fallow for at least two years, had kangaroo rat and other small mammal populations, or were positioned between an occupied kit fox den and adjacent grassland foraging areas.

The grassland habitats in Option A, Sections 4, 5, 34, and 35, have been in the Conservation Reserve Program for at least 20 years. Cattle are grazed every three years on the parcels, but the land is not farmed or tilled. Kit fox were detected frequently in these Sections. Based on the results of the 2010 small mammal trapping study the prey base in these areas consists of ground squirrels, a low abundance of Heermann's kangaroo rats, and low abundance of several species of mice (refer to Section 7.3.6). The low abundance of small mammals in all of these grassland areas suggests each kit fox pair would utilize a larger territory to find adequate prey.

7.3.2 Kern primrose sphinx moth results

All but one of the previously identified 45 locations of *Camissonia strigulosa* were determined by Dr. Richard Arnold to be situated on clay or loam soils which are not suitable for the pupal stage of the Kern primrose sphinx moth. One location in a sandy wash at the south end of Section 4 was determined to be potentially suitable. No sphinx moth adults or larvae were detected, and no evidence of larval feeding on the *Camissonia strigulosa* plants was observed.

7.3.3 Small mammal survey results

A small mammal inventory was compiled from data collected during small mammal trapping surveys, visual detection transect surveys, focused wildlife surveys, and an analysis of barn owl pellet contents. Refer to Table 15 for a complete list of small mammals detected within the PSA. No federally listed small mammals have been detected within the PSA. Special status small mammals detected within the PSA are indicated on BR Map 5 in Section 13.0.

A. Trapping Surveys

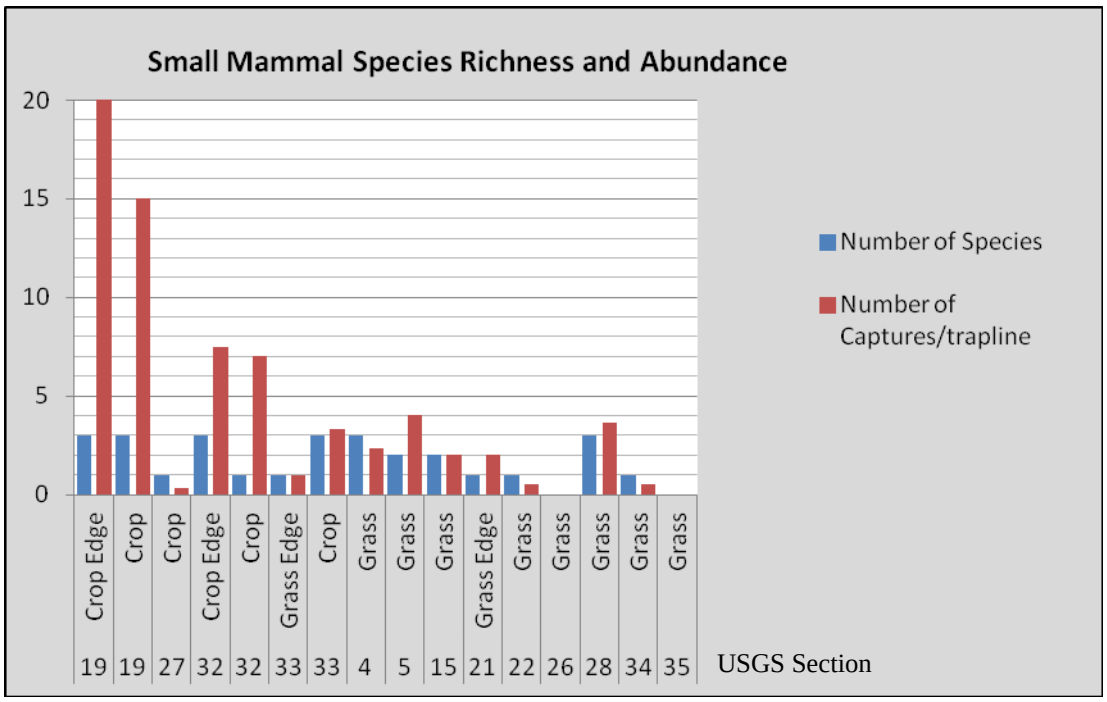
Small mammal trapping surveys conducted throughout the PSA utilized 8,940 trap-nights of effort, and resulted in captures of seven small mammal species. Federally listed small mammals were not detected during any of the four trapping studies. Two special status species were detected: Tulare grasshopper mouse (*Onychomys torridus tularensis*), a Species of Special Concern, and McKittrick pocket mouse (*Perognathus inornatus neglectus*), a Special Animal (refer to Table 17 below, and BR Map 5 in Section 13.0). One Tulare grasshopper mouse was captured during a small mammal trapping study conducted within the PSA in August 2008 by Bill Vanherweg. The location of the capture was at the southern end of Section 29, adjacent to off-site annual grassland habitat. Tulare grasshopper mouse was not captured during subsequent small mammal trapping studies conducted in 2009 and 2010. McKittrick pocket mice were captured 67 times in numerous areas of the PSA during all four trapping studies.

Trapping data collected in the PSA provides information on species richness (number of species in a given area, or species diversity) and on the relative abundance of small mammals within the PSA. All small mammal species were detected with low capture rates, indicating low population numbers (Collins 2009, 2010). In 2009 a total of 72 small mammals were captured during 720 trap nights, with an average trap success of 11.78 percent. In 2010, with 1,220 trap nights of effort only 60 captures were made, with an average trap success of 5.56 percent. Both trapping surveys targeted grassland, cropland, and edge habitats.

We cross-referenced the species richness (diversity) and relative abundance data from Collins 2009 and Collins 2010 with habitat data for each trapline location to understand general trends of small mammal diversity and abundance in various areas of the PSA (Graph 1, below). The 2010 trapping survey targeted, in part, annual grasslands that are in the Conservation Reserve Program and had not been tilled in over 20 years (Sections 4, 5, 26, 34, and 35). These grasslands had a diverse herb component with native and introduced annual grasses. Although not tilled, cattle grazed in the grasslands through spring and summer of most years, often until almost

no vegetation remained. Small mammal diversity and abundance in these grasslands was extremely poor. It is likely that poor cover (plant height) and lack of food (seed abundance) resulted in low abundance and diversity of small mammals.

Active croplands generally had low diversity (except along habitat edges with untilled land), but often abundance was moderate. This is attributed to the fact that the deer mouse tolerates agricultural disturbance, and the abundant seed from the grain crops provides a sufficient food source for multiple annual recruitments. The highest number of captures per trapline was in Section 19 at a cropland edge habitat adjacent to untilled annual grassland.



GRAPH 1. SMALL MAMMAL SPECIES RICHNESS AND ABUNDANCE. Trapping data are provided for each of the 13 land Sections trapped by Collins in 2009 and 2010. The Section number is provided on the horizontal axis with the habitat type labeled above.

The primary reason for the low abundance of small mammal taxa in the PSA is habitat degradation from farming activities and intensive grazing that eliminates stratified vegetative cover and seed crops. Agricultural activities severely reduce local populations of most small mammal species through direct mortality and elimination of habitat. The rotational farming system results in an ever-changing patchwork of different land use areas each year that makes it difficult for small mammal populations to persist. The deer mouse, however, is relatively common in cropland areas where its abundance likely cycles with the rotational farming system. Where grain is planted, deer mouse abundance increases with the availability of food, then decreases when the land is tilled. Cattle grazing maintains short grass habitat conditions, and depending upon the severity of the grazing, eliminates seed crops essential for small mammal populations. The California pocket mouse, McKittrick pocket mouse, Tulare grasshopper mouse, and Heermann's kangaroo rat were found

to be most common along fence lines where the ground is not plowed and their burrow systems persist from year to year.

B. Visual Detection Transect Surveys

Visual detection surveys for the federally threatened Nelson's antelope squirrel (*Ammospermophilus nelsoni*) conducted concurrently with the 2008, 2009 and 2010 BNLL protocol surveys determined this species does not occur in those portions of the PSA. Nelson's antelope squirrel was not observed during the 12 full coverage surveys for the 2010 adult BNLL survey period. Refer to BR Map 6 in Section 13.0 for survey areas covered from 2008 to 2010.

C. Focused Small Mammal Surveys

The giant kangaroo rat (*Dipodomys ingens*) has not been detected within the PSA. Focused wildlife surveys have not detected any special status small mammal species not previously detected by other method. Visual detection surveys conducted during the 2010 BNLL adult survey period identified potential kangaroo rat precincts, which were later evaluated by Paul Collins and Tom Olson (Table 19).

Ten kangaroo rat precincts were positively identified during the burrow and scat measurement study. Three known kangaroo rat precincts were included in the burrow and scat measurement study that were determined to be occupied by Heermann's kangaroo rat (*Dipodomys heermanni*) by body morphometrics obtained during live trapping surveys in 2009 and 2010. These three locations provided a baseline for on-site Heermann's kangaroo rat burrow and scat morphometrics. Average burrow and scat measurements collected from the Topaz Solar Farm Project Option were compared with published literature for giant kangaroo rat (Table 19).

The kangaroo rat burrow and scat measurement study conducted in June 2010 determined all kangaroo rat precincts within the PSA were created and inhabited by the common and widespread Heermann's kangaroo rat (*Dipodomys heermanni*). The federally listed endangered giant kangaroo rat does not occur within the PSA. Table 18 provides the kangaroo rat burrow and scat morphometric data collected by Collins and Olson.

One small mammal species that is extremely rare in the Carrizo Plain but common elsewhere in the state is the ornate shrew (*Sorex ornatus*), which was collected by Jason Dart (SCP 10611) in 2010 along the south boundary of the PSA in Section 4. A single specimen was found recently dead at the base of a fence post where it may have been dropped by a raptor. The specimen was collected and preserved, and presently represents the only voucher specimen ever collected in the Carrizo Plain region (personal communications by email with Daniel F. Williams and Paul Collins May 2010). An ornate shrew captured in 1989 during a trapping study on the Elkhorn Plain Ecological Reserve is the only other record for this species in the Carrizo Plain (Williams 2001). Shrews are typically associated with wetland habitats, and a population in the Carrizo Plain region is unusual in that it is such an arid landscape. The shrew collected within the PSA is presumed to be *Sorex ornatus ornatus*, a common species with no special status listing.

D. Barn Owl Pellet Analysis

An analysis of thirty barn owl pellets collected from within the PSA resulted in the identification of 125 individual animals of eight species (Collins 2009). No federally listed small mammals were detected by the owl pellet analysis. Two common rodent species identified in the pellets, *Reithrodontomys megalotis* and *Neotoma lepida*, had not previously been documented within the PSA. *R. megalotis*, the common harvest mouse, could be present in low numbers within the PSA. *N. lepida*, the desert woodrat, prefers rocky or brushy habitats which do not occur within the PSA but are present in the vicinity. We expect this occurrence is due to an owl which foraged off the PSA and returned to roost on site.

TABLE 17. SMALL MAMMAL TRAPPING RESULTS. No federally listed small mammals were detected within the PSA. The results of small mammal trapping surveys conducted within the PSA are provided.

Survey	Locations	Trap nights	PeMa	ChCa	PeIn	OnTo	DiHe	DiIn	DiNiNi	DiNiBr	SpBe	SyAu
URS 2008	Section 28, north half Section 33	5,400	2	14	27	0	0	0	0	0	0	1
Vanherweg 2008	Sections 6, 8, 16, 29	1,600	2	48	23	1	11	0	0	0	0	0
Collins 2009	Sections 19, 21, 22, 27	720	50	6	3	0	13	0	0	0	0	0
Collins 2010	Sections 4, 5, 15, 26, 28, 32, 33, 34, 35	1,220	33	7	14	0	5	0	0	0	1	0
	Totals	**8,940**	**87**	**75**	**67**	**1**	**29**	**0**	**0**	**0**	**1**	**1**

Abbreviations	Special Status
PeMa: *Peromyscus maniculatus gambelii*	None
ChCa: *Chaetodipus californicus ochrus*	None
PeIn: *Perognathus inornatus neglectus*	Special Animal
OnTo: *Onychomys torridus tularensis*	Species of Special Concern
DiHe: *Dipodomys heermanii swarthi*	None
DiIn: *Dipodomys ingens*	Federal and State Endangered
DiNiNi: *Dipodomys nitratoides nitratoides*	Federal and State Endangered
DiNiBr: *Dipodomys nitratoides brevinasus*	Special Animal
SpBe: *Spermophilus beecheyi*	None
SyAu: *Sylvilagus audubonii*	None

TABLE 18. TOPAZ KANGAROO RAT MORPHOMETRIC DATA. Measurements are provided for average burrow and scat size at kangaroo rat precincts detected within the Topaz Solar Farm Project Option. Asterisks indicate locations where live trapping previously identified *Dipodomys heermanni*. Scat was not present at seven localities.

				Horizontal Burrow Dimensions		Vertical Burrow Dimensions		Scat Dimensions		
USGS Section	**Site ID No.**	**Project Option**	**Coordinates (WGS 84)**	**Width**	**Height**	**Width**	**Height**	**Length**	**Width**	**Species ID**
4	4-1	B	N35.340735 W120.043557	59.2	54.6	40.0	40.0	5.2	2.6	*Dipodomys heermanni*
4	4-2	B	N35.337729 W120.046208	55.0	47.2	41.7	40.0	--	--	*Dipodomys heermanni*
4	4-3*	B	N35.338143 W120.058108	53.3	48.5	--	--	4.9	1.9	*Dipodomys heermanni*
19	19-1*	A/B	N35.388397 W120.090951	52.5	43.8	35.0	30.0	--	--	*Dipodomys heermanni*
22	22-1	A/B	N35.382057 W120.040852	48.3	43.3	40.0	40.0	--	--	*Dipodomys heermanni*
27	27-1	A/B	N35.380662 W120.040201	49.3	43.4	44.0	39.5	--	--	*Dipodomys heermanni*
27	27-2	A/B	N35.38094 W120.03379	47.0	42.0	--	--	--	--	*Dipodomys heermanni*
28	28-1A	A/B	N35.373451 W120.050753	55.5	50.0	40.5	35.8	--	--	*Dipodomys heermanni*
28	28-1B*	A/B	N35.380886 W120.041034	55.0	45.0	40.0	37.5	--	--	*Dipodomys heermanni*
33	33-1	A	N35.358079 W120.049719	70.0	75.0	--	--	6.1	2.4	*Dipodomys heermanni* (based on scat dimensions)

TABLE 19. WILLIAMS GIKR BURROW AND SCAT MORPHOMETRICS. Morphometric ranges for burrow and scat measurements of the giant kangaroo rat are provided from Williams 1992.

Species	Horizontal Burrows		Vertical Burrows	Scat Length (mm)	Scat Width (mm)
	Width (mm)	Height (mm)	Width (mm)		
Dipodomys ingens	88.4 (60-120)	77.7 (50-120)	57.9 (45-75)	6.9 (3.1-9.9)	3.3 (2.5-5.2)
Dipodomys heermanni	48.6 (35-63)	47.9 (31-79)	36.7 (27-48)	5.2 (4.0-6.6)	2.3 (1.9-2.9)

7.3.4 Fairy shrimp results

Protocol level surveys conducted within the PSA determined that three species of fairy shrimp are present: *Branchinecta lindahli*, *B. lynchi*, and *B. longiantenna* (AEC 2009; AEC 2010). The versatile fairy shrimp (*Branchinecta lindahli*) is a common and widespread species with no listing status. *B. lindahli* was detected in 28 pools in the southern and middle regions of the PSA. It occurs in natural vernal pools as well as road ruts and other anthropogenic non-wetland pools. *B. lindahli* is not a species of conservation concern.

The vernal pool fairy shrimp (*Branchinecta lynchi*) is a federally listed threatened species that was detected in 11 pools within the PSA. Within the PSA it only occurs in true vernal pools. All of the eleven *B. lynchi* pools are located in Option A, Section 4, in the extreme south end of the PSA. Four of the vernal pools in Section 4 contained both *B. lynchi* and *B. lindahli*.

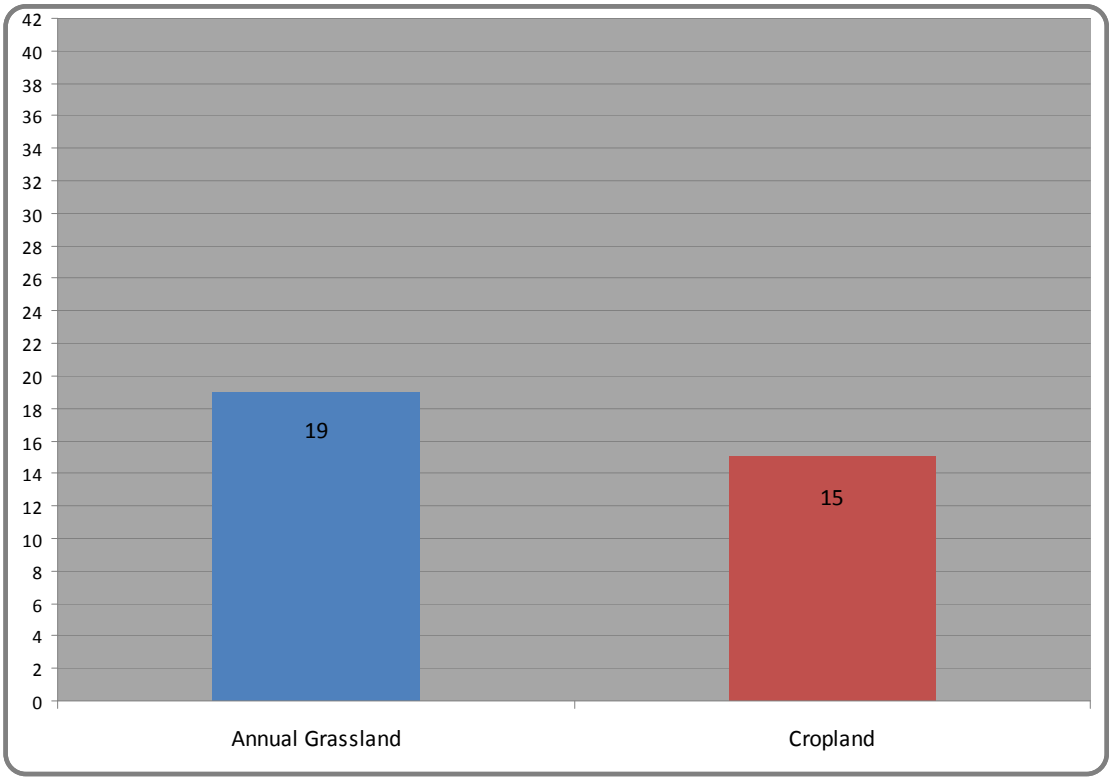
The longhorn fairy shrimp (*Branchinecta longiantenna*) is a federally listed endangered species that was detected in two pools within the PSA. The pools are both located in the south half of Section 20, a farm field in active cultivation with dry-farmed grain that is included in both project Options. Section 20 was included in the 2008-2009 protocol survey area. Ephemeral pools in the active farm field were not detected in 2008-2009 due to the low rainfall year that resulted in no inundation. Also, the pools were plowed and the ground was left bare through the season which effectively made the pools undetectable. In March 2010 while conducting other biological surveys, Althouse and Meade, Inc. biologists found several pool complexes with standing water in the south half of Section 20. A new barley crop was approximately 6 inches tall around the margins of the pools. Unidentified fairy shrimp were visually detected in three pools. AEC sampled the pools on March 23, 2010. Two of the pools contained *B. longiantenna* and the third pool was dry. This pool is situated between the two *B. longiantenna* pools and is mapped as potential habitat for listed fairy shrimp (refer to BR Map 10 in Section 13.0). Because two pools in Section 20 and one in Section 19 were found late in the wet season the protocol was not fully implemented and presence or absence of listed fairy shrimp was not verified. These pools are all mapped as potential habitat.

The 2010 protocol dry season survey conducted by Helm Biological Consulting sampled all 56 pools that were either not sampled or were found not to contain fairy shrimp during the 2010 wet season survey conducted by Advantage Environmental Consultants, LLC. *Branchinecta* cysts were detected in 31 pools. Dry season sampling identifies cysts to genus, not to species; therefore it is unknown if the fairy shrimp in the 31 pools identified during the 2010 dry season survey are common or listed species. BR Map 10 in Section 13.0 indicates the locations of all 31 pools with unidentified fairy shrimp, and provides a 250-foot buffer around each pool that is consistent with USFWS standard listed fairy shrimp pool setbacks.

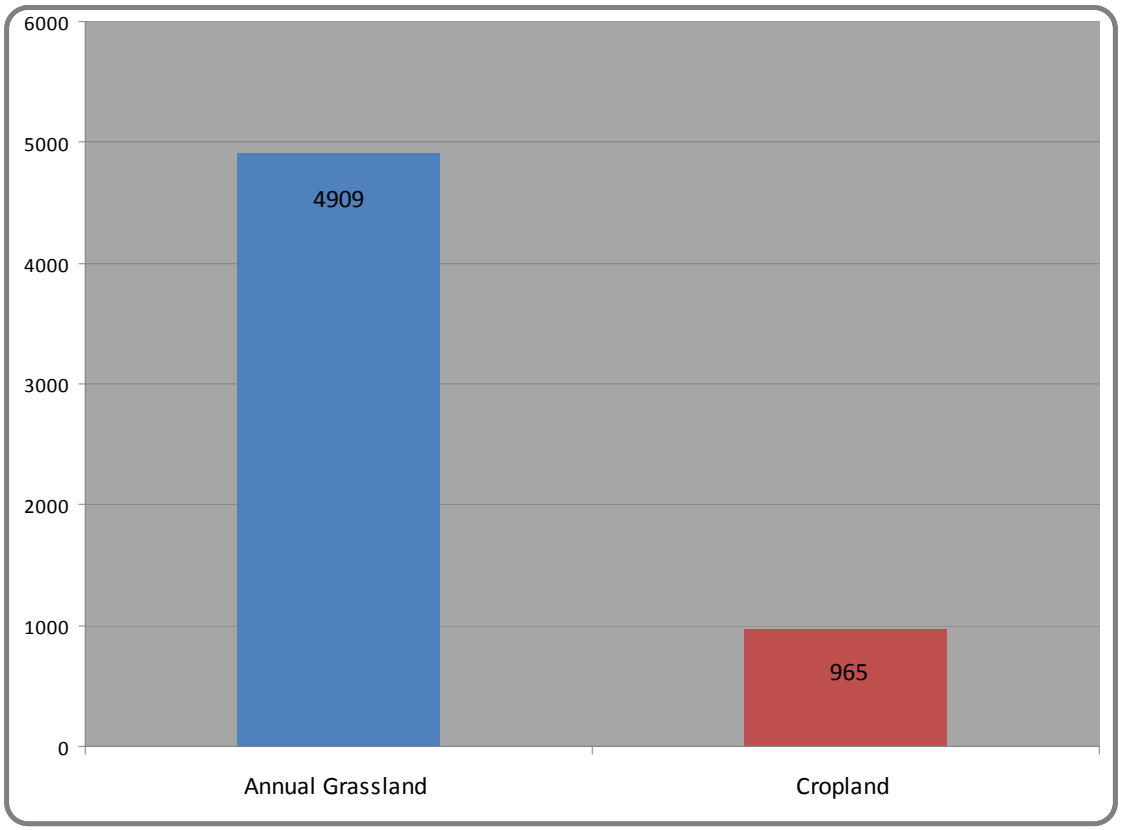
7.3.5 Special status bird survey results

Focused winter bird surveys detected twenty-two species of birds, eight of which are special status species including burrowing owl, ferruginous hawk, golden eagle, long-billed curlew, prairie falcon, tri-colored blackbird, loggerhead shrike, and mountain plover. Winter transect surveys detected twenty-three species of birds, seven of which are special status species including burrowing owl, ferruginous hawk, golden eagle, long-billed curlew, merlin, prairie falcon, and tri-colored blackbird (refer to BR Map 8 in Section 13.0).

Species richness in grassland and cropland habitats were compared graphically using the winter bird survey transect data. Nineteen bird species were detected in grassland habitats and fifteen bird species were detected in croplands (Graph 2). In addition, total bird abundance was compared for grassland and cropland habitats using the winter bird survey transect data. An abundance of 4,909 birds were detected in grassland habitats and 965 birds in croplands within the PSA during a one-day winter transect survey. Approximately 80% more birds were detected in grassland habitat than in cropland habitat (Graph 3).



GRAPH 2. BIRD SPECIES RICHNESS. Data from winter bird transect surveys is graphed to indicate species richness within grassland and cropland habitats. The number of bird species is labeled on the vertical axis and habitat type on the horizontal axis.



GRAPH 3. TOTAL BIRD ABUNDANCE. Data from winter bird transect surveys is graphed to indicate total bird abundance within grassland and cropland habitats. The number of birds detected is on the vertical axis and habitat type on the horizontal axis.

Habitats within the Topaz Solar Farm Project Option (PSA) were found to support breeding activities for twenty-one species of birds (Table 20). Four species (European starling, Eurasian collared dove, rock dove and house sparrow) are not native to the United States. Four species (grasshopper sparrow, lark sparrow, loggerhead shrike and burrowing owl) are special status species. In 2010 we documented one singing male grasshopper sparrow, fledgling lark sparrows, two active loggerhead shrike nests, and seven active burrowing owl nests.

Grasshopper sparrows nest on the ground or in low shrubs in grassland habitat. They were observed occasionally within the PSA during spring migration, however only one singing male was detected in spring 2010. Although nesting was not confirmed, we expect grasshopper sparrows nest in very low numbers in taller grass habitats within both project Options.

Lark sparrows nest on the ground or in low shrubs in grassland or shrubland habitat. They were observed to be uncommon throughout the PSA. Breeding behaviors were observed in Section 8 at the north end of Option B in 2009, and fledglings were observed along the west boundary of Option A in 2010.

Loggerhead shrikes nest in dense shrubs. Two active nests were documented in spring 2010 in ornamental plantings associated with residential compounds in Section 18

(Option B) and Section 33 (Option A). We expect shrikes will nest at both of these locations annually.

Burrowing owls nest in abandoned mammal burrows in grassland habitat. They show a high site fidelity, often returning to nest in the same burrow complex or nearest suitable burrow year after year. We mapped winter burrows, nesting burrows, and satellite burrows (refer to BR Map 9, Section 13.0). Grassland habitat within Option A and Option B supports wintering and nesting burrowing owls. In 2010 a total of seven active nests were documented. Three of the seven active nests were located immediately adjacent to and outside of the PSA. Option A contained four active nests, and Option B contained two active nests. Option A presently contains approximately 3,356 acres of grassland habitat suitable for burrowing owls. Option B presently contains approximately 1,689 acres of grassland habitat suitable for burrowing owls.

Birds are common in all areas of the PSA, however species diversity is generally low. The limited amount of vegetative cover reduces the suitability for most bird species that require shrubs and trees for cover and nesting sites. Only a few species, such as common raven and horned lark, are true residents in the PSA. These species breed on site and live on and near the site throughout the year. Most birds observed in the PSA are migratory or utilize habitat at the site only seasonally. Winter bird surveys identified migrants such as ferruginous hawk and long-billed curlew that come to forage on site during winter months. Spring bird surveys identified spring residents such as lark sparrow and Western kingbird that come to nest within the PSA but leave before the onset of winter. In addition, spring migrants such as Western tanager, MacGillivray's warbler, black-throated gray warbler, and Anna's hummingbird utilize vegetated areas of the PSA during migration.

TABLE 20. NESTING BIRDS. Twenty-one species of birds were documented nesting, or are presumed to be nesting, within the Topaz Solar Farm Project Option.

	Common Name ***Scientific Name***	**Special Status**	**Origin**	**Nesting Location**	**Option**	**Abundance Notes**
1.	Grasshopper Sparrow *Ammodramus savannarum*	SSC	Native	NW corner of Section 16	B	One singing male in 2010
2.	Burrowing Owl *Athene cunicularia*	SSC	Native	In Sections 4, 16, 22, 26, 28 and 35	A/B	7 nesting pairs in 2010. Probably fluctuates year to year.
3.	Red-tailed Hawk *Buteo jamaicensis*	None	Native	Power line towers between Sections 22 and 27	A/B	One pair annually
4.	Anna's Hummingbird *Calypte anna*	None	Native	Residential compound in Sections 4 and 18. Nesting not confirmed.	A/B	Limited to landscaped residential compound
5.	House Finch *Carpodacus mexicanus*	None	Native	Residential compounds in throughout PSA	A/B	Common only in residential areas
6.	Lark Sparrow *Chondestes grammacus*	Special Animal	Native	Grassland in Section 8, possibly north of PSA. Olive grove west of Option A.	A/B	Uncommon; no nests found.
7.	Rock Dove *Columba livia*	None	Introduced	Structures in Sections 21, 22, 27, 28 and 33	A/B	Common
8.	Common Raven *Corvus corax*	None	Native	Residential compounds and other structures in Sections 4, 15, 18, 21, 28 and 33	A/B	Very common
9.	Horned Lark *Eremophila alpestris*	None	Native	In grassland habitats throughout the PSA	A/B	Very common
10.	Brewer's Blackbird *Euphagus cyanocephalus*	None	Native	Presumed in residential compounds throughout PSA	A/B	Common but not abundant
11.	Red-winged Blackbird *Agelaius phoeniceus*	None	Native	Section 28 west half, likely in local areas of grain fields throughout PSA	A/B	Uncommon
12.	Loggerhead Shrike *Lanius ludovicianus*	SSC	Native	Residential compounds in Sections 18 and 33	A/B	2 active nests in 2010.
13.	House Sparrow *Passer domesticus*	None	Introduced	Residential compounds throughout PSA	A/B	Common but not abundant

	Common Name ***Scientific Name***	**Special Status**	**Origin**	**Nesting Location**	**Option**	**Abundance Notes**
14.	Say's Phoebe *Sayornis saya*	None	Native	Residential compounds throughout PSA	A/B	Uncommon
15.	Eurasian Collared Dove *Streptopelia decaocto*	None	Introduced	Residential compounds throughout PSA	A/B	Common but not abundant
16.	Western Meadowlark *Sturnella neglecta*	None	Native	In grassland habitats throughout PSA	A/B	Common
17.	European Starling *Sturnus vulgaris*	None	Introduced	Residential compounds throughout PSA	A/B	Common
18.	Western Kingbird *Tyrannus verticalis*	None	Native	Residential compounds throughout PSA	A/B	Very common
19.	Cassin's Kingbird *Tyrannus vociferans*	None	Native	Confirmed in Section 4 residential landscape. Presumed in Sections 18 and 28 residential areas	A/B	Uncommon
20.	Barn Owl *Tyto alba*	None	Native	Abandoned building in Section 27. Nesting unconfirmed but likely in Section 28	A/B	Uncommon
21.	Mourning Dove *Zenaida macroura*	None	Native	Residential compounds in Sections 4, 16, 18, 22, 27, 28 and 33	A/B	Common

7.3.6 Final golden eagle survey results

Golden eagles forage within the PSA year-round. The number of eagles varies seasonally, with a general increase in winter when the local resident population is bolstered by migrants. In winter, we observed adult and sub-adult golden eagles regularly utilizing habitats within the PSA for hunting, loafing, and night roosting. By late winter and through spring, adult golden eagles are seldom observed. Presumably, they move into mountainous areas where there is better nesting habitat. Un-mated sub-adult golden eagles are present in and near the PSA through the spring, where they hunt ground squirrels, feed on carrion, and occasionally utilize trees in abandoned ranch compounds as night roosts.

Aerial nest surveys conducted by helicopter covered approximately 448,647 acres of land in the Carrizo Plain (Latta 2010). The survey area was based on a 10-mile radius around the Topaz Solar Farm PSA and the proposed California Valley Solar Ranch project. Final results from two complete aerial survey passes determined 12 golden eagle territories are located within the survey area (refer to BR Map 11 in Section 13.0). The survey did not determine how many eagles were present at the time of the survey, however observations of at least one adult on two of the three non-active territories suggest 11 to 12 pairs were present. Twenty-two golden eagle stick nests were located, nine of which were active and contained chicks. Two nests showed signs of recent activity but were not active. The remaining 11 nests are likely alternate nests not used this year. Seven of the 12 golden eagle territories contained nests within ten miles of the Topaz PSA. Four of these territories contained active golden eagle nests that are located within 10 miles of the PSA. No golden eagle nests are located within the PSA.

7.3.7 Reptile and amphibian results

Five reptile species were documented within the PSA (refer to Table 15). Reptiles occur in very low abundance, likely due to historical land use practices. Despite thousands of hours of field work conducted for the BNLL protocol surveys, no special status reptiles were observed, although moderately suitable habitat is present in untilled grassland areas of the PSA. In June 2010 a San Joaquin whipsnake was positively identified by Paul Collins from a snake skin found in the northeast corner of Section 28.

The BNLL has not been detected within the PSA, and is not expected to occur. The BNLL is the only federally listed reptile with a potential to occur within the PSA. Protocol surveys conducted on portions of the PSA in 2008 and 2009 did not detect BNLL. The 2010 BNLL protocol survey, being conducted on 2,010 acres of grassland not previously surveyed, completed 12 full coverage passes for the adult period by July 15 without detecting BNLL (refer to BR Map 6, Section 13.0).

Three species of amphibian were documented within the PSA (refer to Table 15). No federally listed amphibians occur within the PSA, and none are expected to be present. One species, the Western spadefoot toad, is a Species of Special Concern. Western spadefoot toads or larvae were not observed at the Topaz site in 2008 or 2009 during seasonally appropriate surveys. In the spring of 2010, spadefoot toad tadpoles were observed in agricultural reservoirs in Sections 20 and 28, plunge pools in an ephemeral drainage in Section 33, ephemeral pools in Section 18, and in vernal pools in Section 4

(refer to BR Map 7 in Section 13.0). A total of 14 pools were identified that contained spadefoot toad larvae. Of these, only three pools contained water long enough for successful metamorphosis in 2010.

7.3.8 Bat roost survey results

Potential roosting habitat is present for bats in occupied and abandoned structures in Sections 16, 18, 22, 27, 28, and 33. Occupied residences were not surveyed. Abandoned structures were visually inspected for potential entry points and other sign of bat use, including guano and scratch marks at entry points. We found no evidence of temporary or permanent use of abandoned structures within the PSA by roosting bats.

7.3.9 Tule elk and pronghorn antelope results

The summer range of the local (north of Highway 58) tule elk herd includes agricultural lands at the north end of the PSA, although some elk may be present on the site during any month of the year (refer to BR Map 3 in Section 13.0). We observed groups of cows (female elk) averaging approximately 20 to 30 animals grazing and resting within the PSA in May and June 2008. Smaller groups of young males were occasionally observed within the PSA. In June 2009, we observed a large group of approximately 80 elk in Section 18, with several adult males and at least 12 calves. Elk were observed uncommonly in the PSA between December 2009 and April 2010. By June 2010, the large herd of approximately 80 elk had moved back into cropland areas in Sections 17 and 18, and other areas north of the PSA. This large herd was observed in this area through July 2010. It consisted of about a dozen adult and subadult males with a large group of mixed age females. A high count of 11 calves was tallied on June 15, 2010.

Elk do not move through the PSA to access foraging areas. The amount of barbed-wire fencing that is present is a deterrent, and the elk primarily forage and move through the foothills of the Temblor Range just east of the PSA. Access to the cropland areas in Sections 7, 8, 17, and 18 is from the north. Essentially, current elk movements pass north and south through rangelands east of the PSA, then enter into the PSA through a low fence in the southeast corner of Section 8. At times they may also enter the PSA from the north straight through Sections 6 and 7. Elk have only been detected within Sections 7, 8, 17, and 18 of the PSA. All elk observations are within Option B. What may have been an elk footprint was observed in Section 4 in 2010, but no elk sighting confirmed presence in this area.

Pronghorn antelope utilize grassland and cropland habitats throughout the PSA (refer to BR Map 4 in Section 13.0). The pronghorn antelope group observed within the PSA consisted of a maximum of 19 animals, usually one or two adult males with several adult females and several subadult animals. Two fawns were observed in May 2008, six fawns were observed in May 2009, and five fawns were observed in June 2010. The largest group observed in spring 2010 primarily foraged in Sections 4, 5, and 32 in the southwest portion of Option A. This northern California Valley group was present within the PSA consistently during spring months, and consisted of 17-19 individuals at any one time. Adult males were occasionally observed on the site during late winter months. A male was observed along Bitterwater Road in the Bitterwater Valley over five miles north of the PSA in late May 2008. Seasonal movements of pronghorn antelope are expected,

with animals moving between the Carrizo Plain National Monument, California Valley, and Cholame Valley groups (CDFG 2008a). CDFG records indicate antelope are present over a distance of approximately 85 miles from the Cholame Valley in the north to the Cuyama Valley in the south.

Pronghorn movements through the PSA are determined by fence location (refer to BR Map 14, Section 13.0). They make regular movements through permanent fence openings, and take advantage of gates that are left open. In order to pass through a fence where no opening exists, pronghorn prefer to go under as opposed to over. Preferred passages are typically in swales where the distance between the ground and the bottom fence wire is 30 inches or greater. In the southwest corner of Option A we observed a group of 18 pronghorn struggle to pass beneath a fence gap that measured 25 inches in height, suggesting this would be approximately the minimum height required for pronghorn passage beneath a barrier. On one occasion we observed two adult female pronghorn jump a low fence section with a height of approximately 36 inches. These animals were making normal movements without being pressured by human encroachment. Even with the ability to go over or under fences, we found that the potentially suitable movement passages were few and far between with the existing fencelines.

8.0 Vegetation Tests

First Solar commenced two vegetation tests on Topaz during Fall 2009 and Winter 2010. One test investigated site preparation methods for construction, and the second is an on-going test of vegetation response to solar arrays.

Test one was conducted by First Solar and Earth Systems, Inc. and directed by Earth Systems principal Craig Hill, P.E. (Earth Systems 2009). The goal of this site preparation test was to identify a site preparation technique that provides a safe and stable surface for construction workers during installation of the project while also allowing vegetation growth for small mammal habitat and erosion control. This site preparation test occurred in the southeast corner of Section 18. The test commenced shortly after early fall rains that produced 0.8 inch precipitation. The test was delayed for several days due to slippery site conditions, and too much moisture for surface compaction. On October 18, test strips (24, each 15 feet wide by 230 feet long) were laid out in a disked barley field last harvested in the summer of 2009. Site preparation methods included mowing or disking plus compaction with a steel drum or a rubber tired vehicle. All strips were harrowed after mowing or disking, prior to compaction. Strips were seeded with soft-chess brome (*Bromus hordeaceus*), a naturalized grass common in the area, before or after compaction, depending on treatment.

The second vegetation test commenced January 2010, prior to heavy winter rains, in the northeast corner of Section 29. The second test is an on-going study conducted by First Solar with Althouse and Meade, Inc. principal LynneDee Althouse, M.S. and with University of California Cooperative Extension agent Royce Larsen, Ph.D. The goal of this vegetation test is to identify a ground treatment that will provide the appropriate vegetative ground cover within the project site. Appropriate ground cover on the project site will provide habitat for kit fox and their small mammal prey, will protect the soil

from wind and water erosion, and will encourage stormwater infiltration while not shading the PV modules or creating a fire hazard. A fallow field was disked and harrowed prior to laying out test plots in four replicated Latin squares (44 feet by 44 feet) surrounded by a 25-foot buffer that was harrowed and rolled. Three treatments and a control were replicated four times within each Latin square. Treatments included (1) naturalized grasses (soft-chess brome and rat-tail fescue, *Vulpia myuros*); (2) grasses and wildflowers; (3) grasses later treated with a dicot herbicide; and (4) no treatment. The buffer was seeded by a combination of treatment 1 grasses and a cover crop mix recommended by Royce Larsen. In June and July 2010, First Solar installed PV modules (not electrified) over replicate test sites, each with 6 module tables within an area 80 feet by 80 feet. (Photo Collection 6). The vegetation test will continue through 2011.

In January 2010, a faux module table, 8 feet wide by 4 feet tall, was installed in a buffer zone of the second vegetation test site. The faux module site was instrumented with light meters that sample photosynthetic light spectrum radiation, temperature meters, and soil moisture meters. A duplicate set of instruments were placed away from the faux modules for comparison. In August 2010, instruments placed under the faux module will be moved to the vegetation test site where they will collect data under modules of the same material, design, and layout as proposed for the Topaz Solar Farm project.

We evaluated both test sites during late spring and early summer 2010. Soft-chess brome, wild oats (*Avena* spp.) and barley (*Hordeum vulgare*) dominated the site preparation test site, standing 28 to 48 inches tall, with 10 to 30 percent bare ground, and over 5,000 pounds per acre above-ground biomass. Rat-tail fescue, soft-chess brome, rip-gut brome (*B. diandrus*), and Mediterranean grass (*Schismus arabicus*) dominated the second vegetation test site along with pineapple weed (*Chamomilla suaveolens*), mustard (*Hirschfeldia incana*), and fireweed (*Amsinckia menziesii*). Vegetation height at the second site in locations not covered by modules was 10 to 18 inches tall with about 50 percent bare ground, and about 2,500 pounds per acre above-ground biomass.

By comparison, vegetation in a nearby field that had not been plowed for over 20 years (Sections 34 and 35) was dominated by dicots (forbs), not by grasses, particularly filaree (*Erodium cicutarium*). Vegetation height averaged less than 10 inches tall, generally 10 to 20 percent bare ground, and about 1,400 pounds per acre above-ground biomass. This was significantly shorter vegetation than in the vegetation test sites. This finding indicates that some areas may require little or no site preparation, depending on existing vegetative cover and site stability.

Vegetation under the faux module was dominated by rat-tail fescue, soft-chess brome, red-top brome *(Bromus madritensis)*, and rip-gut brome. Vegetation height under the modules averaged 16 inches tall, about 55 percent bare ground, and about 1,800 pounds per acre above-ground biomass. Young bunchgrass *(Nassella* sp.*)* was only observed under the faux module, and was still green in early July. The small bunches were five inches tall. There was no other difference in species composition between the module treatment and out in the open.

TABLE 21. VEGETATION TESTS. Vegetation height, percent bare ground, and above-ground biomass production at four locations. The vegetation test sites produced more biomass per acre than observed a nearby field not plowed for over 20 years.

Location	Land Use History	Vegetation Height (inches)	Bare Ground (percent)	Biomass (pounds per acre)
Compaction test	Recently farmed, planted in fall	>30	20	>5,000
Panel test (before installation)	Fallow field, planted in winter	<18	50	2,500
Under faux panel	Fallow field, planted in winter	<18	55	1,800
Sections 34 and 35	Field last plowed over 20 years ago	<10	<20	1,400

Preliminary review of light, air temperature, and soil temperature data between May 25 and July 7 indicate that light between modules generates peak photosynthetic available radiation (PAR) between 500 and 2000 uE (microEinsteins), and average daytime PAR between 100 and 300 uE, compared to peak PAR away from the modules at 2000 uE. Air temperatures under the faux modules were consistently below those in the open. Under the modules, temperatures generally peaked around 85 degrees Fahrenheit (F) compared with 90 to over 100 degrees F in the open. Soil temperature 12 inches below the surface under the modules started around 58 degrees F on May 25 and reached 75 degrees F by July 7, 2010. In the open, soil temperatures at 12 inches started around 75 degrees in May and rose to over 90 degrees F by July 7. Daily soil temperature fluctuations under the module at 12 inches below the ground surface were much less (about 3 degrees per day) under the modules compared to out in the open where temperatures 12 inches below the surface varied 6 degrees per day.

Weedy species did not increase under the faux module, and are not likely to increase under Topaz PV modules. Botanical surveys conducted within the Topaz project area between 2008 and 2010 identified a number of weedy species that occur in the region, and are considered here regarding their potential to increase after module installation. Yellow starthistle *(Centaurea solstitialis)* is a noxious weed (California C-list) that occurs in disturbed patches within the PSA. Yellow starthistle is adversely affected by shade. Puncture vine *(Tribulus terrestris)* is also a noxious weed (California C-list), but is unlikely to increase under modules because it is generally associated with disturbed sandy soils. Modules are not proposed on sandy soils. White horsenettle *(Solanum elaeagnifolium)* is a California B-list noxious weed that occurs uncommonly along Highway 58 near Section 34. It grows best on disturbed sandy well-drained soils that have summer irrigation, such as cotton fields (DiTomaso and Healy 2007). White horsenettle is unlikely to become established within the PSA. Field bindweed *(Convolvulus arvensis)* is a California List-C noxious weed that is abundant in the PSA. Field bindweed thrives in open disturbed farmland. It may grow under modules but is generally found in disturbed areas. Rush skeletonweed *(Chondrilla juncea)* is a California List-A noxious weed and barbed oatgrass *(Aegilops triuncialis)* is a California

List-B noxious weed. The skeletonweed and barbed oatgrass grow in disturbed areas, and are unlikely to increase in undisturbed soils under PV modules.

In summary, the tallest and densest vegetation grew on the recently farmed barley field prepared for seeding just after the first rains. The shortest vegetation occurs in fields that have not been plowed for over 20 years. The proportion of bare ground showing was highest in the field prepared for seeding during the winter, and lowest in the fields that have not been plowed for over 20 years.

Based on preliminary vegetation test data, unplowed and untreated fields can produce sufficient biomass to protect the soil from erosion. There is sufficient light under modules to support ample biomass that can protect the soil from sheet flow and wind erosion. In addition, vegetation is likely to experience a longer growing season under the modules than out in the open due to lower soil and air temperatures. Shading may benefit perennial bunchgrass species, such as nodding needlegrass *(Nassella cernua).* Nodding needlegrass is a native bunchgrass that occurs along the edge of Highway 58 between Bitterwater Road and Simmler-Soda Lake Road. Roadsides accumulate moisture that drains off the roadway, creating more mesic, or moderate, microsite conditions than adjacent fields in the Carrizo Plain. PV modules ameliorate extreme soil temperatures and allow grasses to grow longer due to an improved moisture regime under the panels compared to open fields.

In conclusion, recommended site preparation methods on actively farmed ground include mowing, harrowing, and light seeding prior to surface compaction. Fallow fields may not need to be mowed. Stable fields that have not been plowed in many years may only require microsite preparation to provide a safe and stable surface for construction workers. First Solar is currently investigating natural compaction levels in stable fields in order to minimize site preparation operations while maintaining worker safety. First Solar plans to prepare actively farmed fields with traditional farming methods plus minimal surface compaction (to 80 percent), as needed. The proposed methods will provide for worker safety while maintaining habitat for kit fox and their prey.

The vegetation test site will continue to be monitored to identify the appropriate ground treatment and seed mix that should be implemented during project site preparation.

9.0 Project Overview

9.1 General Discussion of PSA Site Conditions

The PSA contains numerous parcels that have been in periodic agricultural production for over 70 years. All habitats within the PSA are heavily influenced by past farming and ranching operations. Land management practices have removed all shrub vegetation from the PSA, and converted natural grassland systems to rangeland and farmland dominated by introduced species. Rangeland, described here as California annual grassland, varies in species composition. Areas that have been untilled the longest, some over 20 years as part of the Conservation Reserve Program, typically contain higher diversity and abundance of native plants than areas that have only been untilled for 5 years (Figure 5 in Section 12.0).

Lack of shrub development limits the amount of shade and cover available to many animal species. Species that are locally common in saltbush scrub habitats in the Carrizo Plain National Monument, such as the sage sparrow and Nelson's antelope squirrel, have not been detected within the PSA. Species present within the PSA are those that prefer wide-open habitats and are adaptable to variable habitat conditions, including frequent disturbance. Small mammal and reptile fauna such as mice, kangaroo rats, gophers, lizards and snakes, are present in low abundance. We attribute this condition primarily to detrimental effects of farming activities. Medium sized mammals such as badger, coyote and kit fox occur within the PSA and are also affected by farming activities.

Large mammals such as tule elk and pronghorn antelope forage seasonally within the PSA. The primary reason elk and antelope are attracted to the PSA is farming. Forage is provided by land owners in the form of planted grain in the spring and naturalized bindweed in the summer and fall. Existing fences make movement difficult for large mammals. Elk and antelope move in regular patterns through fence openings or other easy passageways through the PSA.

9.2 Applicant Proposed Measures to Reduce Environmental Impacts

The Topaz Solar Farm project incorporates wildlife-friendly design elements. A goal of project design and construction methodology is to avoid or minimize potential impacts to kit fox and other sensitive biological resources when practicable. The following Applicant Proposed Measures (APM's) would be incorporated into the project design:

- Perimeter fencing with kit fox passages every 100 yards so foxes can move through and potentially inhabit the TSF facility. No new interior fencing. Remove existing cross-fencing.
- Kit fox artificial escape dens located both inside and outside the solar array perimeter fence.
- Artificial dens capable of supporting kit fox pairs and pups located in every Section within the fenced facility.

- Construction activities adjusted to avoid active kit fox and badger dens, nesting birds and other seasonally sensitive resources.
- Vegetate the ground within the PSA facility to promote a natural habitat to support potential kit fox prey. Vegetation managed with grazing or other methods (subject to further testing to confirm feasibility).
- Avoid construction within estimated 100-year flood boundary to create wildlife movement corridors through the TSF facility.
- In addition to fencing removal within solar array areas, cross-fencing and wildlife wire fencing would be removed from 100-year flood boundary movement corridors within the PSA to promote wildlife passage through the TSF Project.
- Avoid ephemeral wetland depressions. Establish a 25-foot setback to protect wetland hydrologic regimes and allow seasonal wildlife access to the pools.
- Avoid vernal pools. Establish a 50-foot setback to protect vernal pool hydrologic regimes and allow seasonal wildlife access to the pools.
- Avoid federally listed fairy shrimp pools. Establish a 250-foot setback to protect vernal pool hydrologic regimes and provide approximately 4.5 acres of protected upland wildlife habitat.

9.3 Regulatory Framework

9.3.1 CEQA guidance

The California Environmental Quality Act (CEQA) requires the lead agency to evaluate potential environmental effects of the project. The lead agency must also identify other State and local agencies (known as responsible agencies) that will be issuing a discretionary approval subject to CEQA for an activity that is part of the project. The following section of the State CEQA Guidelines provides general direction for the evaluation of biological resource impacts as a part of the environmental review of proposed projects.

CEQA Guidelines Section 15065 states that a Lead Agency shall find that a project may have a significant effect on the environment and thereby require an Environmental Impact Report (EIR) be prepared for the project where "there is substantial evidence, in light of the whole record," that the project, among other things, has the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, or substantially reduce the number or restrict the range of an endangered, rare or threatened species.

A significant effect may also be identified by considerable cumulative environmental effects, even if the individual effect is limited. The following definition of a significant effect is defined in Section 15382 of the CEQA Guidelines:

> *"Significant effect on the environment" means a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance.*

All of the plants constituting CNPS List 1B meet the definitions of Section 1901, Chapter 10 of the California Native Plant Protection Act (CNPPA) in the California Fish and Game Code or Secs. 2062 and 2067 (California Endangered Species Act) of the California Fish and Game Code, and are eligible for State listing.

9.3.2 Federal and state resource protections

The agencies that administer the Federal Endangered Species Act (FESA) and California Endangered Species Act (CESA) formally list plant and animal species determined to be Threatened or Endangered, and they have adopted regulations to implement these laws to protect such species.

Other federal statutes that provide protection for species and/or their habitats include, but are not limited to, the National Environmental Policy Act (NEPA), the Clean Water Act (for protection of federal wetlands), Bald and Golden Eagle Protection Act (BGEPA), Migratory Bird Treaty Act (MBTA), Executive Order 11990 (wetlands protection), and California Fish and Game Code sections 1601, 1602, and 1603 (Streambed Alteration Agreements).

Wetlands:

In conjunction with adopting a wetlands policy on March 9, 1987 the California Fish and Game Commission assigned the CDFG the task of recommending a wetlands definition. CDFG found the USFWS wetland definition and classification system to be the most biologically valid. The CDFG staff use this definition as a guide in identifying wetlands while conducting on-site inspections for the implementation of its Commission's wetlands policy. The California State Water Resources Control Board is in the process of adopting a uniform state wetlands definition based on the Section 404 standards used by the U.S. Army Corps of Engineers in administering Section 404 of the Clean Water Act.

Ephemeral drainage channels with a hydrologic connection to Soda Lake are believed to be jurisdictional under Section 404. Impacts to jurisdictional drainages (Section 404, Clean Water Act) resulting from road crossings are therefore expected to require permits or other authorizations from the USACE, RWQCB, and potentially from CDFG (Fish and Game Code, Sections 1600, *et seq*.).

Flora and fauna:

Listed plants and animals under the Federal Endangered Species Act (FESA) have certain protections as specified therein (refer to Section 4.0). The United States Fish and Wildlife Service is the agency that regulates activities affecting terrestrial-based, Federally-listed species.

Certain species of nesting birds are protected from disturbance by The Migratory Bird Treaty Act of 1918, (as regulated by the United States Fish and Wildlife Service) and by sections 3503, 3503.5, and 3800 of the California Department of Fish and Game Code. Special protections for bald and golden eagles are also contained in the federal Bald and Golden Eagle Protection Act.

10.0 Potential Impacts to Biological Resources

Construction of the proposed Topaz Solar Farm (TSF) project potentially could affect common and special status animal species, nesting birds, and annual grassland, cropland, anthropogenic and ephemeral aquatic habitats. The perimeter of the array areas within the TSF Project site would be fenced. The TSF Project fenced area is expected to cover approximately 4,104 acres (Option A) or 4,007 acres (Option B) of the 9,700-acre PSA. The majority of the site would not need to be graded as part of the construction process, however the ground may be harrowed or plowed, and rolled to create an even surface for placement of the solar arrays. Grading may occur to construct access roadways, the lay-down area/staging areas, the substation and other structures, and to reduce slopes where needed for PV panel installation. Trenching would be required for installation of underground cables.

10.1 Potential Habitat Impacts

Potential impacts to habitats within the PSA are addressed below. For reference, all habitat types mapped within the PSA and discussed in this section are overlaid on a high-resolution aerial photograph provided as BR Map 1 in Section 13.0. Tables 22 and 23 provide acreages and impact types for habitats within Options A and B.

All areas within the final TSF Project fencing could be "temporarily disturbed" by construction activities, except for sensitive pool habitats which require setbacks (refer to APM's outlined in Section 9.2). For areas that would be "permanently removed", such as anthropogenic habitat and agricultural reservoirs, the acreage of temporary impact is zero. Additionally, croplands would be permanently converted to project uses or managed as annual grassland habitat, so no temporary disturbance calculations are indicated for this habitat type. Special status species that could be temporarily affected during construction in croplands are addressed separately, in Section 10.4. Natural non-wetland pools and anthropogenic non-wetland pools are considered here for their value to wildlife. However since they were not found to support sensitive wildlife and are not under the jurisdiction of the USACE, the TSF Project would not avoid these habitat types and would result in temporary and permanent impacts, as indicated in the tables. As a conservative calculation, all acreage of annual grassland habitat that occurs within the fenced areas of the TSF Project could be temporarily disturbed during project construction. Temporary disturbance could consist of vegetation management activities, vehicle and equipment driving across the habitat and/or staging within the habitat, and other minor affects from various construction activities. Also included in the temporary disturbance calculation are areas that would be graded to reduce slopes as required for PV panel array installations. These areas are listed as temporary impacts because they would be revegetated with annual grassland species. Approximately 640 acres of Option A would require grading, and approximately 1,638 acres of Option B would require grading.

The "permanently removed" category includes habitat areas which would be covered by TSF Project gravel roads, the substation and other structures, and the area of fence posts and piles that would be driven into the ground.

The "area with PV arrays" category includes all habitat areas that would be situated beneath PV arrays. The acreage within this category does not exclude the open areas between panel rows and aisles: rather, it is calculated conservatively as the total area of PV arrays. For example, the total PV array area of Option A is 3,339 acres, within which only 1,353 acres would have PV modules (panels) that partially shade the ground (amount shaded would vary with the angle of the sun throughout the day). Therefore, the inter-panel open space within the 3,339 acre PV arrays would be approximately 1,986 acres.

TABLE 22. HABITAT IMPACTS-OPTION A. Approximate areas of impact for Option A are provided for temporarily disturbed areas, permanently removed areas, and areas with arrays. Note: All acreages are approximate.

Habitat Type	**Total Acres Within Option A**	**Temporarily Disturbed (acres)** (All areas within project fencing)	**Permanently Removed (acres)** (Piles, fence posts, substation and structures, gravel roads)	**Area With PV Arrays (acres)**
Cropland	4,380	0	49	1,911
California Annual Grassland	3,356	1,719	13	1,428
Vernal Pool	2.2	0	0	0
Ephemeral Wetland Depression	0.6	0	0	0
Natural Non-wetland Pool	1.0	~2,640 sq. ft.	0	~2,640 sq. ft.
Anthropogenic Non-wetland Pool	0.7	~17,230 sq. ft.	~1,000 sq. ft.	~3,600 sq. ft.
Agricultural Reservoir	1,742 sq. ft. (0.04 acres)	0	1,742 sq. ft. (0.04 acres)	0
Anthropogenic	23	0	7	0

TABLE 23. HABITAT IMPACTS-OPTION B. Approximate areas of impact for Option B are provided for temporarily disturbed areas, permanently removed areas, and permanently shaded areas. Note: All acreages are approximate.

Habitat Type	**Total Acres Within Option B**	**Temporarily Disturbed (acres)** (All areas within project fencing)	**Permanently Removed (acres)** (Piles, fence posts, substation and structures, gravel roads)	**Area With PV Arrays (acres)**
Cropland	4,712	0	68	2,402
California Annual Grassland	1,689	1,124	17	937
Vernal Pool	0.1	0	0	0
Ephemeral Wetland Depression	0.6	0	0	0
Natural Non-wetland Pool	0.2	~4,500 sq. ft.	0	~4,500 sq. ft.
Anthropogenic Non-wetland Pool	0.1	~570 sq. ft.	~3,300 sq. ft.	~170 sq. ft.
Agricultural Reservoir	1,742 sq. ft. (0.04 acres)	0	1,742 sq. ft.	0
Anthropogenic	25	0	5	0

10.1.1 Cropland

The proposed TSF Project would convert cropland habitat to various project facilities. The TSF Project site and surrounding lands within the PSA would no longer be used for agriculture. Approximately 4,380 acres of cropland would be removed from production within Option A, and approximately 4,712 acres of cropland would be removed from production in Option B. These areas are expected to be converted to annual grasslands, with approximately 1,911 acres that would be within TSF Project PV arrays in Option A and approxiamtely 2,402 acres that would be within TSF Project PV arrays in Option B (Tables 22 and 23). Option A would permanently convert approximately 49 acres of cropland habitat to project facilities such as piles, fence posts, structures and gravel roads. Option B would permanently convert approximately 68 acres of cropland habitat to project facilities such as piles, fence posts, structures and gravel roads.

Soils, weather conditions, and the fact that there is very limited water availability at the site means that it is poorly suited to economically viable farming. The solar farm would allow establishment of annual grassland species within the Project, and may result in a net increase in annual grassland habitat and associated wildlife species by converting active croplands to passive solar uses.

Cropland habitats within the PSA presently act as an undesirable "biological sink" for many small to medium sized animals, which move into the croplands from adjacent habitats and succumb to farming activities such as plowing. These impacts are particularly detrimental for sensitive reptiles and amphibians such as horned lizard, San Joaquin whipsnake, and Western spadefoot toad, as well as endangered species such as fairy shrimp and kit fox.

Croplands within the PSA are habitat for pronghorn antelope and tule elk, especially as summer foraging and fawning habitat. Potential adverse affects to these and other species from loss of cropland habitat are addressed in Section 11.4.

10.1.2 California annual grassland

The proposed TSF Project would result in adverse effects to California annual grassland habitat within the PSA. Approximately 3,463 acres of California annual grassland habitat is located within the PSA. Option A could temporarily adversely affect up to 1,719 acres of annual grassland habitat (all existing grassland within Project perimeter fence), with 13 acres estimated to be permanently removed for project facilities, such as piles, fence posts, structures and gravel roads. Areas with PV arrays would affect up to 1,428 acres of grassland habitat. Option B could temporarily adversely affect up to 937 acres of annual grassland habitat, with 17 acres estimated to be permanently removed for project facilities, such as piles, fence posts, structures and gravel roads. Areas with PV arrays would affect up to 937 acres of grassland.

Adverse effects to non-native annual grassland habitat do not usually require mitigation in San Luis Obispo County unless special status species are adversely affected. Potential adverse effects to special status species and their habitat are addressed in Section 10.4.

Project installation on existing croplands may result in an increase in California annual grassland habitat through elimination of seasonal tilling and subsequent long-term management for grassland species. Vegetation between and beneath panels is likely to recover after installation and be dominated by annual grasses. In addition, all existing cropland within the Option study area that is selected but is outside the TSF Facility perimeter fencing would be removed from production and managed as annual grassland habitat and protected in perpetuity.

Examination of current habitat types within the PSA and associated land use history provides important insight regarding habitat recovery post-farming. The vegetative condition of areas such as Sections 16 and 28 indicate that within approximately five years after farming is eliminated, the land reverts to a low-diversity annual grassland habitat (refer to Land Use Descriptions in Section 3.2). Areas of the PSA that have been untilled for 20 or more years show a significant increase in plant species diversity, and abundance of native wildflowers. We expect that conversion of croplands within the PSA to passive solar facilities would initiate land conversion to annual grassland habitat, and that by the time the solar facility is decommissioned the land would support higher diversity and abundance of native plants than the present baseline.

10.1.3 Vernal pool

Forty-seven vernal pools are located within the PSA, with a total area of approximately 2.2 acres. Option A contains all 47 vernal pools and Option B contains 2 vernal pools. Vernal pools are sensitive habitat types that support unique associations of plants and wildlife. Many of the vernal pools within the PSA support federally listed fairy shrimp (refer to Section 10.4 for discussion of special status species).

Without proper precautions, construction of a solar facility could result in modification of the hydrological regime critical to prolonged vernal pool inundation. The applicant proposes to implement permanent setbacks around vernal pools that would protect hydrologic function (refer to Section 9.2). Vernal pools within the final Project layout would be protected by a minimum 50-foot buffer, which would be increased to 250 feet in locations where federally listed fairy shrimp are present. The 250-foot setback would also be implemented around vernal pools in which fairy shrimp were detected but not identified to species sufficient to determine listing status under the FESA(refer to Sections 10.4.5 and 11.4.5). Construction of the proposed TSF Project therefore would not result in adverse impacts to vernal pool habitat.

Seven vernal pools located in Sections 4, 19, 20, and 32 of the PSA are situated in cropland habitat, and are severely degraded by the current farming operation. Despite seasonal impacts from tilling, unique plants and animals are present, including federally listed fairy shrimp and breeding Western spadefoot toads. Vernal pools in cropland habitats that are included in the final TSF Project layout would no longer be subjected to adverse farming effects and would be protected from Project-related activities with applicant-proposed buffers. The TSF Project could, therefore, result in a beneficial effect to vernal pool habitat that is within the final Project layout. Construction of Option A would result in a beneficial effect to all seven of these vernal pools that are presently within active cropland habitat. Construction of Option B would result in a beneficial effect to two of these vernal pools.

10.1.4 Ephemeral wetland depression

Eight small ephemeral wetland depressions are located within the PSA, with a total area of approximately 0.7 acres. Ephemeral wetland depressions are isolated seasonal pools that are potential habitat for fairy shrimp, spadefoot toads and other wildlife, are dominated by hydrophytic plants, and have hydric soil indicators. The applicant proposes to implement permanent setbacks around ephemeral wetland depressions (refer to Section 9.2). Ephemeral wetland depressions within the final Project layout would be protected by a 25-foot buffer. Construction of the proposed TSF Project would not result in adverse impacts to ephemeral wetland depressions.

Two of these ephemeral wetland depressions within Section 18 of the PSA (Option B) are located in cropland habitat, and are severely degraded by the current farming operation. Despite seasonal impacts from tilling, vernal pool plants and animals are present, including non-listed fairy shrimp and breeding Western spadefoot toads. Ephemeral wetland depressions in cropland habitat that are included in the final TSF Project layout would no longer be subjected to adverse farming effects and would not be affected by the

proposed TSF Project. The TSF Project is expected, therefore, to result in a beneficial effect to ephemeral wetland depression habitat that is within the Option B layout.

Cattle graze the remaining six ephemeral wetland depressions within the PSA seasonally, which generally results in degraded habitat quality for sensitive vegetation and wildlife. Conversion of the grazing lands to passive solar uses would result in a beneficial effect on ephemeral wetland depressions in both Option A and Option B.

10.1.5 Natural non-wetland pool

Nine natural non-wetland pools are located within the PSA, with a total area of approximately 1.1 acres. Natural non-wetland pools are similar in form to ephemeral wetland depressions, however they do not remain inundated long enough to become dominated by hydrophytic plants and do not have hydric soils. In a hierarchical context, we consider this habitat type to be generally less biologically important than ephemeral wetland depression (except where listed fairy shrimp are present).

One natural non-wetland pool, located in Section 20, contains listed fairy shrimp and would therefore be protected by the 250-foot APM setback (refer to Sections 9.2 and 10.4.5). Two natural non-wetland pools in Section 20 (one on the boundary with Section 29) and two pools in Section 4 are mapped as potential habitat for listed fairy shrimp due to their proximity to known listed fairy shrimp pools, positive identification of Branchinecta cysts during 2010 dry season fairy shrimp surveys, and lack of positive species identification during previous protocol wet season surveys, and therefore would also be protected by the 250-foot APM setback (refer to BR Map 10, Section 13.0).

The remaining four natural non-wetland pools are widely scattered across the PSA, in both TSF Project Options, in both annual grassland and cropland habitats. Option A would permanently shade two natural non-wetland pools. Option B would permanently shade one natural non-wetland pool. Trenching, grading and installation of solar panel mounting posts could adversely affect other natural non-wetland pools. Because natural non-wetland pools with listed fairy shrimp would be avoided, we anticipate the proposed TSF Project would have a negligible adverse effect on the remaining natural non-wetland pools within the PSA because they do not support sensitive plants or wildlife.

Natural non-wetland pools within the PSA that are located in cropland habitat are severely degraded by the current farming operation. Natural non-wetland pools in cropland habitat that are included in the final TSF Project layout would no longer be subjected to adverse farming effects. The TSF Project could, therefore, result in a beneficial effect to natural non-wetland pool habitat that is within the final project layout.

10.1.6 Anthropogenic non-wetland pool

Anthropogenic non-wetland pools are man-made pools and ruts located in dirt roads throughout the PSA. Vehicles regularly disturb most of these pools. They do not contain hydrophytic plants or have hydric soils, but they can be low quality potential habitat for fairy shrimp and Western spadefoot toads. Except where special status species could be affected, the TSF Project may result in filling of anthropogenic non-wetland pools during road improvement and maintenance activities. Filling of anthropogenic non-wetland pools that do not contain special status species would not cause adverse effects to biological resources.

10.1.7 Agricultural reservoir

Two agricultural reservoirs are located within the PSA that support standing water during the rainy season, one in Section 20 and one in Section 28. Both reservoirs support breeding Western spadefoot toads and other common amphibian species. Two additional reservoirs are located within the PSA that do not hold any water during the rainy season, one in Section 28 and one in Section 29.

Agricultural reservoirs that end up within the final TSF Project layout may be used for water detention during construction, and would ultimately be removed if they fall within proposed solar arrays. Removal of the two reservoirs that do not hold water would not result in adverse impacts to ephemeral aquatic habitat or special status species. Utilization of the two reservoirs that do support standing water and breeding amphibians potentially could result in adverse effects to Western spadefoot toads. Adverse impacts could occur during pumping or other construction-related activities associated with use of the reservoirs as temporary detention basins, or during demolition of the reservoirs. Loss of breeding habitat could occur if the reservoirs are replaced by Project facilities. Potential Project effects on Western spadefoot toads are addressed in detail in Section 10.4.

10.1.8 Anthropogenic

Anthropogenic areas within the TSF Project site could be converted to Project facilities. No mitigation is required for conversion of anthropogenic habitat.

Conversion of anthropogenic habitat to solar facilities may result in removal of landscape trees and shrubs, abandoned homes and outbuildings, and various farm equipment and materials. This is expected to occur in Section 28, which is within both project Options. The abandoned residential compound in Section 33 would not be removed by either Project Option. Conversion of anthropogenic habitat within the PSA to solar facilities would not affect special status plants. Anthropogenic habitat within the PSA is suitable for use by nesting birds, including special status species such as the loggerhead shrike and raptors such as the red-tailed hawk and golden eagle. If appropriate avoidance and mitigation measures are not implemented, conversion of anthropogenic habitat within the PSA to solar facilities could result in adverse effects on nesting and roosting birds. The potential for the TSF Project to adversely affect nesting and roosting birds in anthropogenic habitat can be reduced (refer to Section 11.4.2).

10.2 Potential Impacts to Ephemeral Drainages

We anticipate that the United States Army Corps of Engineers (USACE) will take jurisdiction over certain ephemeral drainages within the PSA. A wetland delineation report was prepared for the Project which is currently under review by USACE (Althouse and Meade, Inc. 2010b). Solar arrays would not be located within federal jurisdictional drainages. Up to five permanent at-grade crossings would be constructed for the TSF Project.

Impacts to jurisdictional ephemeral drainages, such as crossings, would be mitigated (refer to Section 11.2).

10.3 Potential Impacts to Nesting Birds

Vegetation removal or other construction and maintenance activities associated with the installation and long-term management of a solar facility within the PSA could result in adverse impacts to nesting birds if conducted during nesting season (March 15 through August 15). The potential for the TSF Project to adversely affect nesting birds can be reduced (refer to section 11.4.2).

10.4 Potential Impacts to Special Status Species

We identified 10 special status plants and thirty-one special status animals within or immediately adjacent to the PSA. Three federally listed animals, the San Joaquin kit fox, vernal pool fairy shrimp, and longhorn fairy shrimp, are present within the PSA. Two of these species occur within Option B and all three occur within Option A. Construction of the proposed TSF Project potentially could result in adverse effects on special status species. Also covered in this Section are potential effects of the TSF Project on pronghorn antelope and tule elk.

10.4.1 Special status plants

Nine special status plants were identified within the PSA: round-leaved filaree (*California macrophylla*, CNPS List 1B.1), spiny-sepaled button celery (*Eryngium spinosepalum*, CNPS List 1B.2), Santa Lucia dwarf rush (*Juncus luciensis*, CNPS List 1B.2), shining navarretia (*Navarretia nigelliformis* ssp. *radians*, CNPS List 1B.2), Munz's tidy-tips (*Layia munzii*, CNPS List 1B.2), oval-leaved snapdragon (*Antirrhinum ovatum*, CNPS List 4.2), Ferris' goldfields (*Lasthenia ferrisiae*, CNPS List 4.2), Salinas milk-vetch (*Astragalus macrodon*, CNPS List 4.3), and Paso Robles navarretia (*Navarretia jaredii*, CNPS List 4.3).

One additional species, the diamond-petaled California poppy (*Eschscholzia rhombipetala*, CNPS List 1B.1) was mapped just outside the PSA boundary. No plant species listed under the federal Endangered Species Act or the California Endangered Species Act occur within the PSA.

The PSA is within the range of, and contains suitable habitat and soil features for, a broad variety of special status plants, including but not limited to those species identified on the site between 2008 and 2010. Based on our extensive field work we believe the single most significant limiting factor for special status plant occurrence within the PSA is consistent vegetation and soil disturbance related to farming practices. Termination of farming within the PSA and implementation of land management practices designed toward increasing grassland habitat suitable for kit fox would result in a beneficial effect to all special status plant populations presently occurring within the PSA, and potentially to other species occurring in the region. The TSF Project would, therefore, result in a strong overall beneficial effect on special status plants. Option A would permanently convert an estimated 4,380 acres of cropland habitat to annual grassland habitat that would be potentially suitable for special status plant establishment. Option B would permanently convert an estimated 4,712 acres of cropland habitat to annual grassland habitat that would be potentially suitable for special status plant establishment (Tables 24 and 25).

Construction activities associated with project build-out would likely result in some temporary adverse effects to special status plants if the activities overlap the bloom periods, if perennial species are removed, or if significant soil disturbance occurs. Tables 24 and 25 provide an overview of the anticipated temporary and permanent adverse effects, and overall effects of the project, on special status plants. Detailed accounts of potential project effects on each special status plant species are provided following the tables. Recommended minimization and protection measures for special status plants are provided in Section 11.4.1.

TABLE. 24. SPECIAL STATUS PLANT IMPACTS-OPTION A. Potential temporary and permanent adverse impacts to special status plants within Option A are provided, as well as an account of the overall effect of the TSF Project on special status plants. Locations of special status plants are indicated on BR Map 12.

	Common Name ***Scientific Name*** **Listing Status**	**Project Option**	**Temporary Adverse Impact**	**Permanent Adverse Impact**	**Overall Effect of TSF Project**
1.	**Round-leaved filaree** *California macrophylla* List 1B.1	Option A	**None** Occurrences would be avoided during construction.	**None** No project facilities would be located in occurrence areas	**Beneficial** • Occurrences are within proposed open space • Conversion of 4,380 acres of annually plowed cropland to annual grassland open space suitable for establishment to new areas • On-site populations expected to increase after project construction due to elimination of annual tilling
2.	**Spiny-sepaled Button Celery** *Eryngium spinosepalum* List 1B.2	Option A	**None** Only occurs in one vernal pool, which would be avoided during construction	**None** No project facilities would be located in vernal pools	**Beneficial** • Occurrence is within proposed open space • Project would result in protection of onsite vernal pools in perpetuity • Lands containing this species are presently in the CRP program, but no permanent protection from future farming is provided if contract is not renewed

	Common Name ***Scientific Name*** **Listing Status**	**Project Option**	**Temporary Adverse Impact**	**Permanent Adverse Impact**	**Overall Effect of TSF Project**
3.	**Santa Lucia Dwarf Rush** *Juncus luciensis* List 1B.2	Option A	**None** Only occurs in one vernal pool, which would be avoided during construction	**None** No project facilities would be located in vernal pools.	**Beneficial** • Occurrences are within proposed open space • Project would result in protection of onsite vernal pools in perpetuity • Lands containing this species are presently in the CRP program, but no permanent protection from future farming is provided if contract is not renewed
4.	**Shining Navarretia** *Navarretia nigelliformis* ssp. *radians* List 1B.2	Option A	**None** Occurrence would be avoided during construction	**None** No project facilities would be located in occurrence areas	**Beneficial** • Project would convert 4,380 acres of annually plowed cropland to annual grassland
5.	**Munz's Tidy-tips** *Layia munzii* List 1B.1	Option A	**Negligible** Small number of plants could be affected during construction (up to 16 individuals, 2.5% of PSA population, per 2010 survey results)	**None** Significant permanent occurrence areas (as indicated by polygons on BR Map 12) would be avoided by TSF Project layout	**Beneficial** • Project would convert 4,380 acres of annually plowed cropland to annual grassland • Permanent population could become established in newly created grassland in Sections 32 and 33 • Occurrences in southwest corner of Section 5 could expand into lands that are currently farmed • Sufficient room would be present within the Project for periodic and possibly permanent establishment

	Common Name ***Scientific Name*** **Listing Status**	**Project Option**	**Temporary Adverse Impact**	**Permanent Adverse Impact**	**Overall Effect of TSF Project**
6.	**Oval-leaved Snapdragon** *Antirrhinum ovatum* CNPS List 4.2	Option A	**Negligible** Up to 35plants could be affected during construction (100% of PSA population, per 2010 survey results)	**None** Impacted occurrence is currently within cropland, and is expected to be present after Project installation	**Beneficial** • Project would convert 4,380 acres of annually plowed cropland to annual grassland • Occurrence is in active cropland. High potential for expansion of existing onsite population after elimination of tilling
7.	**Ferris' Goldfields** *Lasthenia ferrisiae* List 4.2	Option A	**Negligible** Small number of plants could be affected during construction (up to 2 individuals, 50% of PSA population, per 2010 survey results)	**None** No significant permanent occurrence areas are present	**Beneficial** • Project would convert 4,380 acres of annually plowed cropland to annual grassland • Suitable conditions would be present within the Project for periodic and possibly permanent establishment
8.	**Salinas Milk-vetch** *Astragalus macrodon* List 4.3	Option A	**Negligible** Small number of plants could be affected during construction (up to 13 individuals, 1.9% of PSA population, per 2010 survey results)	**None** Impacted occurrences are expected to become re-established after construction	**Beneficial** • Project would convert 4,380 acres of annually plowed cropland to annual grassland • This perennial species was observed to recruit to croplands in Sections 4, 5, 32, and 33, but was eliminated by fall tilling • Suitable conditions would be present within the Project for permanent establishment

	Common Name ***Scientific Name*** **Listing Status**	**Project Option**	**Temporary Adverse Impact**	**Permanent Adverse Impact**	**Overall Effect of TSF Project**
9.	**Paso Robles Navarretia** *Navarretia jaredii* List 4.3	Option A	**Negligible** 1,004 plants could be affected (35% of PSA population, per 2010 survey results)	**None** Impacted occurrences are expected to become re-established after construction	**Beneficial** • Project would convert 4,380 acres of annually plowed cropland to annual grassland • High potential for expansion of existing onsite population
10.	**Diamond-petaled California Poppy** *Eschscholzia rhombipetala* List 1B.1	Outside Option A	**None** Occurrence is outside Project area and would be protected by a construction buffer	**None** No project facilities would be located in the occurrence area	**Beneficial** • Elimination of annual tilling of the occurrence may benefit this species

TABLE. 25. SPECIAL STATUS PLANT IMPACTS-OPTION B. Potential temporary and permanent adverse impacts to special status plants within Option B are provided, as well as an account of the overall effect of the TSF Project on special status plants.

	Common Name ***Scientific Name*** **Listing Status**	**Project Option**	**Temporary Adverse Impact**	**Permanent Adverse Impact**	**Overall Effect of TSF Project**
1.	**Munz's Tidy-tips** *Layia munzii* List 1B.1	Option B	**Negligible** Small number of plants could be affected during construction (up to 12 individuals, 2% of PSA population, per 2010 survey results)	**None** No significant permanent occurrence areas are present	**Beneficial** • Project would convert 4,712 acres of annually plowed cropland to annual grassland • Sections 27 and 28 could support a permanent population after project construction

	Common Name ***Scientific Name*** **Listing Status**	**Project Option**	**Temporary Adverse Impact**	**Permanent Adverse Impact**	**Overall Effect of TSF Project**
2.	**Salinas Milk-vetch** *Astragalus macrodon* List 4.3	Option B	**None** All plants would be avoided during construction	**None** No project facilities would be located in occurrence areas	**Beneficial** • Project would convert 4,712 acres of annually plowed cropland to annual grassland • High potential for expansion of existing onsite population
3.	**Ferris' Goldfields** *Lasthenia ferrisiae* List 4.2	Option B	**Negligible** Small number of plants could be affected during construction (up to 2 individuals, 50% of PSA population, per 2010 survey results)	**None** No significant permanent occurrence areas are present	**Beneficial** • Project would convert 4,712 acres of annually plowed cropland to annual grassland • Suitable conditions would be present within the Project for periodic and possibly permanent establishment
4.	**Paso Robles Navarretia** *Navarretia jaredii* List 4.3	Option B	**Negligible** 1,000 plants could be affected (35% of PSA population, per 2010 survey results)	**None** Impacted occurrences are expected to become re-established after construction	**Beneficial** • Project would convert 4,712 acres of annually plowed cropland to annual grassland • High potential for expansion of existing onsite population

A. Oval-leaved Snapdragon: A colony of oval-leaved snapdragon occurs in Option A, Section 5. Approximately 35 plants were present in 2010, scattered over 0.8 acres of cropland habitat planted in barley. This species, restricted to heavy clay vertisols, is presently adversely affected by the existing farming operation. The occurrence may be larger than observed since adjacent cropland areas with clay soils were plowed bare. Oval-leaved snapdragon is an annual species which germinates from a dormant seed bank during years of good rainfall. Construction activities associated with Option A could adversely affect up to approximately 35 oval-leaved snapdragon plants if work was done during the bloom period from May to November during years when this species blooms (based on 2010 location and abundance data). The TSF Project Option A would convert approximately 4,380 acres of existing croplands to annual grasslands. Option A would likely provide an opportunity for oval-leaved snapdragon to become permanently established over a greater area than is currently occupied. Option A would likely have an overall beneficial effect on oval-leaved snapdragon.

The TSF Project Option B would convert approximately 4,712 acres of existing croplands to annual grasslands. Construction activities would not adversely affect any oval-leaved snapdragon plants (based on 2010 location and abundance data). Option B would likely provide an opportunity for oval-leaved snapdragon to become permanently established over a greater area than is currently occupied. Option B would have an overall beneficial effect on oval-leaved snapdragon.

B. Salinas Milk-vetch: Scattered throughout Option A and located in one area of Option B, Salinas milk-vetch would only be adversely affected by the Option A layout. This perennial species was observed in 2010 to be common in Option A fallow croplands where only seedlings were present. These new colonization events are short-lived due to seasonal plowing which kills the plants. The TSF Project Option A would convert approximately 4,380 acres of existing croplands to annual grasslands. Construction activities could adversely affect up to 13 Salinas milk-vetch plants if work was done during the bloom period from April to July (based on 2010 location and abundance data). Option A would likely provide an opportunity for Salinas milk-vetch to become permanently established over a greater area than is currently occupied. Option A would have an overall beneficial effect on Salinas milk-vetch.

The TSF Project Option B would convert approximately 4,712 acres of existing croplands to annual grasslands. Construction activities would not adversely affect any Salinas milk-vetch plants (based on 2010 location and abundance data). Option B would likely provide an opportunity for Salinas milk-vetch to become permanently established over a greater area than is currently occupied. Option B would have an overall beneficial effect on Salinas milk-vetch.

C. Round-leaved Filaree: Two small patches of round-leaved filaree occur within the PSA, one in Section 33 and one in Section 5, both within Option A. Each patch contains approximately 100 plants. Both patches are occasionally disturbed by seasonal tilling for the dry-farmed grain operation. Round-leaved filaree is an annual herb that has the potential to recruit to fallow farm fields where suitable soils are

present. The current TSF Project layouts indicate that both patches of round-leaved filaree are situated within protected areas and would not be adversely affected by construction or operation of the TSF Project. The plants in Section 5 are situated in a project boundary setback area, and the plants in Section 33 are situated within a 100-year flood boundary setback. The TSF Project would not result in adverse effects to round-leaved filaree. It is likely that the TSF Project would result in a beneficial effect to these populations by eliminating annual tilling associated with the farming operation (Tables 24 and 25).

D. Spiny-sepaled Button Celery: This obligate wetland plant occurs in one vernal pool in Option A, Section 4. Only five plants were documented in 2010. The one vernal pool that supports this occurrence also contains listed fairy shrimp and would be protected with an applicant proposed 250-foot setback (refer to Section 9.2). Construction and operation of either Option A or Option B of the TSF Project would not adversely affect spiny-sepaled button celery. Preservation of on-site vernal pools in perpetuity would be a beneficial effect to the species (Tables 24 and 25).

E. Diamond-petaled California Poppy: A small and highly sensitive population of diamond-petaled California poppy occurs outside the southwest boundary of Option A. The population is subjected to occasional disturbance by on-going farming activities. This is an annual species with poorly understood habitat requirements. It occurs in only one small area, despite more potentially suitable habitat in the vicinity. The close proximity of the diamond-petaled California poppy to the Option A boundary makes it potentially susceptible to disturbance during construction of perimeter fencing or other facility features. Installation of a construction barrier fence around this population would adequately reduce the potential for incidental adverse effects of the TSF Project (refer to Section 11.4.1).

F. Santa Lucia Dwarf Rush: This tiny obligate wetland plant is abundant in the understory of other vernal pool vegetation in several pools within Option A, Section 4. These pools contain listed fairy shrimp and each pool would be protected with an applicant proposed 250-foot setback (refer to Section 9.2). Construction and operation of either Option A or Option B of the TSF Project would not adversely affect Santa Lucia dwarf rush. Preservation of on-site vernal pools in perpetuity would be a beneficial effect to the species (Tables 24 and 25).

G. Ferris' Goldfields: All four detections of Ferris' goldfields within the PSA were of a single plant. A stable and consistent population of this species does not exist within the PSA; its presence is the result of accidental introduction. Construction and operation of Option A of the TSF Project would not adversely affect Ferris' goldfields, based on 2010 location and abundance data. Conversion of approximately 4,380 acres of cropland habitat to grassland habitat would be a beneficial effect to the species. Construction and operation of Option B of the TSF Project cold adversely affect Ferris' goldfields, based on 2010 location and abundance data. Construction activities could adversely affect up to two Ferris' goldfields plants if work was done during the bloom period from February through May (based on 2010 location and abundance data). Conversion of approximatley 4,712 acres of cropland habitat to grassland habitat would be a beneficial effect to the species. It is possible, through elimination of farming practices and subsequent increase in quality of grassland

habitat, that Ferris' goldfields could become permanently established within the TSF Project and surrounding preserved lands.

H. Munz's Tidy-tips: This annual wind-dispersed wildflower is abundant in localized areas of the Carrizo Plain National Monument and California Valley, and occurs in scattered localities within the PSA. Many of the occurrences are of single plants mingled with the similar but common *Layia platyglossa*. Munz's tidy-tips was widely distributed in the southern region of the PSA during spring 2010, primarily within Option A. Because this species is wind-dispersed, we expect Munz's tidy-tips could occur occasionally, with varying abundance and distribution, throughout the southern portions of the PSA where detected in 2010. Patches of Munz's layia, where it is likely stable and consistently present year to year, are only located in Option A. Munz's tidy-tips occurrences in Option B consisted of small isolated patches containing up to 10 plants.

The TSF Project Option A would avoid the significant occurrences of Munz's tidy-tips, and would convert approximately 4,380 acres of existing croplands to annual grasslands. Construction activities could adversely affect up to 16 Munz's tidy-tips plants if work was done during the bloom period in March and April (based on 2010 location and abundance data). Option A would likely provide an opportunity for Munz's tidy-tips to become permanently established over a greater area than is currently occupied. Option A would have an overall beneficial effect on Munz's tidy-tips.

The TSF Project Option B would not affect any significant occurrences of Munz's tidy-tips, and would convert approximately 4,712 acres of existing croplands to annual grasslands. Construction activities could adversely affect up to 12 Munz's tidy-tips plants if work was done during the bloom period in March and April (based on 2010 location and abundance data). Option B would likely provide an oportunity for Munz's tidy-tips to become permanently established over a greater area than is currently occupied. Option B would have an overall beneficial effect on Munz's tidy-tips (Tables 24 and 25).

I. Paso Robles Navarretia: An annual herb that prefers areas with little competition from introduced annual grasses, Paso Robles navarretia was identified in scattered locations within Options A and B of the TSF Project. The TSF Project Option A would convert approximately 4,380 acres of existing croplands to annual grasslands. Construction activities could adversely affect up to 1,004 Paso Robles navarretia plants if work was done during the bloom period from April to July (based on 2010 location and abundance data). We have observed this species colonizing road cuts and vineyards elsewhere in the region, and expect it would re-colonize suitable micro-habitat areas within the fenced project area. Option A would likely provide an opportunity for Paso Robles navarretia to become permanently established over a greater area than is currently occupied. Option A would have an overall beneficial effect on Paso Robles navarretia.

The TSF Project Option B would convert approximately 4,712 acres of existing croplands to annual grasslands. Construction activities could adversely affect up to 1,000 Paso Robles navarretia plants if work was done during the bloom period from

April to July (based on 2010 location and abundance data). We have observed this species colonizing road cuts and vineyards elsewhere in the region, and expect it would re-colonize suitable micro-habitat areas within the fenced project area. Option B would likely provide an opportunity for Paso Robles navarretia to become permanently established over a greater area than is currently occupied. Option B would have an overall beneficial effect on Paso Robles navarretia (Tables 24 and 25).

J. Shining Navarretia: One small local occurrence of shining navarretia occurs in Option A of the TSF Project; it does not occur in Option B. About 100 plants occur in an area estimated at 800 square feet in size. The location of the single occurrence of shining navarretia is outside proposed array layouts in Option A; therefore construction activities would not adversely affect shining navarretia. Option A would convert approximately 4,380 acres of existing croplands to annual grasslands. Option B would convert approximately 4,712 acres of existing croplands to annual grasslands. Options A and B would likely provide an opportunity for shining navarretia to become permanently established over a greater area than is currently occupied. Options A and B would have an overall beneficial effect on shining navarretia.

10.4.2 Special status birds

The TSF Project would result in a net loss of potential nesting habitat for some bird species. Construction activities or post-construction vegetation maintenance could result in nest abandonment or loss of special status bird species if appropriate pre-construction surveys, setback requirements, and management practices are not implemented (refer to Section 11.4.2).

Both proposed project Options would affect known burrowing owl nesting and wintering burrows. Option A would potentially affect three nesting territories occupied in 2010. Option B would potentially affect two nesting territories occupied in 2010. Table 26 provides burrowing owl potential impact data for each proposed project Option.

Both proposed project Options for the TSF Project would result in loss of grassland habitat due to array placement that is potential nesting habitat for special status bird species. However, conversion of existing cropland habitat surrounding the TSF Facility to annual grassland would result in a net increase in potential grassland nesting habitat.

A. Burrowing Owl: The burrowing owl is a California Species of Special Concern. Much of the completed TSF Facility would not be suitable for burrowing owls due to the confined nature of the array configuration. There would be open spaces within the facility fences and it is plausible that a small number of burrowing owls could occupy the completed TSF Project site.

The TSF Project would result in a loss of burrowing owl nesting and wintering habitat where arrays would be constructed, specifically causing displacement of several breeding pairs of burrowing owls and several wintering territories (Table 26).

The TSF Project would, however, result in a net increase in the amount of grassland habitat suitable for use by burrowing owls. Cropland habitat within the PSA is not

presently suitable for breeding or wintering burrowing owls. Conversion of cropland habitat to annual grassland would be a beneficial effect for burrowing owls.

TABLE 26. POTENTIAL IMPACTS TO BURROWING OWLS. Burrowing owl data from 2010 is provided for each Option.

Proposed Project Option	Number of Active Nests in 2010	Number of Nest Sites Potentially Affected	Wintering Burrows Present?	Wintering Burrows Potentially Affected?
Option A	4	3	Yes	Yes
Option B	2	2	Yes	Yes

B. Lark Sparrow: The lark sparrow is on the CDFG Special Animal list with no California or Federal ESA listing status. It nests infrequently in low shrubs in grassland areas of the PSA. The TSF Project would result in a net increase of potential nesting habitat for lark sparrows by converting existing croplands to annual grasslands. The net increase in available nesting habitat would be a long-term beneficial effect for lark sparrows. Construction activities could result in direct adverse effects to nesting lark sparrows if conducted during the nesting season. Implementation of minimization and mitigation measures can off-set potential direct adverse effects of the TSF Project on nesting lark sparrows.

C. Grasshopper Sparrow: The grasshopper sparrow is a California Species of Special Concern that likely nests within grassland areas of the PSA where taller grasses are present. Nesting was not confirmed within the PSA in 2010, however a singing male was detected in Section 16, an area shared by both project Options. The TSF Project could result in direct adverse effects to nesting grasshopper sparrows, but would likely result in long-term beneficial effect by converting existing croplands to annual grasslands.

Direct impacts to grasshopper sparrows, such as loss of individuals or occupied nests, can be reduced by implementing pre-construction surveys, monitoring, and nest setbacks.

D. Loggerhead Shrike: The loggerhead shrike is a Species of Special Concern that nests within the PSA. A nest with several fledglings was found in Section 15 in 2009 (an area no longer within the PSA), and in 2010 two shrike pairs nested within the PSA, one in Option A and one in Option B. All nests were located in landscape plantings in anthropogenic habitat areas. The TSF Project could result in loss of potential nesting habitat and direct impacts to nesting shrikes by removal of landscape plantings. Options A and B Project layouts would not affect landscape vegetation in the two areas where nests were detected in 2010.

Potential adverse impacts to individual birds or occupied nests can be avoided by implementing pre-construction surveys, monitoring, and nest setbacks.

E. Golden Eagle: Golden eagles forage within the PSA throughout the year. They hunt wherever prey is present, including both croplands and annual grasslands. There are no golden eagle nests, either active or inactive, within the PSA (Latta 2010). The TSF Project would result in a net loss of golden eagle foraging habitat for the life of the project. Loss of foraging habitat is the primary potential adverse effect of the TSF Project on golden eagles. We expect that most of the approximately 4,100-acre TSF Project facility would no longer be usable by golden eagles. It is possible that golden eagles could hunt effectively in larger open spaces within the facility such as proposed drainage setbacks. The approximately 4,100-acre TSF Project represents a very small fraction (less than 1%) of the over 500,000 acres of potential foraging habitat in the Carrizo Plain region. Displacement of the golden eagle from foraging habitat would have a negligible adverse effect on the few individual eagles that utilize the site for foraging.

There is no compelling reason to expect that Project construction activities might potentially result in take or disturbance of golden eagles under the Bald and Golden Eagle Protection Act. There is ample suitable foraging habitat and prey in the vicinity that golden eagles would be expected to simply move to other foraging areas when construction activities are in progress. Accordingly, the Project is not expected to cause injury to golden eagles or any nest abandonment or any substantial interference with breeding, feeding or sheltering behavior.

F. California Condor: The California condor is a federally-listed endangered species that is not presently known to inhabit the Carrizo Plain, but it could be an occasional visitor during travels from the Central Valley foothills, the Pinnacles, the Sespe Wilderness in Santa Barbara and Ventura Counties and the Ventana Wilderness in Monterey County. In California, the condor presently ranges over approximately 9,500 square miles of land extending in a wishbone shaped area from Los Angeles northwest through the Coast Ranges to Monterey and San Benito Counties, and northeast through the Tehachapi Mountains east of Bakersfield into southern Fresno County. Over 600,000 acres of land is designated as critical habitat. The 9,700-acre PSA, which is not within a designated critical habitat area, accounts for approximately one tenth of one percent of the total range of the California condor.

Construction and subsequent operation of the 4,100-acre TSF Project would be extremely unlikely to adversely affect the California condor. No carcasses would be present within the TSF Project perimeter fencing that would attract condors to the site. Condors are known to ingest small metal and plastic trash. The Project construction, operation and maintenance procedures include regular trash clean-up and removal of small metal objects such as nuts and bolts. Site clean-up protocols would eliminate small trash items in the very unlikely event that a condor would land within the TSF Project.

The TSF Project would have some medium-voltage collection system lines that would be designed with established avian protection measures so as to not present a danger for electrocution or collision by condors or raptors.

The Carrizo Plain is not presently occupied by any condors. The TSF Project is not within a designated critical habitat area for condors. The change of use on up to approximately 4,100 acres of farming and grazing land would be a discountable effect to California condor, particularly with approximately 250,000 acres of suitable habitat within the Carrizo Plain National Monument and another 12,570 acres of critical habitat located in the region.

G. Mountain Plover: Mountain plovers were observed within the PSA on three occasions in winter 2010, with a maximum of 17 birds observed at one time. Mountain plovers do not nest in the Carrizo Plain region. The TSF Project would remove potential winter foraging habitat for mountain plovers. The loss of potential winter foraging habitat would be a negligible adverse effect on the species that could be offset by preservation of suitable off-site habitat (refer to Section 11.4.2).

H. Bald Eagle: The bald eagle is a Fully Protected and California state-listed endangered species that is known to periodically forage in the Carrizo Plain, primarily during the winter (non-breeding) months. It is not a listed species under FESA, although it is protected by the BGEPA. An adult bald eagle was observed along Bitterwater Road adjacent to the PSA in February 2009, and a sub-adult bald eagle was observed feeding in cropland habitat within Section 33 in February 2010. There is no suitable breeding habitat in the region.

Bald eagles are becoming more common and widespread in San Luis Obispo County with the effective reintroduction program conducted by the Ventana Wildlife Society. In winter, bald eagles are regularly observed in San Luis Obispo County from the coastal beaches to inland valleys. The closest nesting location to the TSF Project is most likely at Santa Margarita Lake, approximately 25 miles west.

The PSA is low quality foraging habitat for bald eagles. The change of use on up to approximately 4,100 acres of farming and grazing land would have a negligible effect to the bald eagle. The TSF Project would have some medium-voltage collection system lines that would be designed to not present a danger for electrocution or collision by raptors. The Project also would not take or disturb bald eagles for the reasons set forth above for golden eagles.

I. Other Special Status Birds: The mountain plover, merlin, ferruginous hawk, northern harrier, Oregon vesper sparrow, tri-colored blackbird, and long-billed curlew are special status species that winter in the Carrizo Plain and were detected foraging within the PSA. Mountain plovers, ferruginous hawks, northern harriers, and long-billed curlews prefer wide-open spaces with short vegetation and are not expected to forage within the completed TSF Project. Vesper sparrows, which prefer open habitats with scattered shrubs, may find limited suitable wintering habitat within the TSF Project. The TSF Project would result in a net loss of wintering habitat for these species. Because of the large amount of remaining habitat in the region, displacement of wintering special status bird species would be a minor adverse impact.

10.4.3 Special status small mammals

The PSA is potential habitat for six special status rodents known to be present in the Carrizo Plain region, including one federally-listed species and one state-listed species. Four small mammal trapping studies and intensive field surveys conducted within the PSA determined that no small mammals are present that are listed under FESA or CESA. Results of 2010 surveys for giant kangaroo rat and Nelson's antelope squirrel have been completed, and neither species is present. Two special status species, the Tulare grasshopper mouse and the McKittrick pocket mouse, were detected within the PSA.

Construction of the TSF Project and associated roads and infrastructure could result in minor adverse impacts to the Tulare grasshopper mouse and the McKittrick pocket mouse. Potential minor adverse impacts to Tulare grasshopper mouse and McKittrick pocket mouse would have a negligible effect on the local populations of these species (refer to Section 11.4.3).

Current farming practices of tilling and poisoning are detrimental to most small mammal populations within the PSA. Pocket mice and grasshopper mice persist in marginal areas of grassland habitat adjacent to open non-farmed areas. Conversion of croplands within the PSA to a passive solar facility, the TSF Project, could increase the habitat quality for special status small mammals, resulting in a positive effect to these species.

10.4.4 Special status reptiles and amphibians

One special status reptile, the San Joaquin whipsnake, was detected within the PSA during our surveys. This snake was detected by its shed skin in the northeast corner of Section 28, an area shared by both project Options.

Results of the 2010 blunt-nosed leopard lizard protocol survey will be completed by September 2010; as of July 15 two full 17-pass protocol surveys (2008 and 2009) and a 12-pass adult survey in 2010 were negative for BNLL. Species of Special Concern such as the coast horned lizard are known from the region and could potentially enter the TSF Project site in the future but have not been found despite thousands of hours of field surveys.

The Western spadefoot toad is a Species of Special Concern that was detected at 14 breeding pools in 2010. Several of the breeding localities are surrounded by intensive dry-farmed agriculture that is very poor habitat for spadefoot toads during the dry season.

Construction of the TSF Project in areas potentially inhabited by aestivating spadefoot toads could result in loss of some individuals. The TSF Project could have a beneficial effect on the local population of Western spadefoot toads by eliminating farming and returning the uplands to untilled annual grassland habitat.

Current farming practices are detrimental to most reptile populations within the PSA. Very few of even the most common species, side-blotched lizard and gopher snake, were observed. Conversion of farmland to a passive solar facility may increase the habitat quality for special status reptiles, resulting in a positive effect to these species.

Construction activities associated with the TSF Project potentially could result in adverse impacts on special status reptiles and amphibians if appropriate pre-construction surveys are not implemented. Pre-construction surveys would reduce the potential for such

impacts. Where potential aquatic breeding habitat would be affected, replacement of habitat on-site would offset potential adverse effects (refer to Section 11.4.4).

10.4.5 Special status fairy shrimp

Two species of fairy shrimp were identified in the PSA that are federally-listed: Longhorn fairy shrimp and vernal pool fairy shrimp. The TSF Project would avoid all occurrences of these federally listed fairy shrimp. Protection measures would be implemented as part of the APM's (refer to Section 9.2) to ensure TSF Project construction, operation and subsequent maintenance activities do not result in adverse impacts to listed fairy shrimp or their habitat (refer to Section 11.4.5). The TSF Project would not adversely affect listed fairy shrimp.

10.4.6 American badger

The American badger, a California Species of Special Concern, is a resident within the PSA. We observed badgers at numerous locations within the PSA, including den sites and foraging areas. They are generally uncommon and wide-ranging, but due to their foraging behaviors we observed badger sign in many areas of the PSA.

Construction of the proposed TSF Project would permanently displace badgers from the up to approximately 4,100-acre Project site. Displacement of badgers from the project site would be mitigated concomitantly with kit fox mitigation land acquisition.

Loss of badgers could occur during construction phases. Implementation of appropriate pre-construction surveys would reduce the potential for loss during construction.

Significant adverse impacts to badgers after completion of Project construction would be very unlikely. Refer to Section 11.4.6 for recommendations and mitigations specific to the American badger.

10.4.7 San Joaquin kit fox

The San Joaquin kit fox, a federally listed endangered species, occurs within the PSA. A separate document, the Topaz Solar Farm San Joaquin Kit Fox Mitigation and Monitoring Plan (Althouse and Meade, Inc. 2010c) specifically addresses potential project effects and mitigation strategies for this species.

10.4.8 Tule elk and pronghorn antelope

A. Effects of Displacement on Tule Elk and Pronghorn

Certain tule elk and pronghorn antelope groups that are part of the greater Carrizo Plain region herds utilize habitats within the PSA. These herds are non-migratory, but some animals do make small seasonal movements to exploit regional food and water resources. The PSA is utilized by both pronghorn and elk, primarily as spring and summer foraging habitat where the land is plowed and left fallow encouraging growth of bindweed, a preferred late season forage plant.

Elk forage and calve in the northern parcels within the PSA (Sections 7, 8, 17 and 18), an area approximately 1,795 acres (refer to BR Map 3, Section 13.0). This area consists of 110 acres of annual grasslands and 1,685 acres of active croplands. Elk do

not utilize any other areas of the PSA, as documented by our field observations and CDFG radio-collar data. Elk are present within the PSA primarily during the spring and summer months, although they can be present at any time of the year. The local elk herd consists of approximately 80 individuals that are present in the late spring and summer during the calving season. At other times of the year, particularly winter months, elk observed within the PSA are within small groups (typically young males) consisting of approximately 8 to 15 individuals. Option A would not displace elk from their currently used foraging habitat within the PSA, as defined above. Option B would permanently displace approximately 80 elk from 1,215 acres of foraging habitat within the PSA. Displacement area is calculated as the acreage of the PSA that would have perimeter exclusion fencing within the identified elk range.

Pronghorn forage in all areas of the PSA except Sections 15, 16, 21 and 22, as documented by our field observations and CDFG aerial survey data (refer to BR Map 4, Section 13.0). The total area of foraging habitat within the PSA that we documented as being in use between 2008 and 2010 is approximately 8,085 acres. This area consists of approximately 1,900 acres of grasslands and 6,185 acres of croplands. The pronghorn that forage within the PSA are considered a single group, with multiple groups within the region that comprise the total population in the Carrizo Plain (CDFG 2008a). Our observations suggest this group is comprised of a maximum of 19 adult and subadult pronghorn. From May through July 2010 a single adult male was present in Sections 7 and 18 with up to six females and six fawns. Option A would permanently displace the local pronghorn group consisting of up to 19 individuals from approximately 3,672 acres of foraging habitat within the PSA. Option B would permanently displace the local pronghorn group consisting of up to 19 individuals from approximately 3,062 acres of foraging habitat within the PSA. Displacement area is calculated as the acreage of the PSA that would have perimeter exclusion fencing within the identified pronghorn range.

Displacement from foraging habitat could result in adverse effects on the local tule elk herd and a local pronghorn group. Recommendations to minimize potential adverse effects of the TSF Project on tule elk and pronghorn are provided in Section 11.4.8.

B. Movement Patterns

A wildlife movement corridor is an area of land that primarily functions to connect significant habitat areas (Bond 2003). Although mammal populations in the Carrizo Plain region do not migrate, movement and connection to other populations is still important. Movement corridors are generally considered on a regional scale, whereby land managers designate and attempt to protect swaths of land potentially suitable for facilitating wildlife movements between core habitat areas. Designating and protecting wildlife movement corridors responds to habitat fragmentation in landscapes where wildlife movements are constrained by surrounding land uses.

The PSA is situated north of California Valley with the Temblor Range to the east and the San Juan Creek drainage and Caliente Range to the west. Historically, herds of pronghorn antelope and tule elk roamed throughout the region. These animals may have moved into, and out of, the Carrizo Plain to access seasonal foraging areas.

Their movements were largely unrestricted and were probably very opportunistic through suitable habitat patches.

Potential wildlife linkages to the San Joaquin Valley from north of Carrizo Plain, such as Antelope Valley and Bitterwater Valley, are still largely viable. Such movements are not undertaken by the reintroduced herds of tule elk and pronghorn antelope that are present in the Carrizo Plain region. However, elk and antelope may move north out of the Carrizo Plain, along the San Andreas Rift Zone in the Temblor Range as far north as Cholame Valley.

The northern California Valley tule elk herd roams foothills of the Temblor Range east of the PSA, utilizing croplands at the north end of the PSA seasonally (refer to BR Map 3 in Section 13.0). Tule elk do not move through the PSA to access core habitat areas, as evidenced by the lack of observations in the middle and southern areas of the PSA. The northern California Valley pronghorn group regularly moves through the PSA while foraging. Movements through the PSA, however, are negatively affected by current fencing locations and paved roads (refer to BR Map 14, Section 13.0).

The proposed project would reduce the amount of open land available to some wildlife species for long-range movements into and out of the northern Carrizo Plain. The project would affect up to approximately 4,100 acres of mostly flat bottomlands, which is the preferred movement area for pronghorn. However, applicant proposed measures would provide passage through the TSF Project for pronghorn and other species (refer to Section 9.2).

Pronghorn could still cross Bitterwater Road to access farm fields to the west, or utilize hilly terrain east of the PSA where pronghorn and elk commonly move through the area. Ungulates moving around or through the PSA could access the San Andreas Rift Zone to the east, the San Juan Creek watershed to the west, and the Bitterwater Valley area to the north.

The TSF Project proposes to incorporate broad wildlife movement corridors along primary ephemeral drainages and along the east side of Bitterwater Road that would facilitate ungulate movements through the Project to encourage regional dispersal between the Carrizo Plain National Monument and lands to the north.

The proposed TSF Project would have a negligible effect on the ability for tule elk to disperse north out of the Carrizo Plain because this species is able to move through foothill and mountain regions. Elk do not move south through the PSA to cross Highway 58, so long-range movements to the south would not be affected. Movement corridors through the proposed TSF Project, and other enhancements such as alteration or removal of existing fencing, could provide movement opportunities for pronghorn through and around the TSF Project. Recommendations to minimize potential adverse effects of the TSF Project on tule elk and pronghorn are provided in Section 11.4.8.

11.0 Recommendations and Mitigations

Sensitive biological resources are present within the PSA, including endangered species and their habitat. Applicant Proposed Measures (APM's) outlined in Section 9.2 are design features of the proposed TSF Project that would benefit biological resources, or reduce the effect of the Project on biological resources. This section provides additional recommendations and mitigations to reduce the effect of the Project on biological resources. Where potentially adverse impacts to biological resources could occur during construction and operation of the Project, or due to the presence of the Project, we provide biological resource (BR) mitigation measures designed to offset the effect.

11.1 Habitats

The proposed TSF Project would affect existing habitat types within the PSA. The TSF Project would primarily affect California annual grassland and cropland habitat types. Of these, California annual grassland has higher functions and values for wildlife. Croplands within the PSA have very low diversity of native species, and provide limited essential resources to most wildlife. In addition, the croplands are dangerous to most wildlife species due to heavy equipment activities and presence of poisons. Conversion of active croplands to untilled passive uses would likely increase native species diversity as well as potential functions and values for wildlife. We provide the following recommendations to avoid, minimize and/or mitigate potential Project effects on higher quality habitat within the PSA.

11.1.1 California annual grassland

Loss of California annual grassland habitat usually does not require mitigation except where it affects special status species or important wildlife populations. Section 11.4 provides mitigation recommendations for potential impacts to special status species and important wildlife populations and their habitat.

Both Project Options would purchase and permanently conserve land surrounding the fenced array areas, resulting in a net increase of grassland habitat. Vegetation between and beneath panels is likely to recover after installation and be dominated by California annual grasses. Management strategies that maintain appropriate grass height and residual dry matter could result in usable habitat for a variety of species.

- We recommend development of a vegetation management plan that would specify grazing standards, residual vegetation quantities, and land management practices compatible with facility management and wildlife use.

11.1.2 Cropland

The loss of cropland habitat within the PSA does not require mitigation, except where special status species are affected.

Cropland habitat within the PSA is habitat for tule elk and pronghorn antelope. Section 11.4.8 addresses mitigation recommendations for the loss of pronghorn antelope and tule elk habitat.

11.1.3 Vernal pool

Applicant Proposed Measures to benefit biological resources at the proposed TSF Project site include avoidance of vernal pool habitat and establishment of a minimum 50-foot buffer around all vernal pools (refer to Section 9.2). We expect avoidance and establishment of the proposed buffer would protect vernal pools from potential adverse effects for the life of the TSF Project. Vernal pool management measures should be included in a vegetation management plan (refer to Section 10.1.1).

- We recommend vernal pools be protected during construction by installation of orange fencing placed at the setback boundary between the vernal pool and project areas. Note that the setback for vernal pools that contain listed fairy shrimp is 250 feet.

11.1.4 Ephemeral wetland depression

The Project would avoid ephemeral wetland depressions; therefore, no mitigation is required.

The APM to establish a minimum 25-foot setback from ephemeral wetland depressions would sufficiently reduce the potential for the TSF Project to result in adverse impacts to ephemeral wetland depressions.

- We recommend ephemeral wetland depressions be protected during construction by installation of orange fencing placed at the setback boundary between the ephemeral wetland depression and project areas. Note that the setback for ephemeral wetland depressions that contain listed fairy shrimp is 250 feet.

11.1.5 Natural non-wetland pool

Natural non-wetland pools within the PSA, in general, have a low biological significance. Natural non-wetland pools that contain listed fairy shrimp or are identified as potential habitat for listed fairy shrimp would be protected with a 250-foot setback (refer to Sections 9.2 and 10.1.5).

The TSF Project could have a negligible adverse impact on the remaining natural non-wetland pools within the PSA.

- We recommend ephemeral wetland depressions be protected during construction by installation of orange fencing placed at the setback boundary between the ephemeral wetland depression and project areas. Note that the setback for natural non-wetland pools that contain listed fairy shrimp is 250 feet.

11.1.6 Anthropogenic non-wetland pool

Adverse effects to anthropogenic non-wetland pools within the PSA would have a negligible adverse impact to biological resources; no mitigation is required for impacts to anthropogenic non-wetland pools.

11.1.7 Agricultural reservoir

Mitigation would not be required for the loss of man-made aquatic habitat in agricultural reservoirs within the PSA. However, two of the agricultural reservoirs support breeding Western spadefoot toads, a California Species of Special Concern. The loss of these

habitat areas would result in adverse effects on Western spadefoot toads. Mitigation recommendations are provided in Section 11.4.4 that specifically address potential adverse effects of the TSF Project on Western spadefoot toads.

11.1.8 Anthropogenic

No mitigation is specifically required for the loss of anthropogenic habitat within the PSA.

Mitigation recommendations are provided in Section 11.4 that address potential adverse effects of habitat removal on special status species and nesting birds.

11.2 Ephemeral Drainages

Ephemeral drainages and swales that are not within the jurisdiction of the USACE, CDFG, or RWQCB do not require mitigation for adverse effects that could occur from the proposed TSF Project.

Project impacts to jurisdictional drainages will be addressed in a separate document prepared by Huffman-Broadway Group, Inc. that will conform to the current mitigation standards of the USACE.

11.3 Nesting Birds

Migratory non-game native bird species are protected by international treaty under the Federal Migratory Bird Treaty Act (MBTA) of 1918 (50 C.F.R. Section 10.13). Sections 3503, 3503.5 and 3513 of the California Fish and Game Code prohibit take (as defined therein) of all native birds and their active nests, including raptors and other migratory non-game birds (as listed under the Federal MBTA).

BR-1. Within one week of ground disturbance activities, if work occurs between March 15 and August 15, nesting bird survey**s** shall be conducted**.** If surveys do not locate nesting birds, construction activities may be conducted. If nesting birds are located, no construction activities shall occur within 100 feet of nests until chicks are fledged. A pre-construction survey report shall be submitted to the lead agency immediately upon completion of the survey. The report shall detail appropriate fencing or flagging of the buffer zone and make recommendations on additional monitoring requirements**.** A map of the Project site and nest locations shall be included with the report. The TSF Project biologist conducting the nesting survey shall have the authority to reduce or increase the recommended buffer depending upon site conditions.

11.4 Avoidance, Minimization, and Mitigation for Special Status Species

11.4.1 Special status plants

The proposed TSF Project could result in negligible temporary adverse effects to special status plants within both Project Options during construction. We expect that the overall affect of Option A or Option B would be beneficial for special status plant populations that occur within and near the PSA. This is due to the net gain in annual grassland habitat by conversion of croplands to grasslands.

The following recommendations are provided to reduce potential direct adverse effects of the TSF Project on special status plants:

- Special status plant occurrences within 100 feet of proposed project facilities should be protected with orange construction fencing placed between the occurrence and construction activities.
- Temporary access roads required during construction should be planned to avoid special status plant occurrences.
- Construction should be timed to avoid occurrences of special status plants in bloom, where practicable.
- Where special status plants would likely be removed during construction, seeds should be collected for distribution after construction is complete.

11.4.2 Special status birds

A. Lark Sparrow, grasshopper sparrow, and loggerhead shrike: In order to reduce the potential for disturbance of nests of the lark sparrow, grasshopper sparrow, and loggerhead shrike, the applicant shall implement BR-1 one week prior to ground disturbance activities (refer to Section 11.3). If nests of these species are identified in the work area, the following additional mitigation measures shall be implemented:

BR-2. Occupied nests of special status bird species shall be mapped using GPS or survey equipment. Work shall not be allowed within the 100 foot buffer while the nest is in use. The buffer zone shall be delineated on the ground with orange construction fencing where it overlaps work areas

BR-3. Occupied nests of special status bird species that are within 100 feet of project work areas shall be monitored at least every two weeks through the nesting season to document nest success and check for project compliance with buffer zones. Once nests are deemed inactive and/or chicks have fledged and are no longer dependant on the nest, work may commence in these areas.

B. Burrowing Owl: Burrowing owl abundance and distribution within the PSA could vary from year to year. Option A would potentially affect three nesting territories occupied in 2010. Option B would potentially affect two nesting territories occupied in 2010.

Since kit fox and burrowing owl utilize similar habitat, lands designated for kit fox mitigation for the Project would likely be sufficient to offset potential adverse Project effects on burrowing owls. We recommend evaluating mitigation options for habitat loss for these species together.

In order to avoid adverse impacts to burrowing owls during construction of the TSF Project, BR-4 should be implemented. If burrowing owls are present in the work areas during the breeding season (February 1 through August 31), the burrows must be avoided and protected from impacts. Mitigation and protection procedures should incorporate recommendations outlined in the burrowing owl protocol survey

guidelines (California Burrowing Owl Consortium 1993). If burrowing owls are present during the non-breeding season, a passive relocation effort may be instituted.

BR-4. Pre-construction surveys for burrowing owls shall be conducted not more than 30 days prior to any work that affects previously undisturbed grassland habitat containing burrows. The pre-construction surveys shall be conducted in a manner sufficient to determine no burrowing owls are present in the work areas, including a 250 foot buffer surrounding the work areas. Pre-construction surveys shall be conducted throughout the year, when work is proposed, to account for breeding, wintering, and transient owls.

C. California Condor: Establishment of the Carrizo Plain National Monument in 2001 protected in perpetuity approximately 250,000 acres of land approximately six miles south of the PSA that is considered potential habitat for the California condor. Condors have not been observed at or near the PSA during our surveys of the site in 2008, 2009 and 2010. The loss of up to approximately 4,100 acres of potential foraging habitat is unlikely to adversely affect the species. No mitigation is recommended for loss of potential condor foraging habitat within the PSA.

11.4.3 Special status small mammals

Small mammal trapping studies and focused visual surveys conducted within the PSA determined that no federally-listed or state-listed small mammals are present. To reduce the potential for loss of other special status small mammal species, such as Tulare grasshopper mouse and McKittrick pocket mouse, the applicant should implement the following mitigation measure, as applicable:

BR-5. A biological monitor shall be present during construction activities in all areas identified as potential habitat for special status mammals that have not previously been disturbed by construction. The monitor shall be qualified to capture and relocate any special status species that are found during construction. The monitor shall have the authority to stop work, if special status species are encountered, for any duration necessary to capture and relocate the animals.

11.4.4 Special status reptiles and amphibians

San Joaquin whipsnake and coast horned lizard could potentially be present in project construction areas. Western spadefoot toads breed in several areas of the PSA, in Both Option A and Option B.

To protect Western spadefoot toad on the TSF Project site, we recommend avoidance of potential breeding habitat, monitoring ground disturbance activities near breeding pools to relocate disturbed spadefoot toads, and creation of breeding habitat if existing breeding habitat is removed.

The following mitigation measure shall be implemented to reduce potential direct adverse effects on special status reptiles and amphibians:

BR-6. Pre-construction surveys for the presence of San Joaquin whipsnake, coast horned lizard, and Western spadefoot toad shall be conducted, as applicable, prior to primary Project site preparation, grubbing and other construction activities that affect previously undisturbed grassland or ephemeral pool habitat. Walking visual surveys shall be conducted to locate and move special status reptile or amphibian species. . The surveys shall be conducted at appropriate times of day to locate the species, and shall be conducted as close as possible to the proposed start of work. If no special status species are found, construction activities may begin immediately. If special status species are found, a qualified biologist shall move them to the nearest safe location. At that time, the TSF Project biologist shall have the authority to recommend additional monitoring if it is determined that special status species could move onto the Project site during construction, or be forced out of underground burrows during grading. The TSF Project biologist shall have the authority to temporarily stop work if special status species are found in the Project areas during construction.

11.4.5 Special status fairy shrimp

Protocol level surveys for listed fairy shrimp are complete. Isolated populations of listed fairy shrimp occur within the PSA. The TSF Project would avoid all federally listed fairy shrimp occurrences by establishing 250-foot setbacks around pools in which the presence of listed fairy shrimp has been documented (refer to Section 9.2, and BR Map 10 in Section 13.0).

11.4.6 American badger

American badgers utilize habitats within the PSA. The TSF project would result in a net loss of badger habitat. Mitigation is not recommended for loss of badger habitat. To ensure that potential adverse impacts to live badgers does not occur, the following mitigation recommendation should be implemented:

BR-7. A pre-construction survey shall be conducted within thirty days of beginning construction work on a portion of the Project site to identify if badgers are present within the PSA. The results of the survey shall be sent to the Project manager and the lead agency.

If the pre-construction survey finds potential badger dens, they shall be inspected to determine whether they are occupied. The survey shall cover all Project areas included in the respective construction phase, and shall examine both old and new dens. If potential badger dens are too long to completely inspect from the entrance, a fiber optic scope shall be used to examine the den to the end. Inactive dens may be excavated by hand with a shovel to prevent re-use of dens during construction. If badgers are found in dens between February and July, nursing young may be present. To avoid disturbance and the possibility of direct loss of adults and nursing young, and to prevent badgers from becoming trapped in burrows during construction activity, no grading shall occur within 100 feet of active badger dens between February 1 and July 1. Between July 1 and February 1 all potential badger dens shall be inspected to determine if badgers are present. During the winter badgers do not truly

hibernate, but are inactive and asleep in their dens for several days at a time. Because they can be torpid during the winter, they are vulnerable to disturbances that may collapse their dens before they rouse and emerge. Therefore, surveys shall be conducted for badger dens throughout the year. If badger dens are found on the Project site during the pre-construction survey, and are not raising young, they may be encouraged to vacate the den by a qualified biologist. If measures such as partially blocking den entrances do not result in the badger moving, badgers may be live trapped and moved to safe locations.

11.4.7 San Joaquin kit fox

The San Joaquin kit fox is known to occur within the PSA. Mitigation alternatives are discussed in detail in a separate document, the Topaz Solar Farm San Joaquin Kit Fox Mitigation and Monitoring Plan (Althouse and Meade, Inc. 2010c).

11.4.8 Tule elk and pronghorn antelope

Tule elk and pronghorn antelope are managed by CDFG as game animals, and have been studied by local CDFG biologists. Herd population dynamics have been studied, as well as seasonal movement patterns. The CDFG considers the loss of summer forage and fawning habitat and any reduction of a movement corridor a significant adverse impact to tule elk and pronghorn antelope (CDFG 2008a).

Loss of cropland habitat within the PSA that is currently used by tule elk and pronghorn would have an adverse effect on these two species, but would be a habitat improvement for San Joaquin kit fox. Habitat improvements for endangered species should be given greater weight in decision making processes than benefits to game species. The following recommendations are provided as minimization measures to offset potential adverse effects of the TSF Project on tule elk and pronghorn.

- Wildlife movement corridors are proposed through the Project arrays. Proposed pathways are over one mile in width in places. Minimum pathway width is approximately 500 feet. Pronghorn and elk could move north and south through the pathways.
- Fencing at existing crossing sites along Highway 58 and fences within the pathways in the PSA would be eliminated or made antelope-friendly to facilitate passage. Movement pathways for this wide ranging and fleet species are also present east and west of the TSF Project site.
- If determined necessary, mitigation for loss of tule elk and pronghorn habitat would be accomplished through protection of land designated as mitigation for kit fox. Through this approach, if adopted, acreages of lands substantially greater than habitat used by pronghorn and elk within the proposed TSF Project areas could be protected as TSF Project mitigation for San Joaquin kit fox. Mitigation lands would provide beneficial habitat for both elk and pronghorn without reducing quality of habitat for kit fox.

12.0 PSA Figures

- **Figure 1. USGS Topographic Map**
- **Figure 2. Aerial Photograph**
- **Figure 3. USDA Soils Map**
- **Figure 4. CNDDB & FWS Critical Habitat Map**
- **Figure 5. Land Use History**

Figure 1: USGS Topographic Map

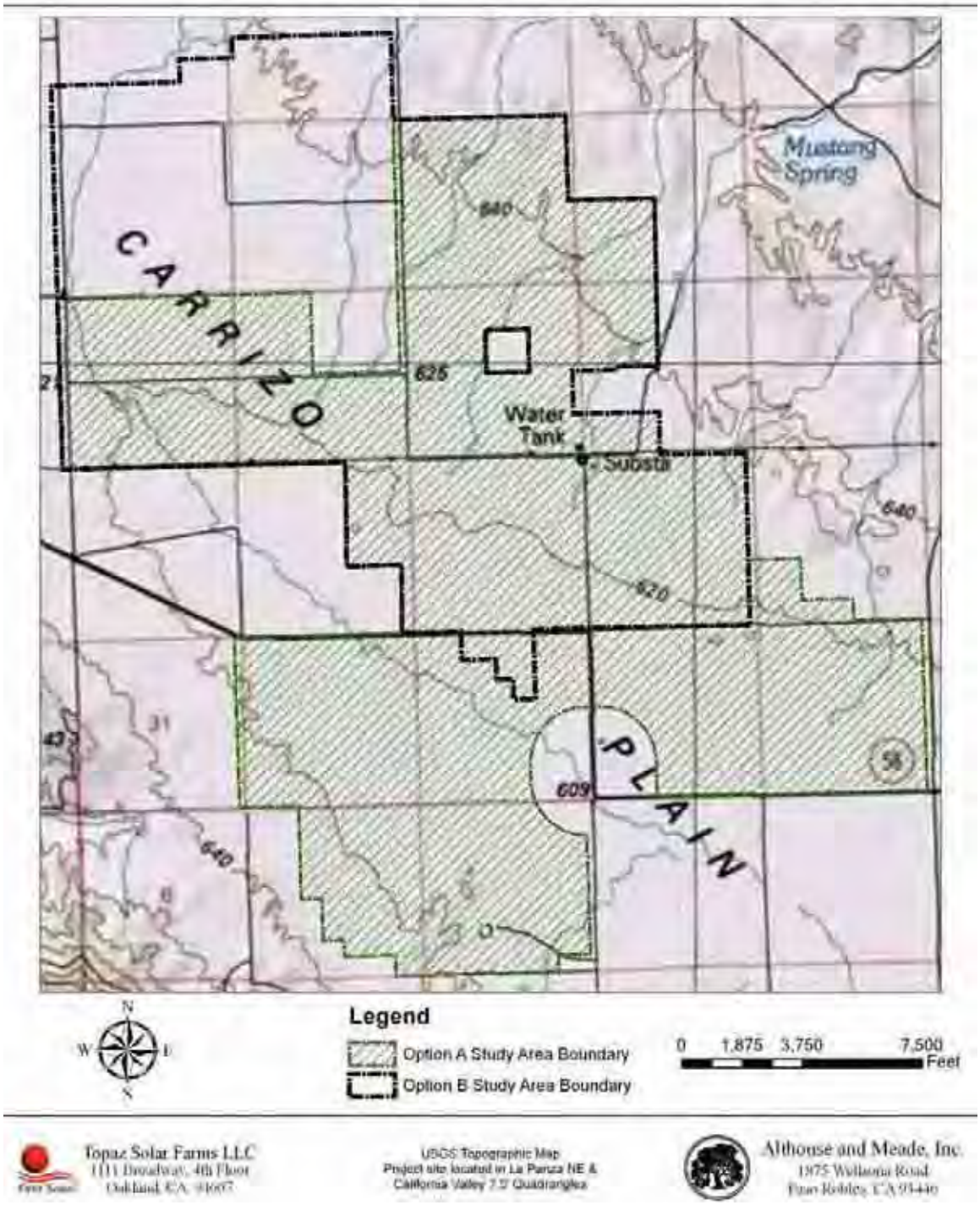


FIGURE 1. USGS TOPOGRAPHIC MAP. The approximately 9,700 acre PSA is located on all or portions of Township 29 South, Range 18 East, Sections 7, 8, 15, 16, 17, 18, 19, 20, 21, 22, 16, 27, 28, 29, 32, 33, 34, 35 and Sections 4 and 5 of Township 30 South, Range 18 East.

Figure 2: Aerial Photograph

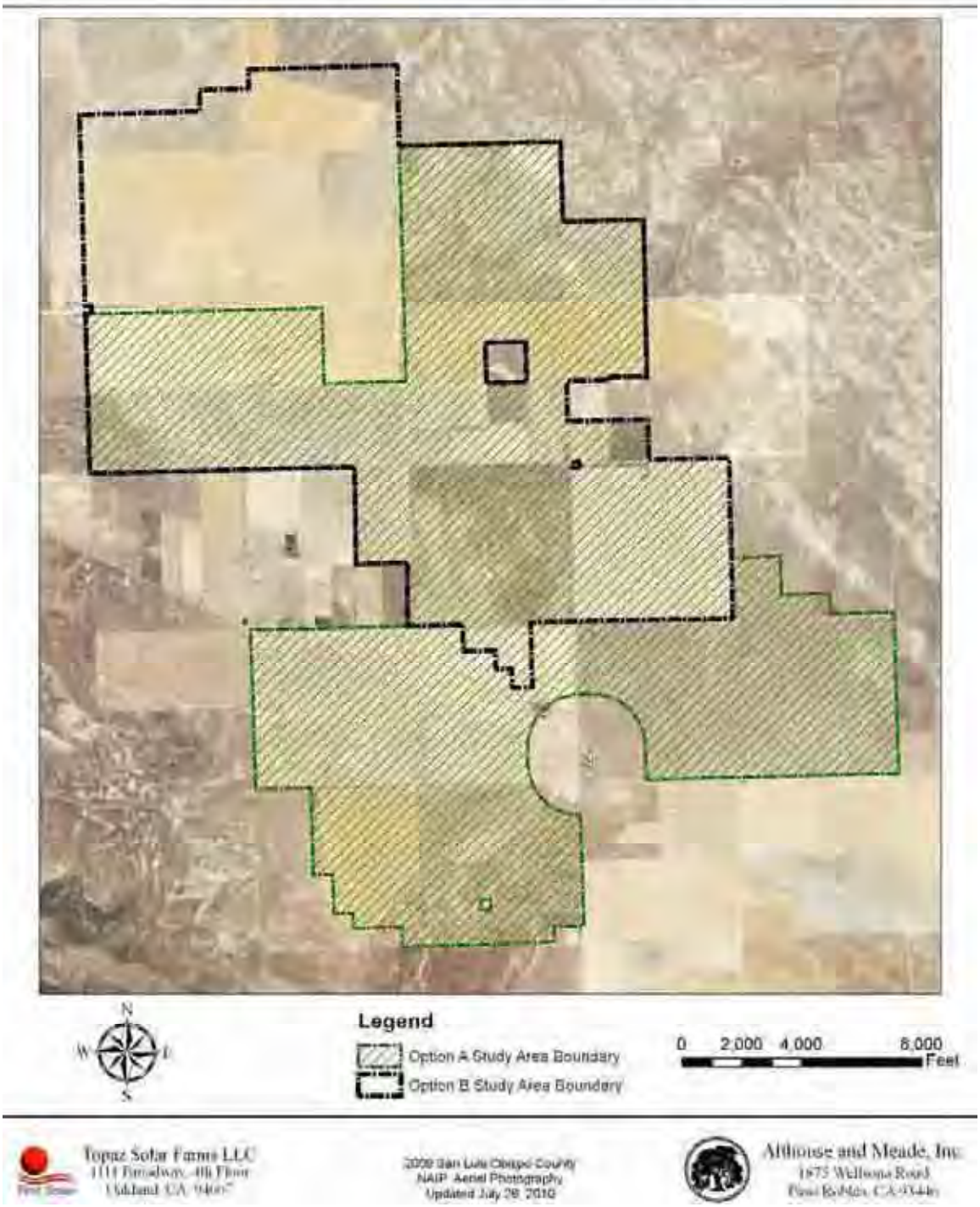


FIGURE 2. AERIAL PHOTOGRAPH. The approximate boundaries of the Option A Option and Option B are indicated on a 2009 aerial photograph.

Figure 3: USDA Soils Map

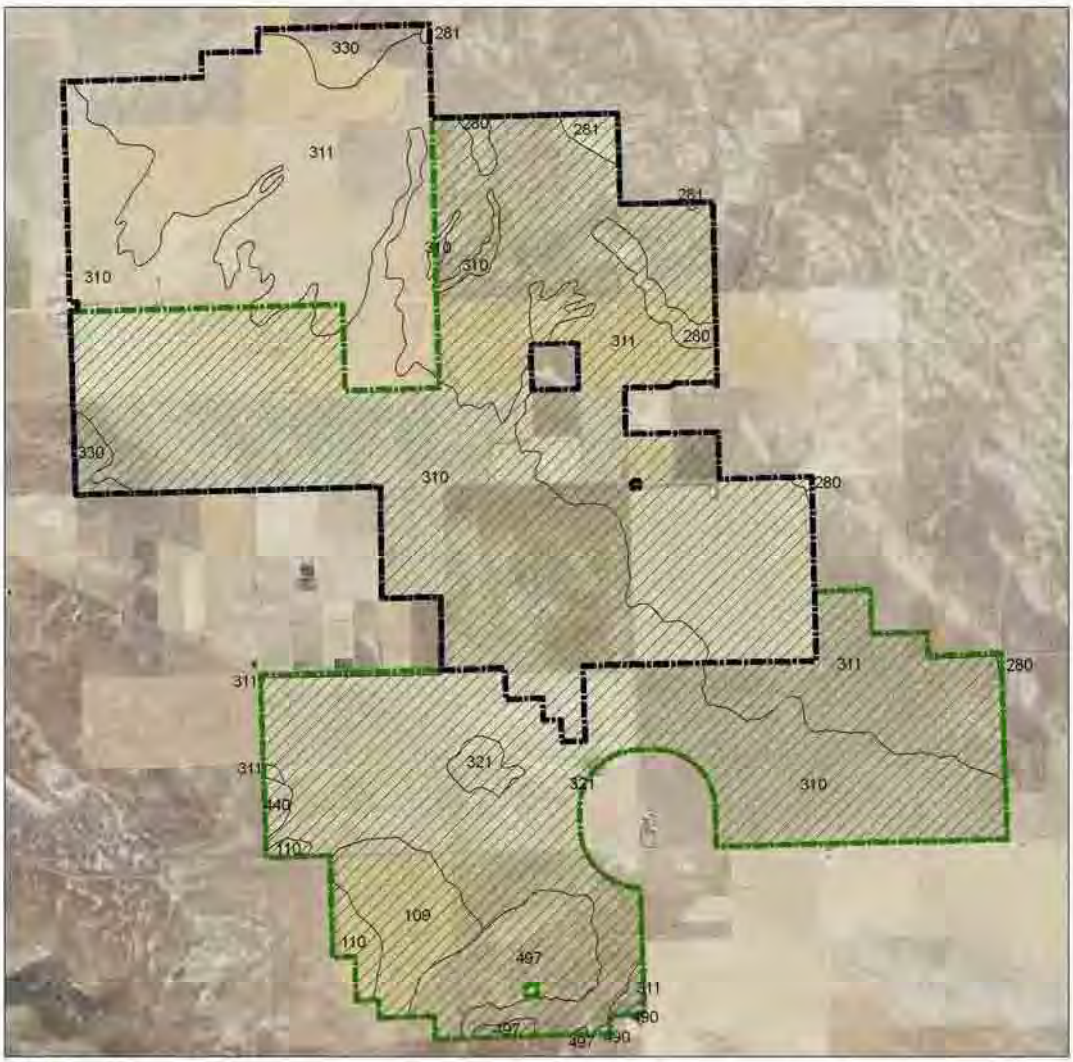


FIGURE 3. USDA SOILS MAP. The approximate boundaries of PSA are outlined in red on the USDA Soil Survey of San Luis Obispo County, California, Carrizo Plain Area (2003) map.

Figure 4: CNDDB & FWS Critical Habitat Map

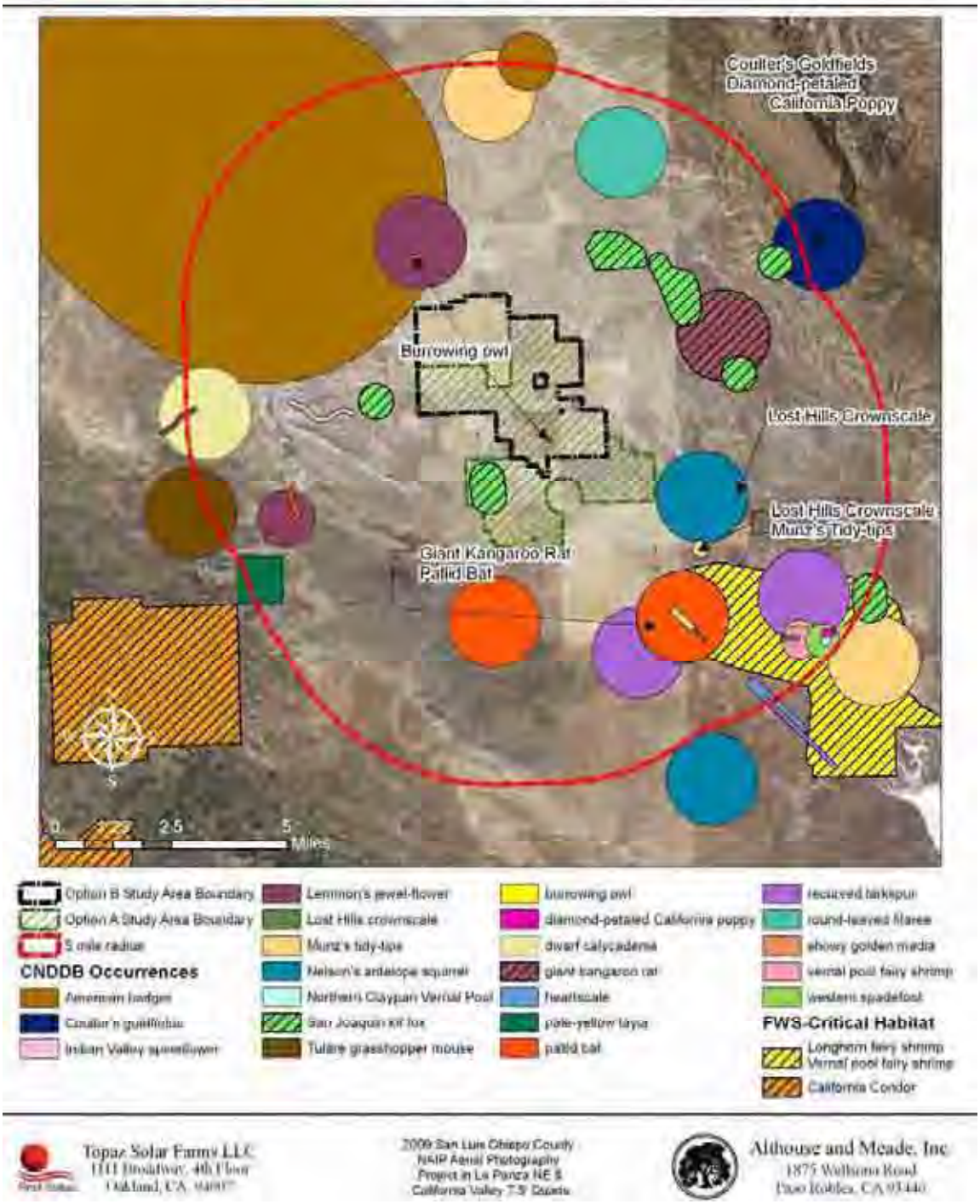


FIGURE 4. CNDDB/FWS GIS MAP. The current GIS data from the CNDDB for special status species mapped in the vicinity of PSA is depicted on a 2009 aerial photograph. The approximate boundaries of each Project Option are indicated, and a five-mile radius around the PSA perimeter is indicated by the dashed red line.

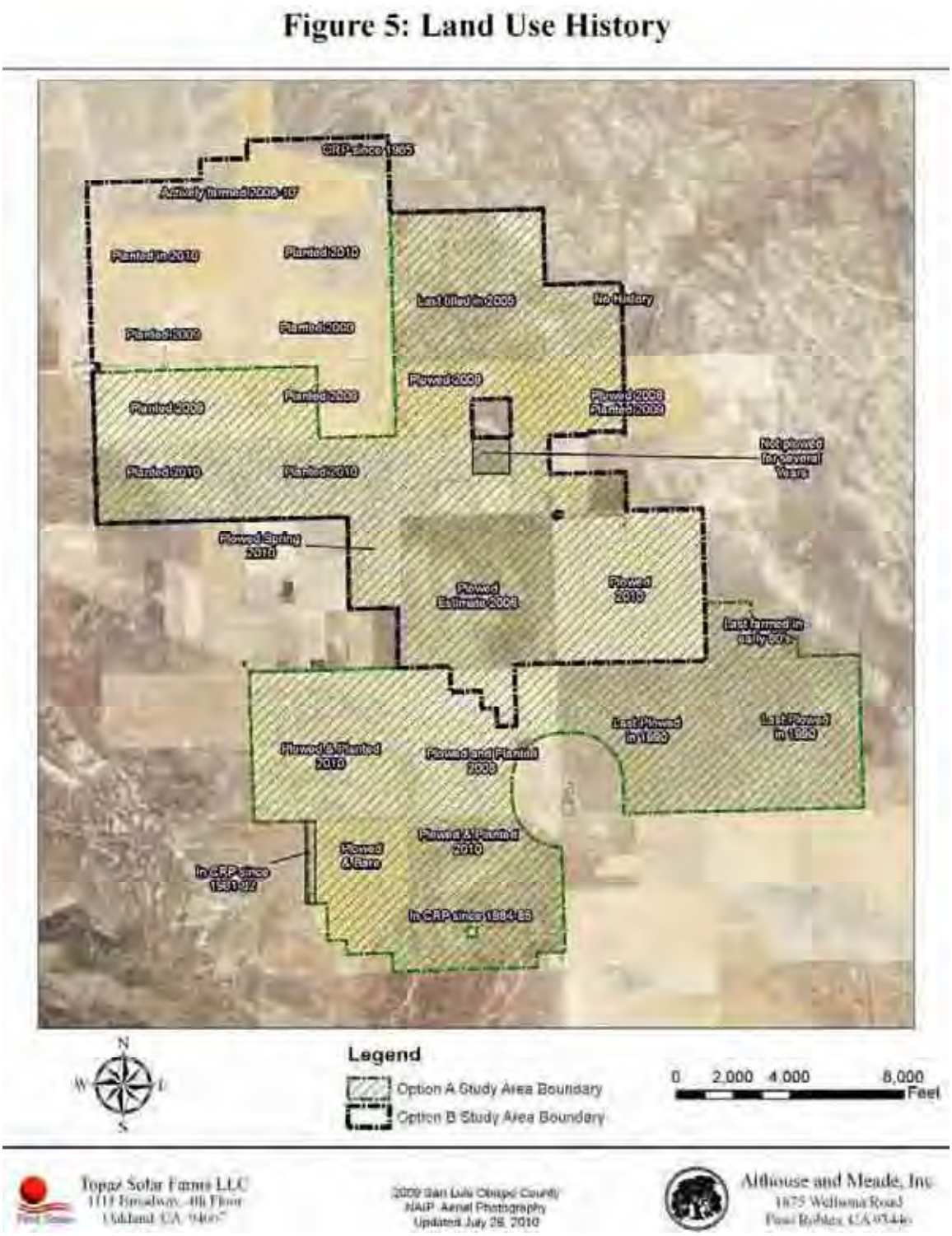
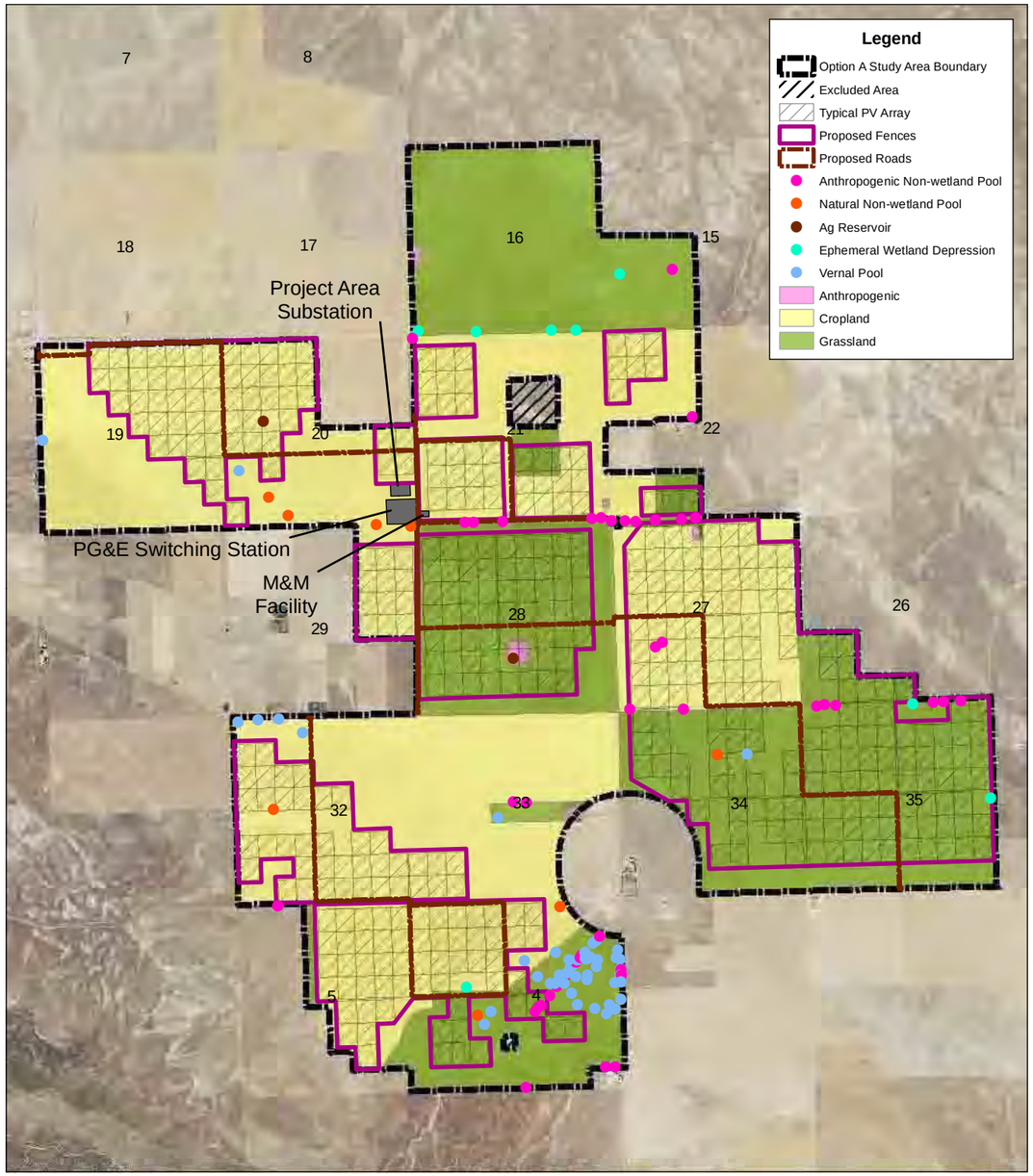


FIGURE 5. LAND USE HISTORY. Agricultural land use history is provided for all Sections within the PSA.

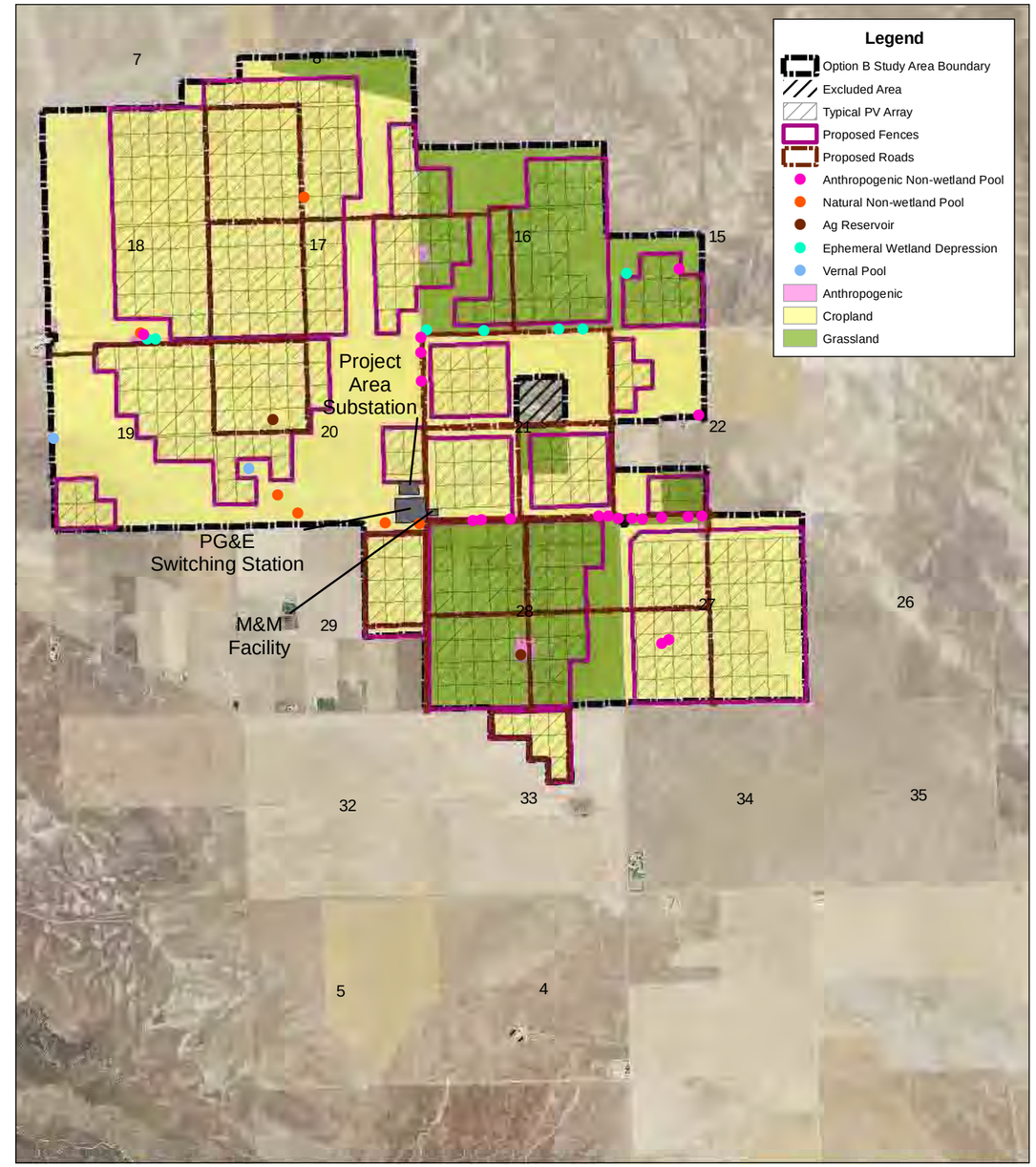
13.0 Biological Resource Maps

- **BR Map 1. Topaz Solar Farm Habitat Map**
- **BR Map 2-Option A. San Joaquin Kit Fox Genetic Results**
- **BR Map 2-Option B. San Joaquin Kit Fox Genetic Results**
- **BR Map 3. CDFG Tule Elk Radio Collar Data**
- **BR Map 4. CDFG Pronghorn Antelope Aerial Survey Data**
- **BR Map 5. Special Status Mammal Detections**
- **BR Map 6. BNLL and NEAS Survey Areas 2007-2010**
- **BR Map 7. Western Spadefoot Toad Breeding Pools**
- **BR Map 8. Special Status Wintering Birds**
- **BR Map 9. Burrowing Owl Map**
- **BR Map 10. Listed Vernal Pool Branchiopod Localities**
- **BR Map 11. Golden Eagle Aerial Nest Survey Results**
- **BR Map 12. Special Status Plants Map**
- **BR Map 13. Pronghorn Movement**
- **BR Map 14. San Joaquin Kit Fox Active Den Territories**

BR Map 1. Topaz Solar Farm Habitat Map



Option A



Option B

N
W E
S

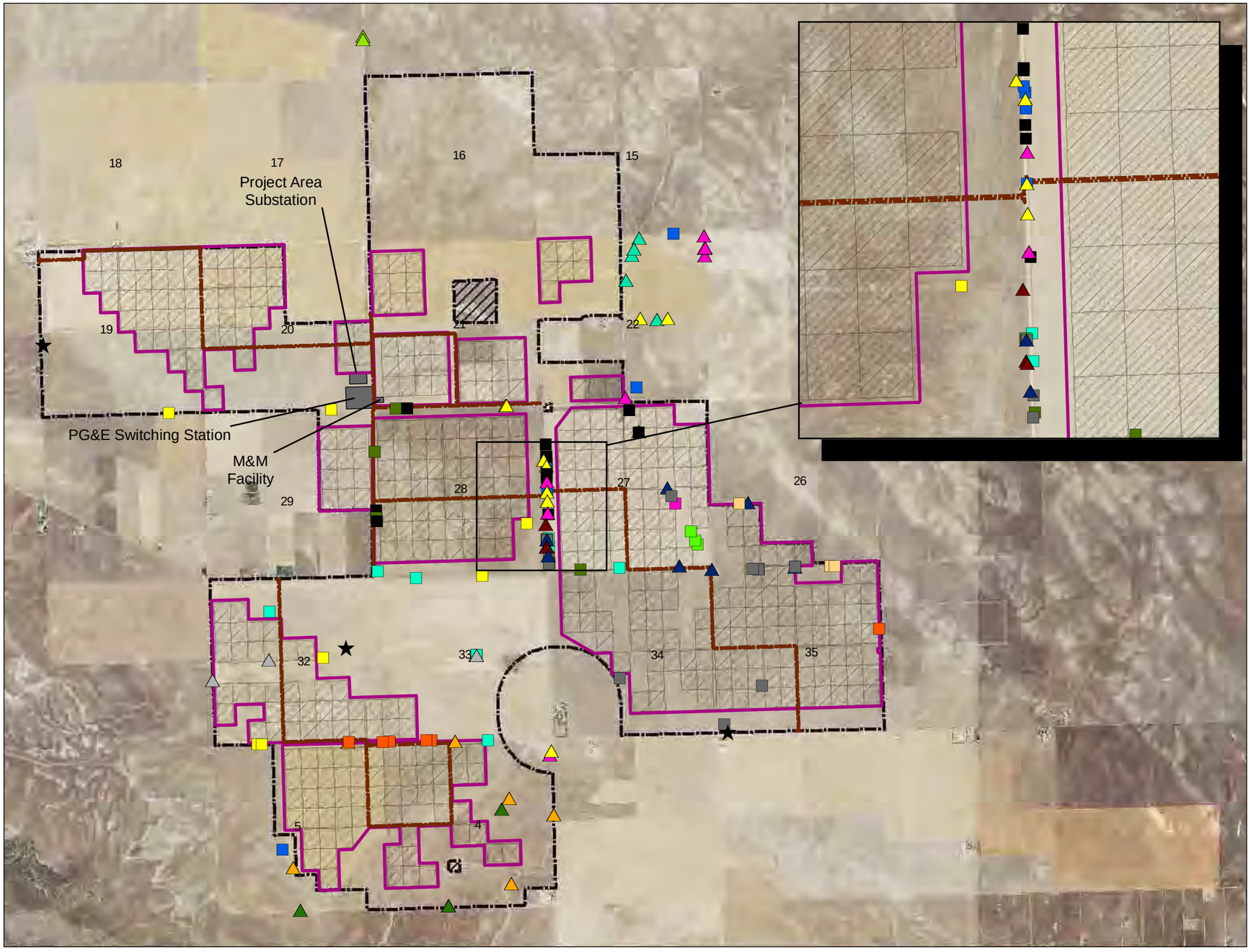
0 0.5 1 2 3 Miles

Topaz Solar Farms LLC
1111 Broadway, 4th Floor
Oakland, CA 94607

2009 San Luis Obispo County
NAIP Aerial Photography
Map Updated July 29, 2010

Althouse and Meade, Inc.
1875 Wellsona Road
Paso Robles, CA 93446

BR Map 2-Option A. San Joaquin Kit Fox Genetic Results



Legend

- Option A Study Area Boundary
- Excluded Area
- Typical PV Array
- Proposed Fences
- Proposed Roads
- ★ Red Fox

Map Symbol	Sex	SJKF Individual	Number of Detections
	Male	2	8
	Male	3	14
	Male	7	6
	Male	8	4
	Male	9	6
	Male	13	4
	Male	14	8
	Male	15	1
	Male	17	7
	Male	19	13
	Female	1	4
	Female	4	3
	Female	5	6
	Female	6	2
	Female	10	4
	Female	11	5
	Female	12	7
	Female	16	8
	Female	18	10

Scat collection locations from Smith 2010
Genetic results from Henry and Maldonado 2010

N
W E
S

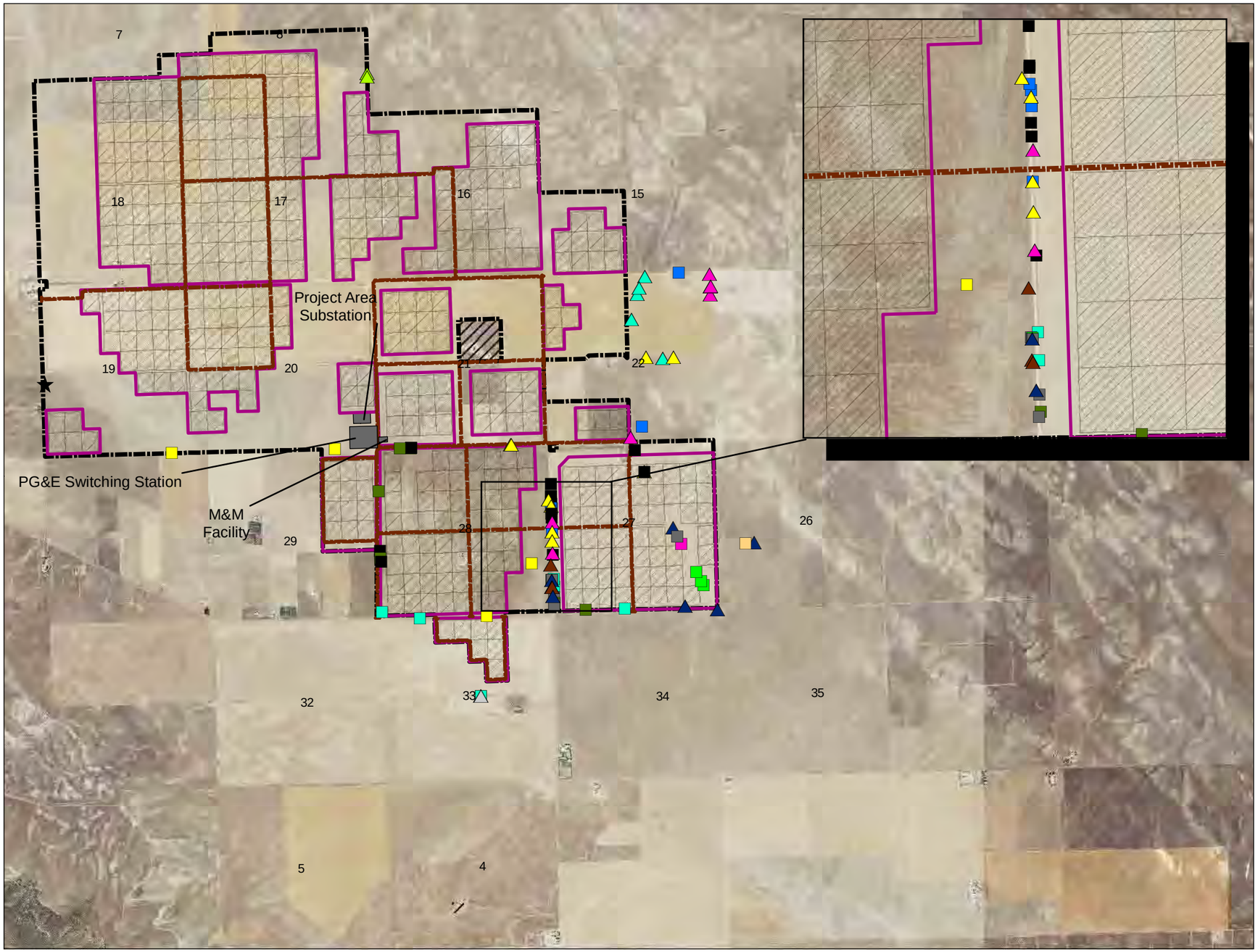
0 0.25 0.5 1 Mile

Topaz Solar Farms LLC
1111 Broadway, 4th Floor
Oakland, CA 94607

2009 San Luis Obispo County
NAIP Aerial Photography
Map Updated July 29, 2010

Althouse and Meade, Inc.
1875 Wellsona Road
Paso Robles, CA 93446

BR Map 2-Option B. San Joaquin Kit Fox Genetic Results



Legend

- Option B Study Area Boundary
- Excluded Area
- Typical PV Array
- Proposed Fences
- Proposed Roads
- ★ Red Fox

Map Symbol	Sex	SJKF Individual	Number of Detections
	Male	2	5
	Male	3	6
	Male	8	1
	Male	9	6
	Male	13	4
	Male	14	6
	Male	15	1
	Male	17	6
	Male	19	13
	Female	1	2
	Female	4	3
	Female	6	2
	Female	11	5
	Female	12	6
	Female	16	7
	Female	18	9

Scat collection locations from Smith 2010
Genetic results from Henry and Maldonado 2010

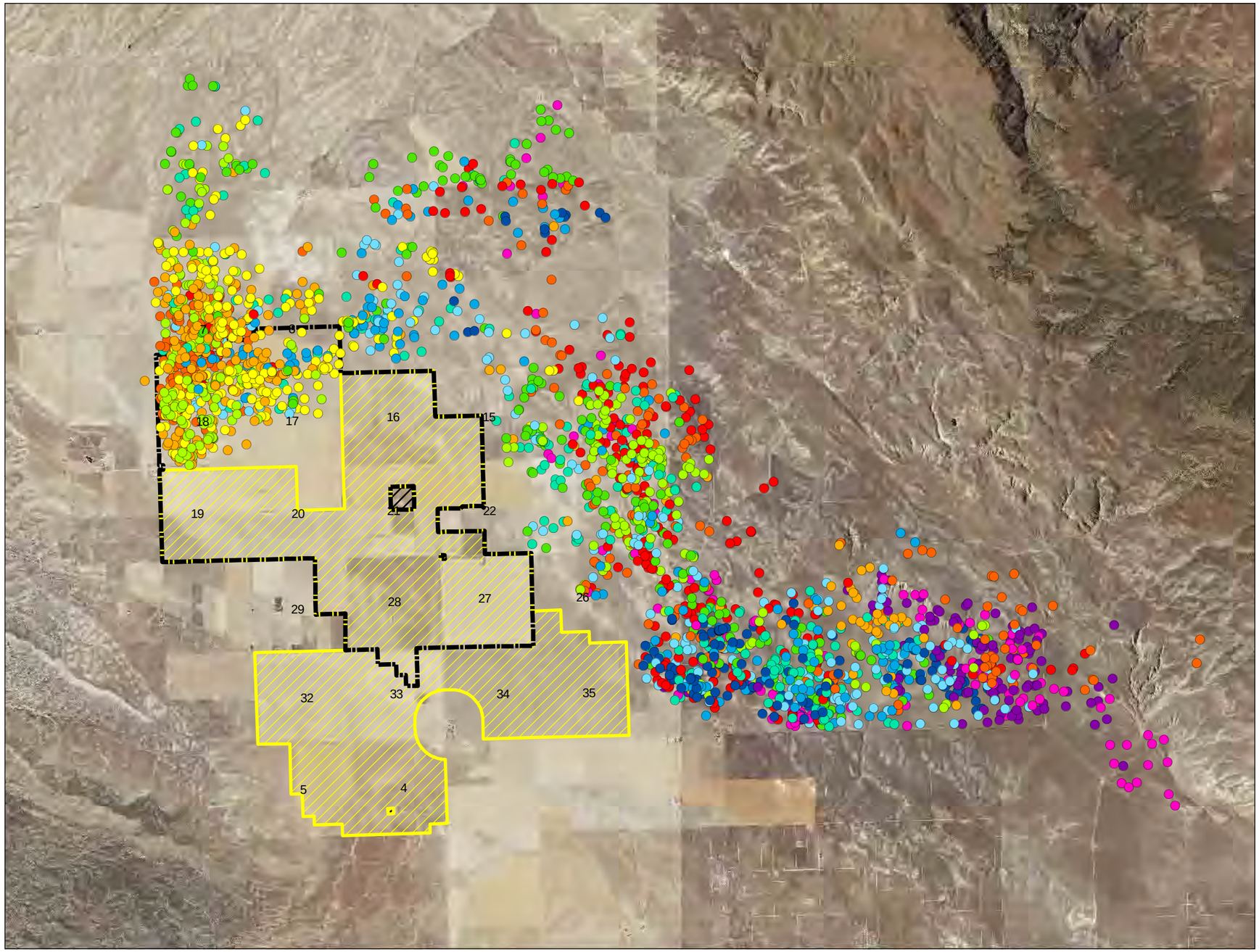
N
W E
S

0 0.25 0.5 1 Miles

Topaz Solar Farms LLC
1111 Broadway, 4th Floor
Oakland, CA 94607

2009 San Luis Obispo County
NAIP Aerial Photography
Map Updated July 27, 2010

Althouse and Meade, Inc.
1875 Wellsona Road
Paso Robles, CA 93446



Legend

- Option A Study Area Boundary
- Option B Study Area Boundary
- Excluded Area
- January
- February
- March
- April
- May
- June
- July
- August
- September
- October
- November
- December

2005-2006 Radio Collar Data provided by CDFG

N
W E
S

0 0.5 1 2 Miles

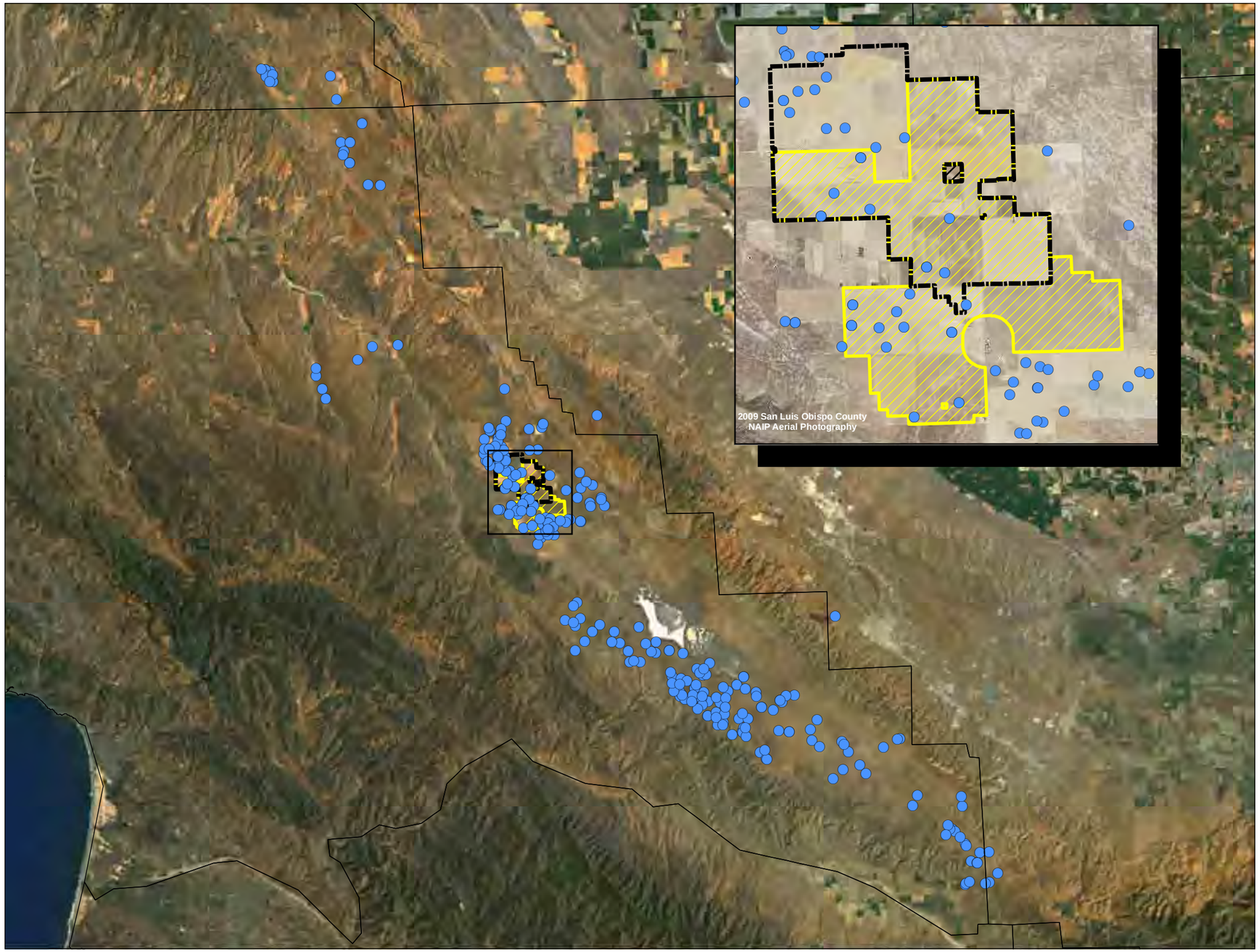
BR Map 3. CDFG Tule Elk Radio Collar Data

Topaz Solar Farms LLC
1111 Broadway, 4th Floor
Oakland, CA 94607

2009 San Luis Obispo County
NAIP Aerial Photography
Map Updated July 27, 2010

Althouse and Meade, Inc.
1875 Wellsona Road
Paso Robles, CA 93446

BR Map 4. CDFG Pronghorn Antelope Aerial Survey Data



Legend

- Option A Study Area Boundary
- Option B Study Area Boundary
- Excluded Area
- Pronghorn Sightings

2000-2008 Pronghorn Aerial Survey Data provided by CDFG

N
W E
S

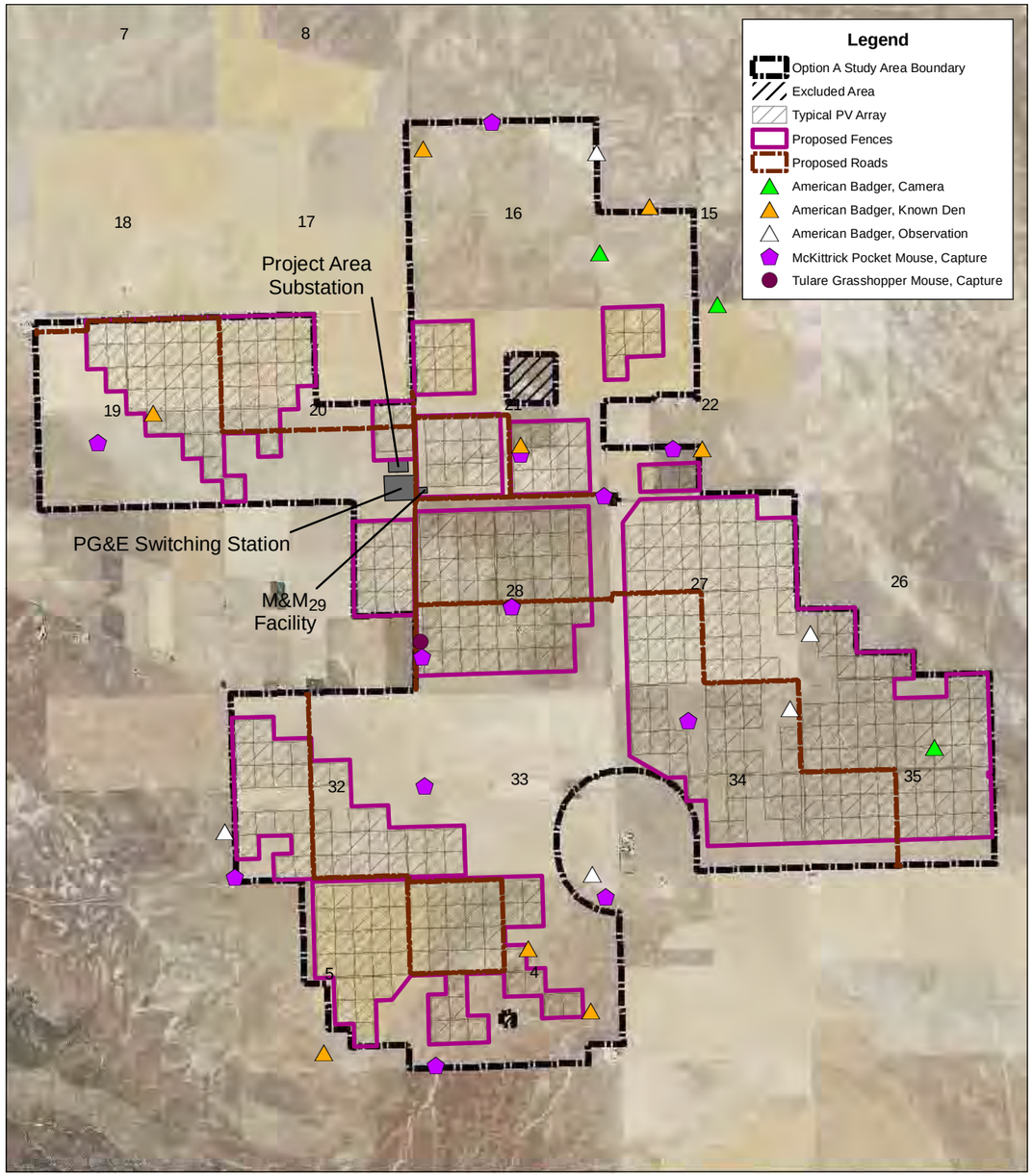
0 3.75 7.5 15 Miles

Topaz Solar Farms LLC
1111 Broadway, 4th Floor
Oakland, CA 94607

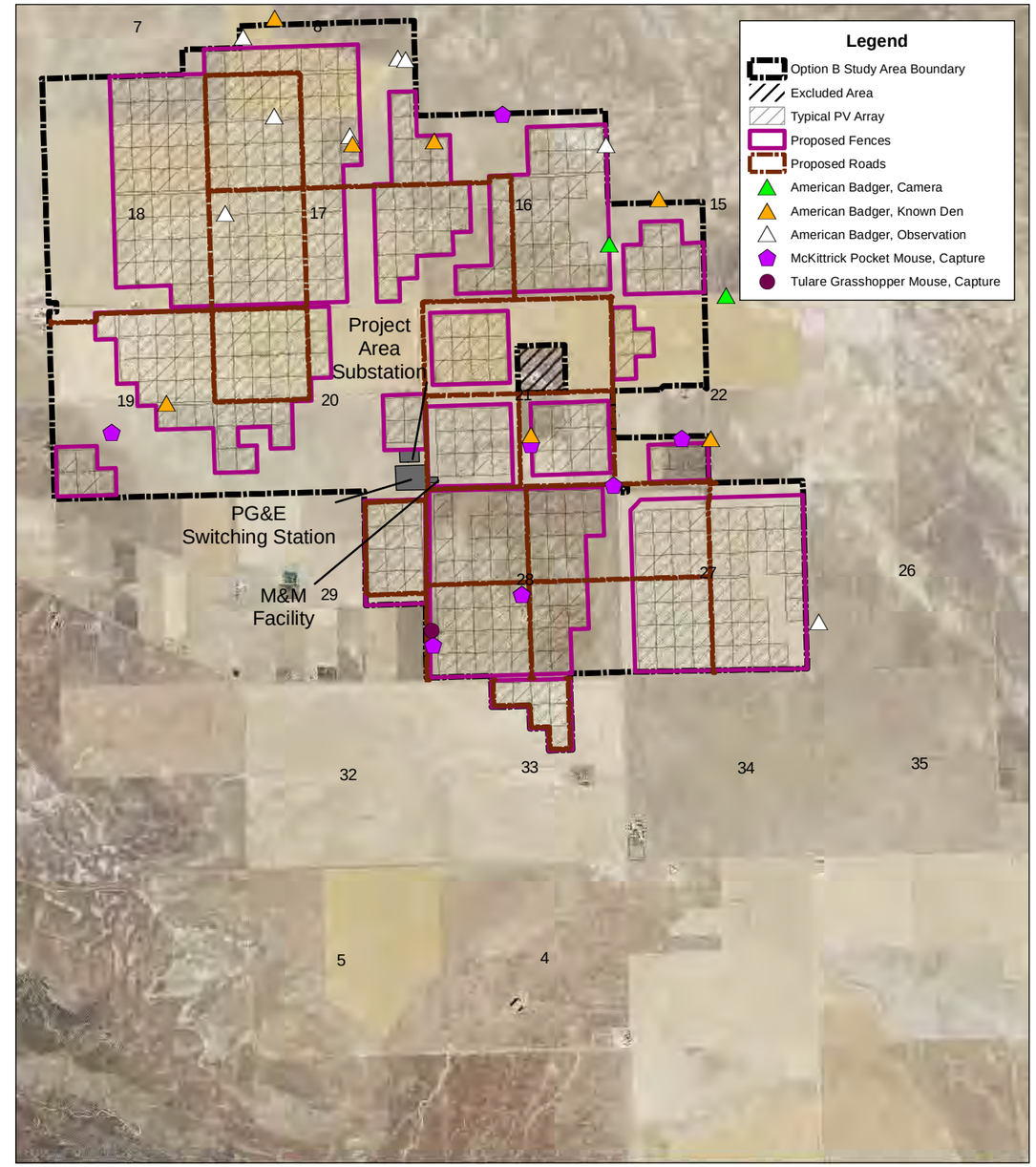
2005
NAIP Aerial Photography
Map Updated July 27, 2010

Althouse and Meade, Inc.
1875 Wellsona Road
Paso Robles, CA 93446

BR Map 5. Special Status Mammal Detections



Option A



Option B

N
W E
S

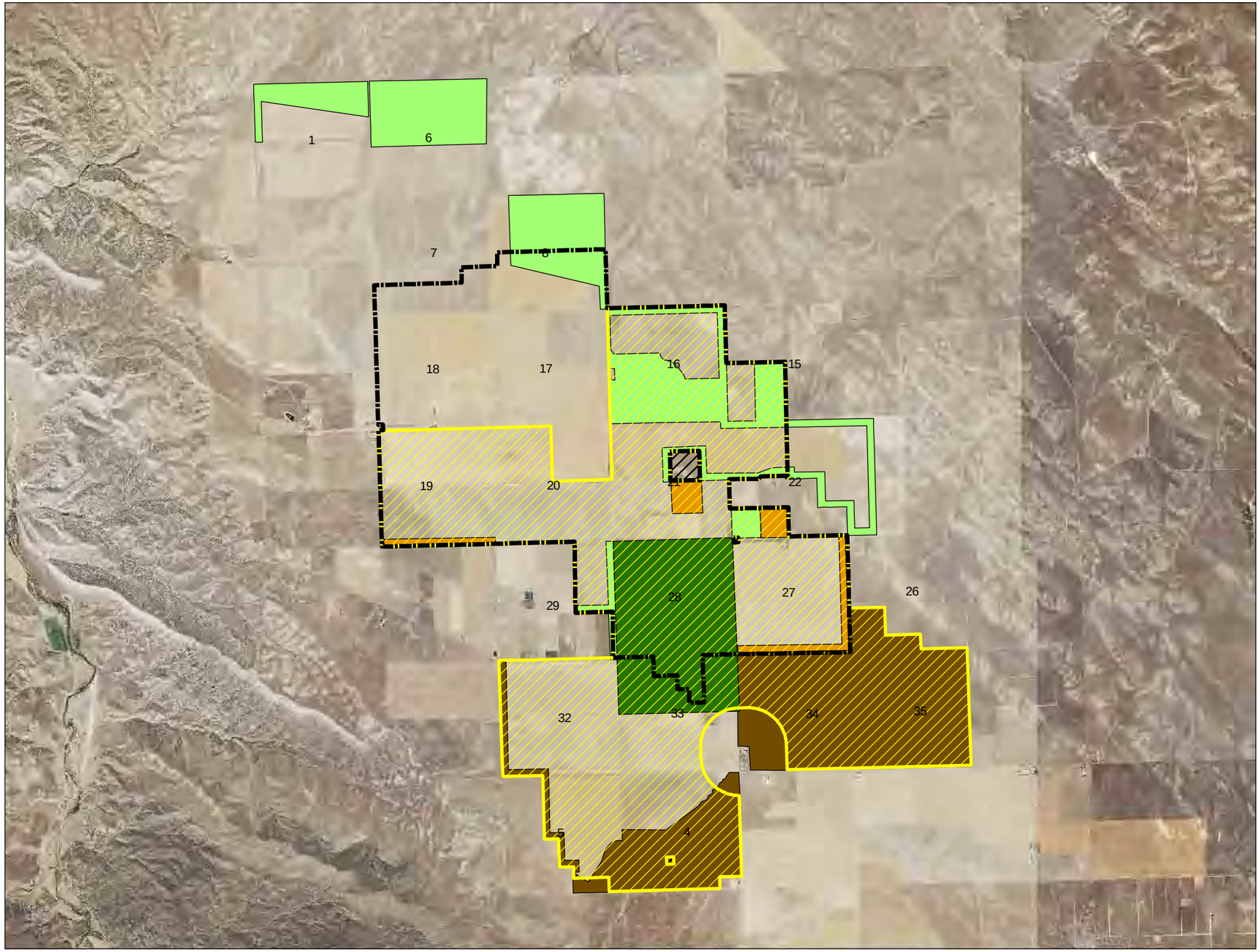
0 0.5 1 2 3 Miles

Topaz Solar Farms LLC
1111 Broadway, 4th Floor
Oakland, CA 94607

2009 San Luis Obispo County
NAIP Aerial Photography
Map Updated July 29, 2010

Althouse and Meade, Inc.
1875 Wellsona Road
Paso Robles, CA 93446

BR Map 6. BNLL and NEAS Survey Areas, 2007-2010



Legend — **Approx. Acres**

- Option A Study Area Boundary
- Option B Study Area Boundary
- Excluded Area
- '07-'08 Ausra Survey Area...1020
- 2008 Survey Area.....1584
- 2009 Survey Area.....224
- 2010 Survey Area.....2010

BNLL: Blunt-nosed Leopard Lizard
NEAS: Nelson's Antelope Squirrel

N
W E
S

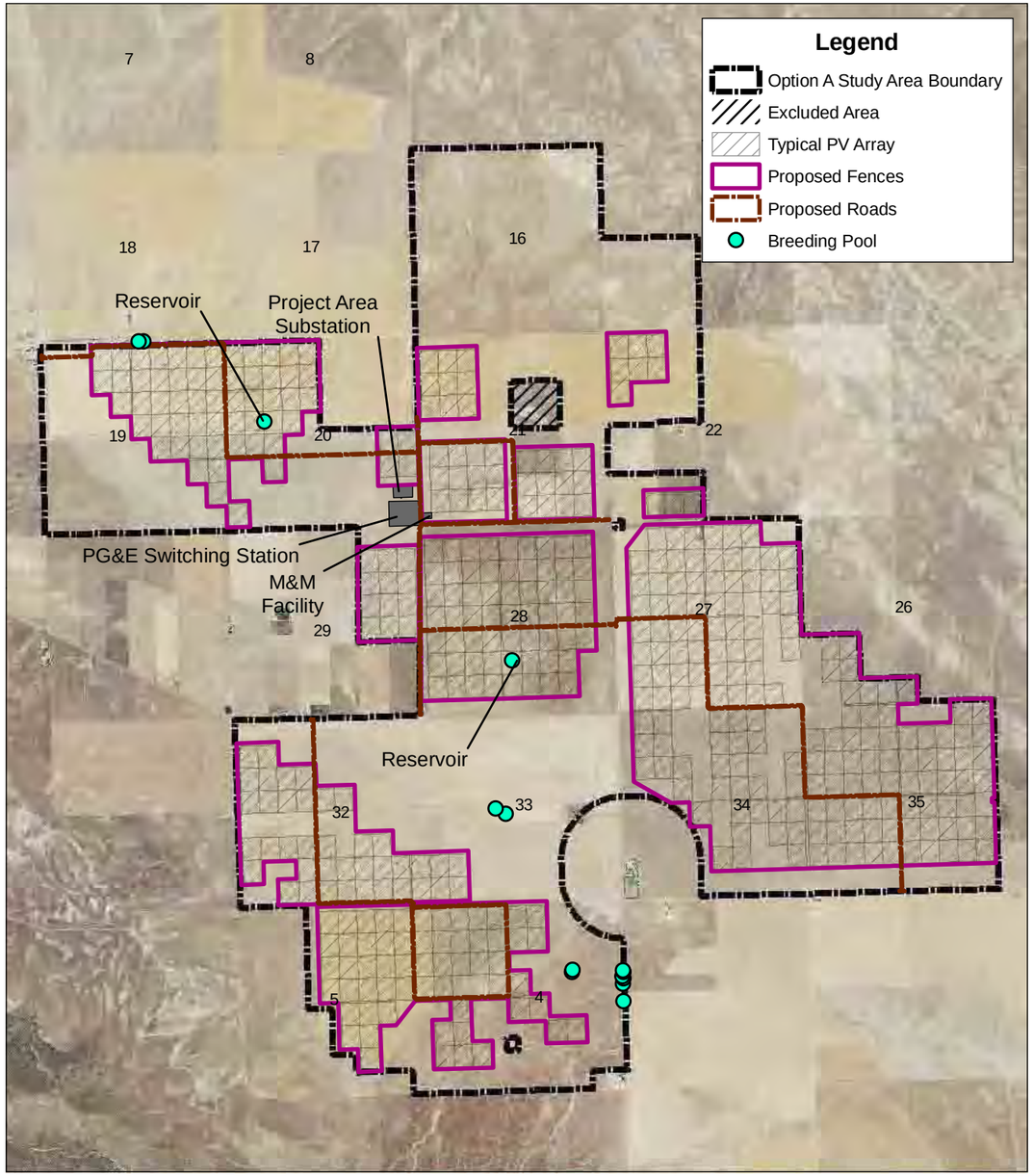
0 0.5 1 2 Miles

Topaz Solar Farms LLC
1111 Broadway, 4th Floor
Oakland, CA 94607

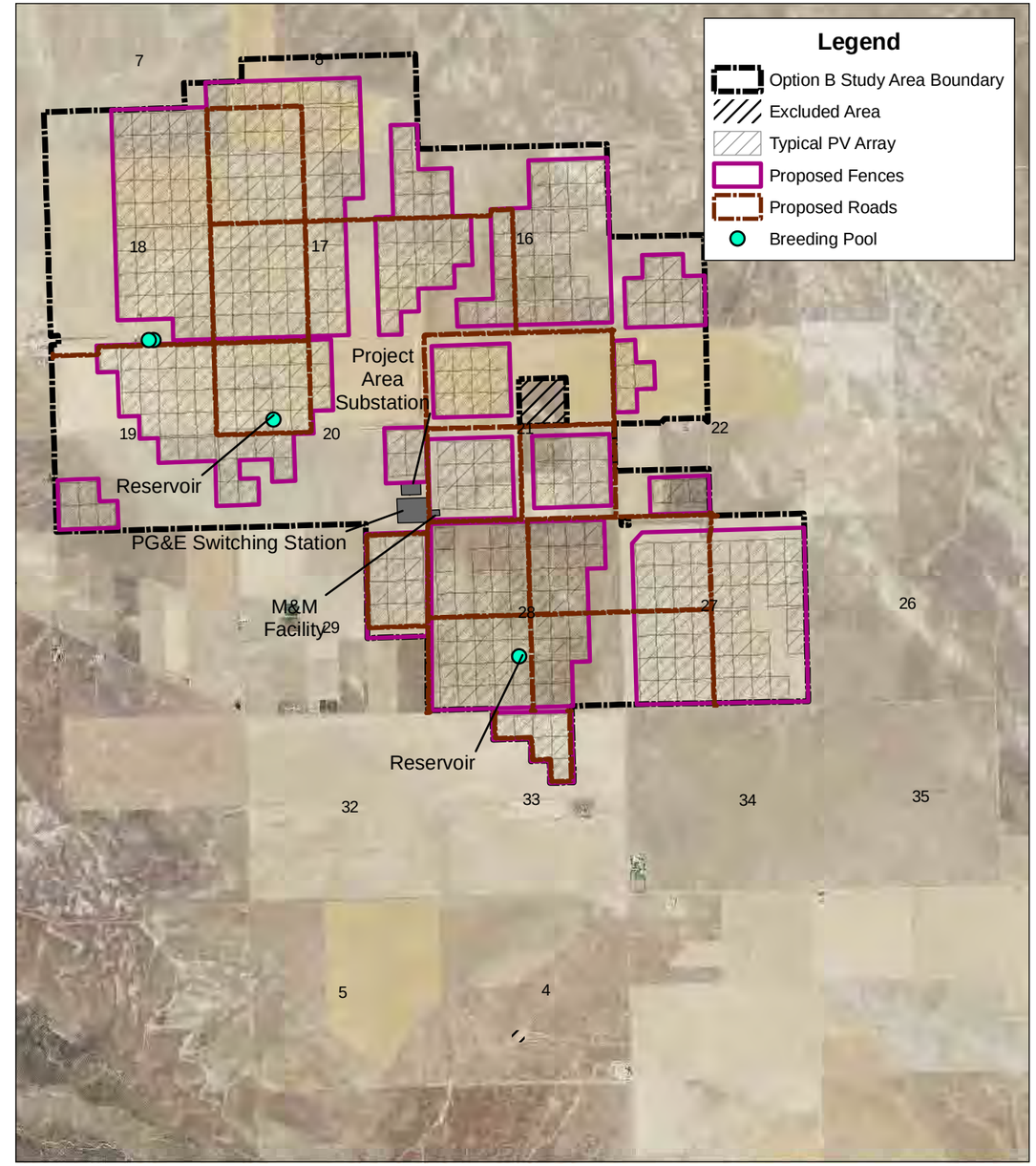
2009 San Luis Obispo County
NAIP Aerial Photography
Map Updated July 27, 2010

Althouse and Meade, Inc.
1875 Wellsona Road
Paso Robles, CA 93446

BR Map 7. Western Spadefoot Toad Breeding Pools



Option A



Option B

N
W E
S

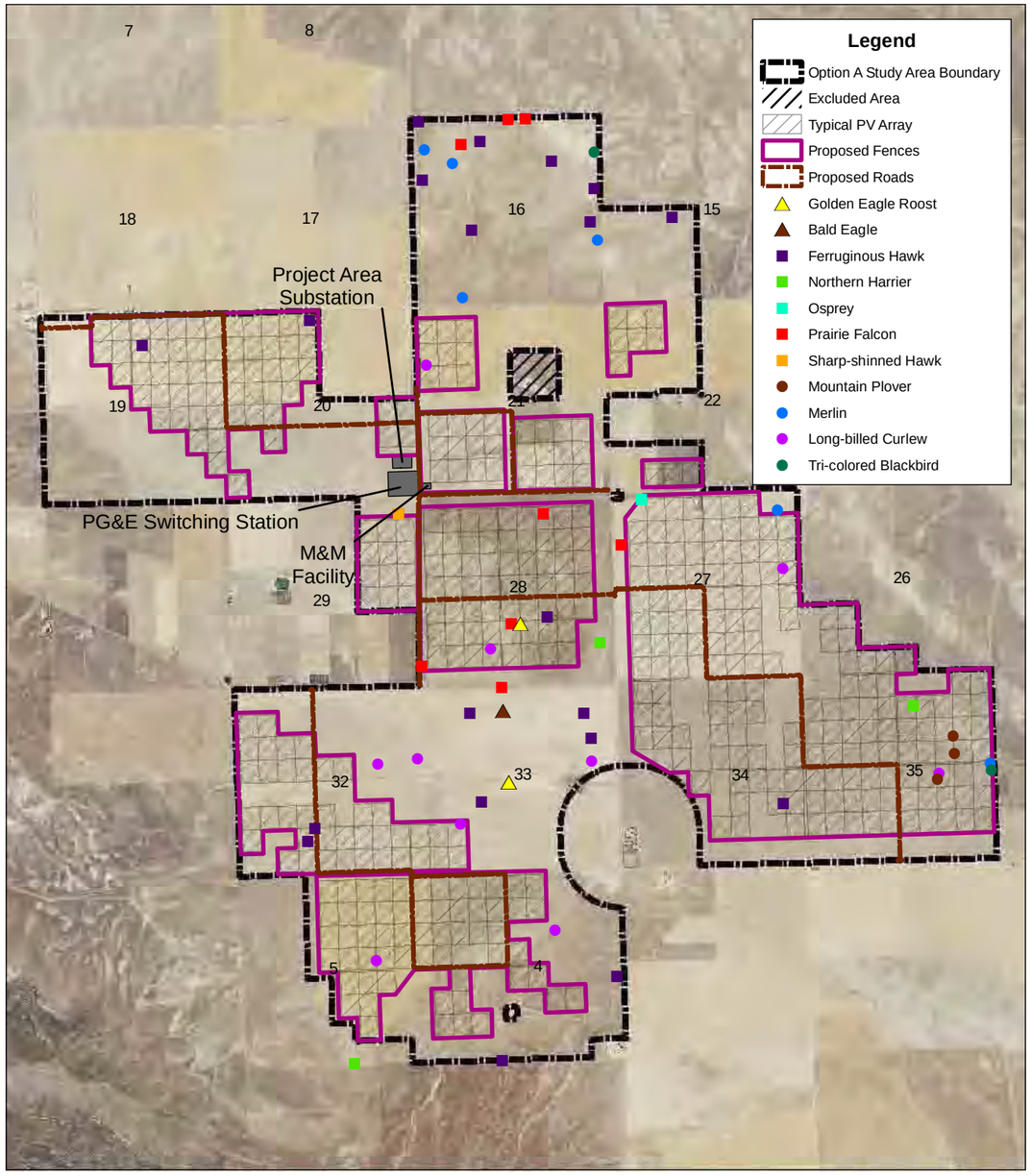
0 0.5 1 2 3 Miles

Topaz Solar Farms LLC
1111 Broadway, 4th Floor
Oakland, CA 94607

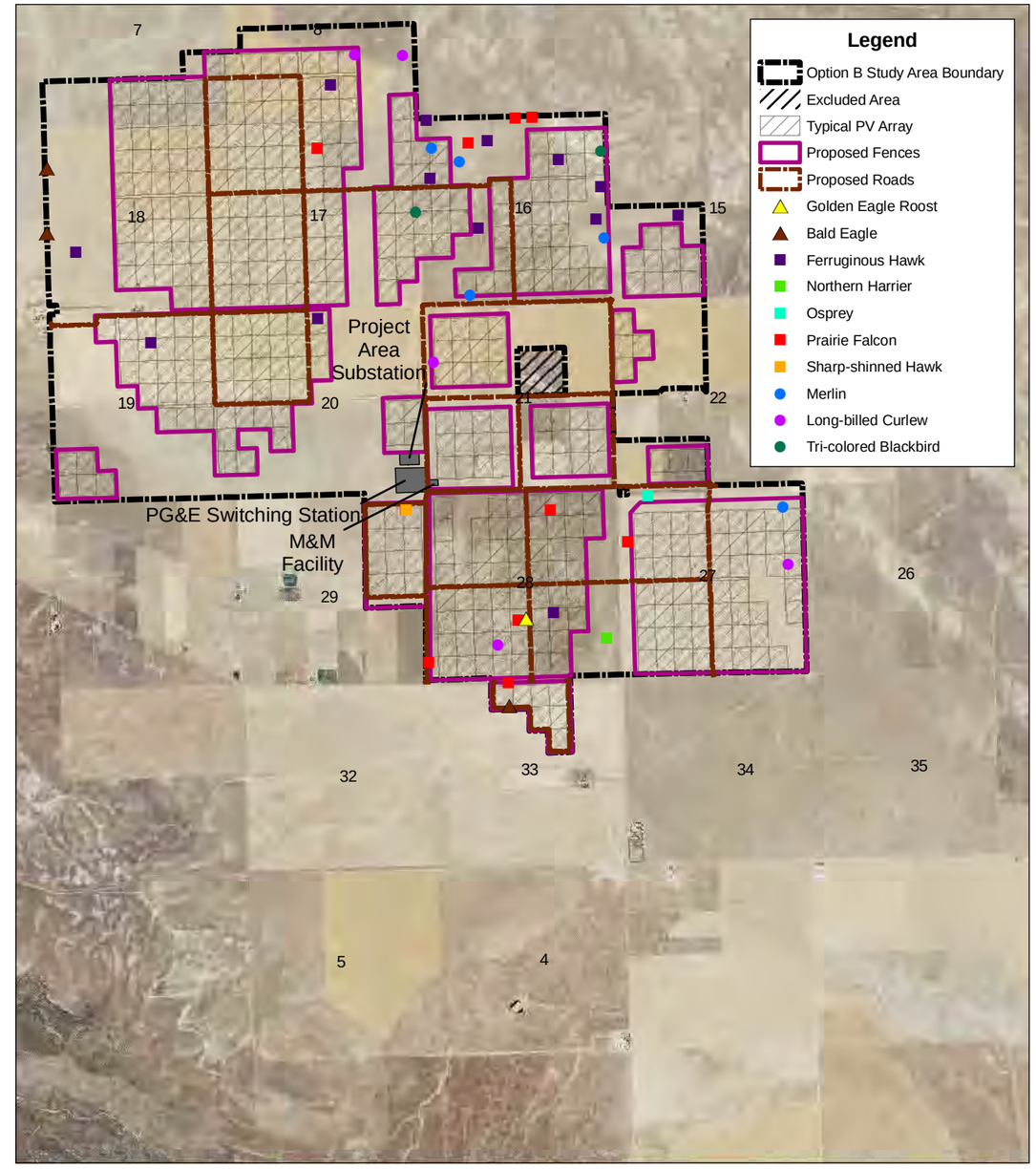
2009 San Luis Obispo County
NAIP Aerial Photography
Map Updated July 29, 2010

Althouse and Meade, Inc.
1875 Wellsona Road
Paso Robles, CA 93446

BR Map 8. Special Status Wintering Birds



Option A



Option B

N
W E
S

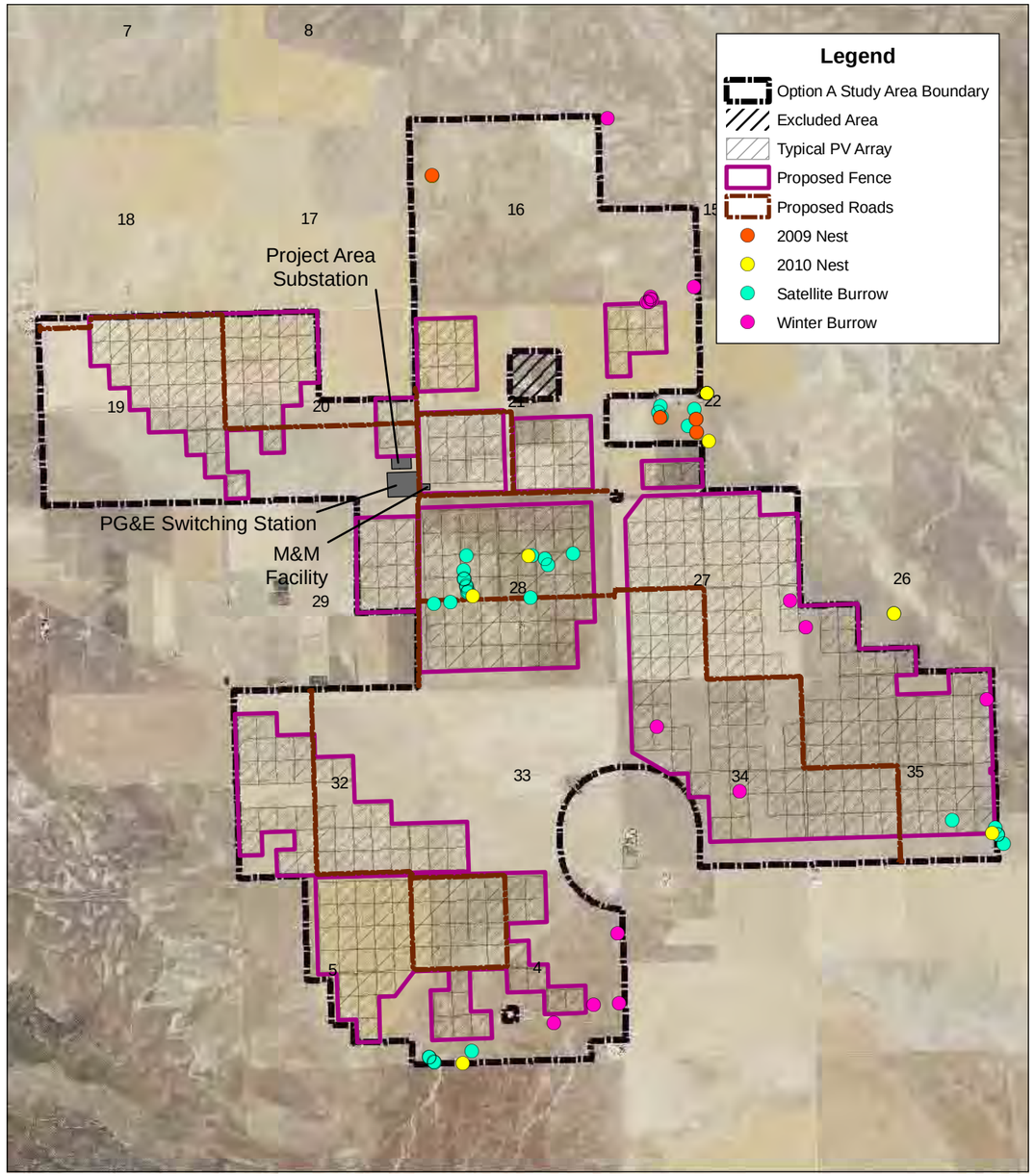
0 0.5 1 2 3 Miles

Topaz Solar Farms LLC
1111 Broadway, 4th Floor
Oakland, CA 94607

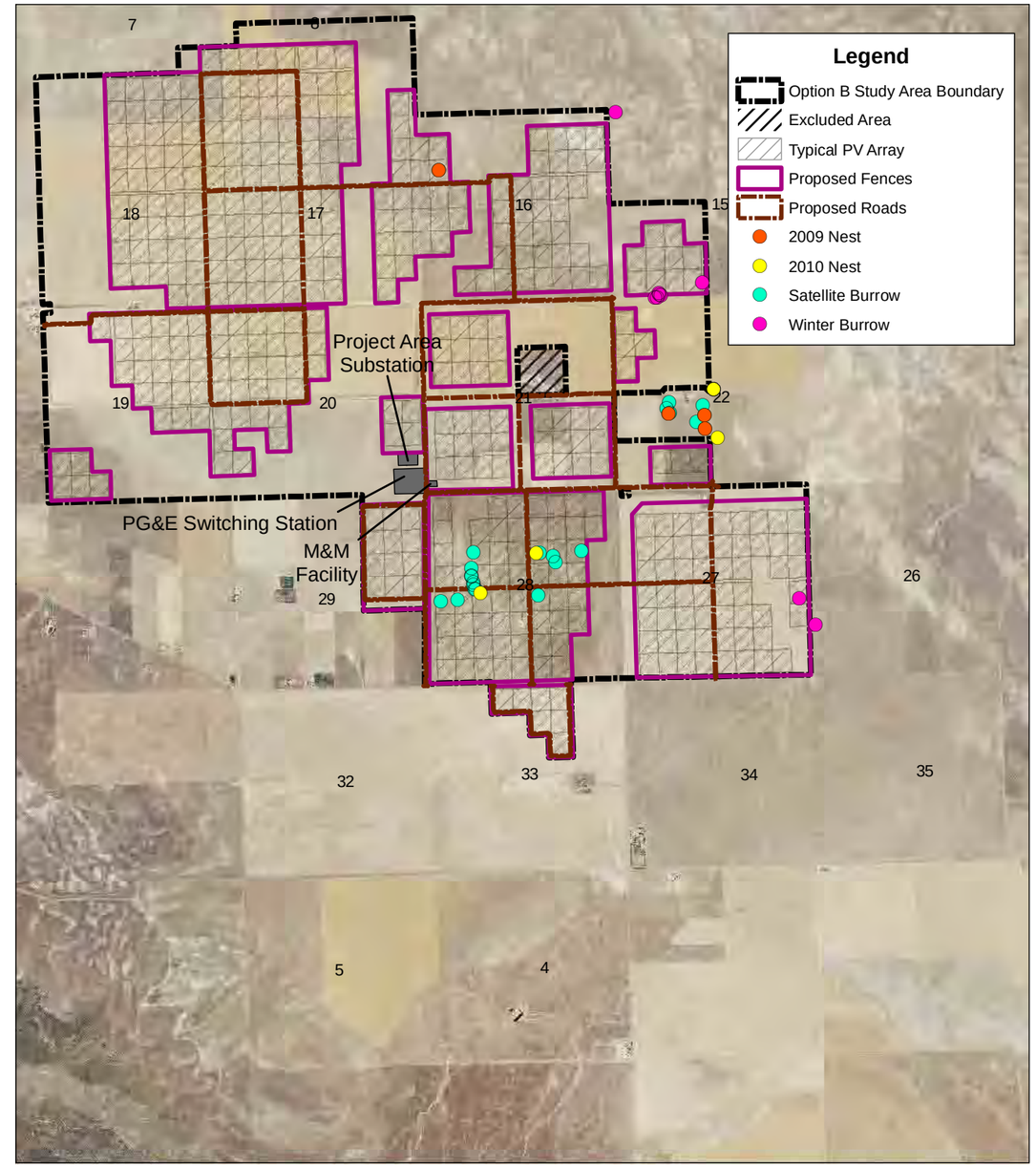
2009 San Luis Obispo County
NAIP Aerial Photography
Map Updated July 29, 2010

Althouse and Meade, Inc.
1875 Wellsona Road
Paso Robles, CA 93446

BR Map 9. Burrowing Owl Map



Option A



Option B

N
W E
S

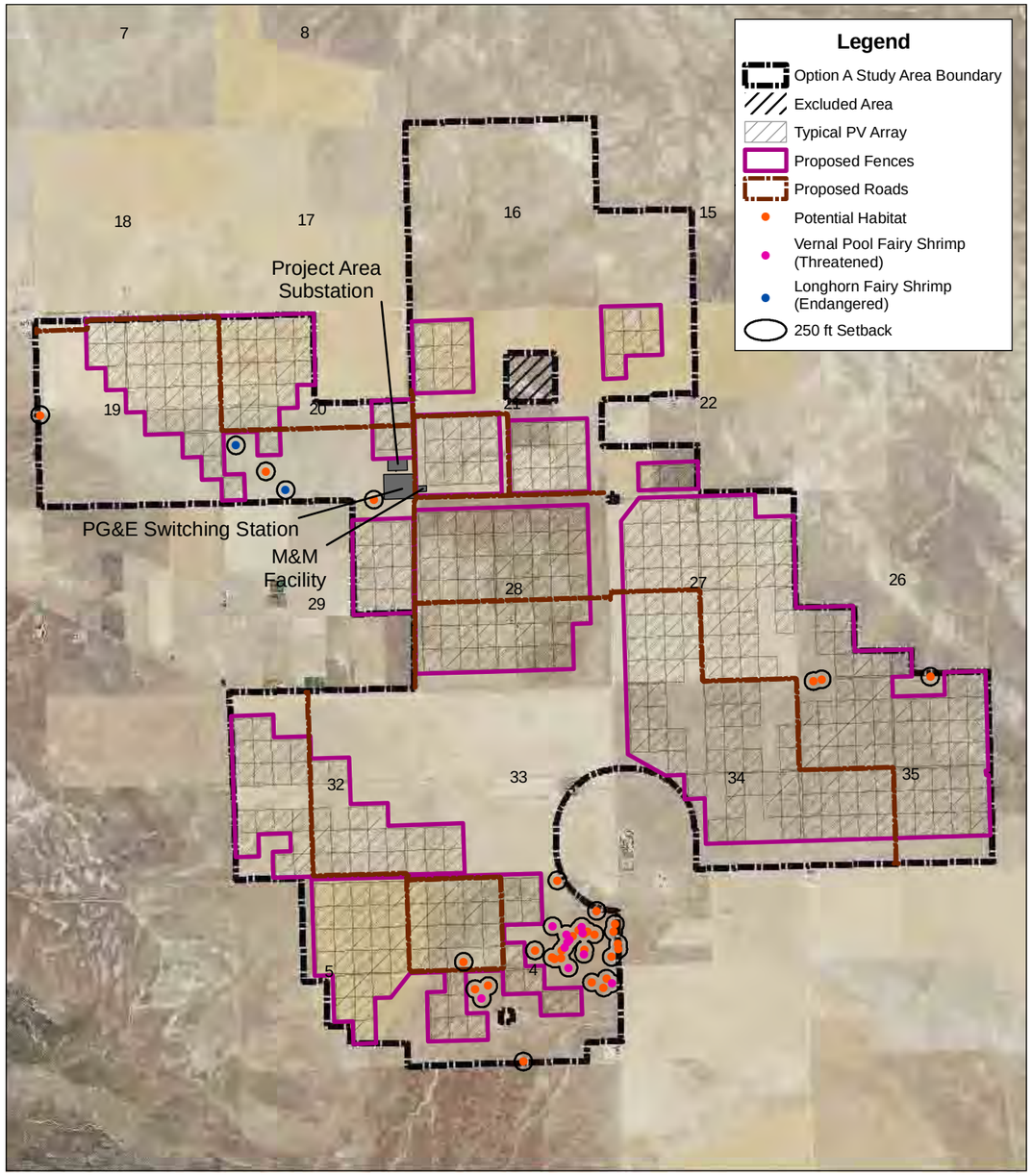
0 0.5 1 2 3 Miles

Topaz Solar Farms LLC
1111 Broadway, 4th Floor
Oakland, CA 94607

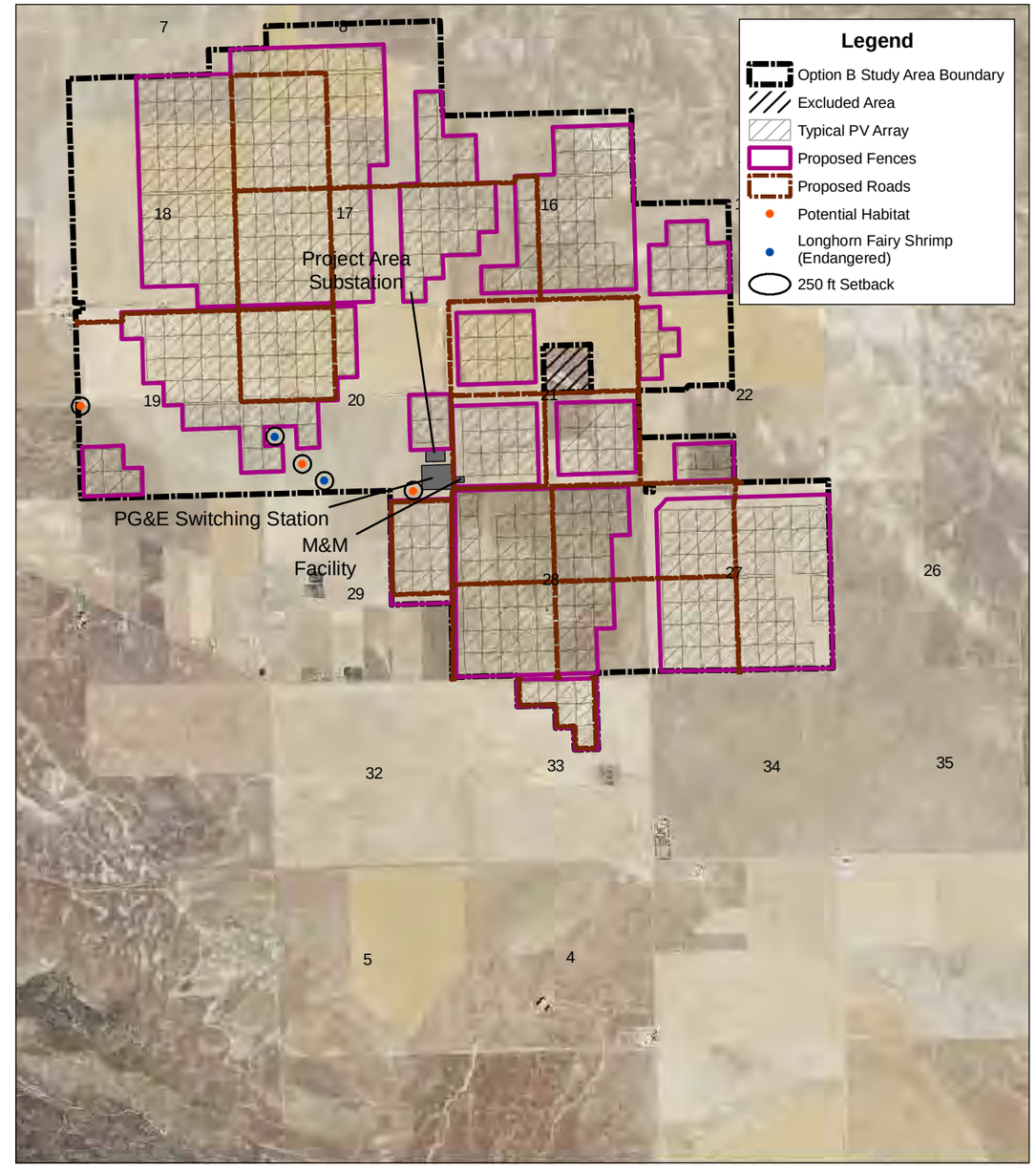
2009 San Luis Obispo County
NAIP Aerial Photography
Map Updated July 29, 2010

Althouse and Meade, Inc.
1875 Wellsona Road
Paso Robles, CA 93446

BR Map 10. Listed Vernal Pool Branchiopod Localities



Option A



Option B

N
W E
S

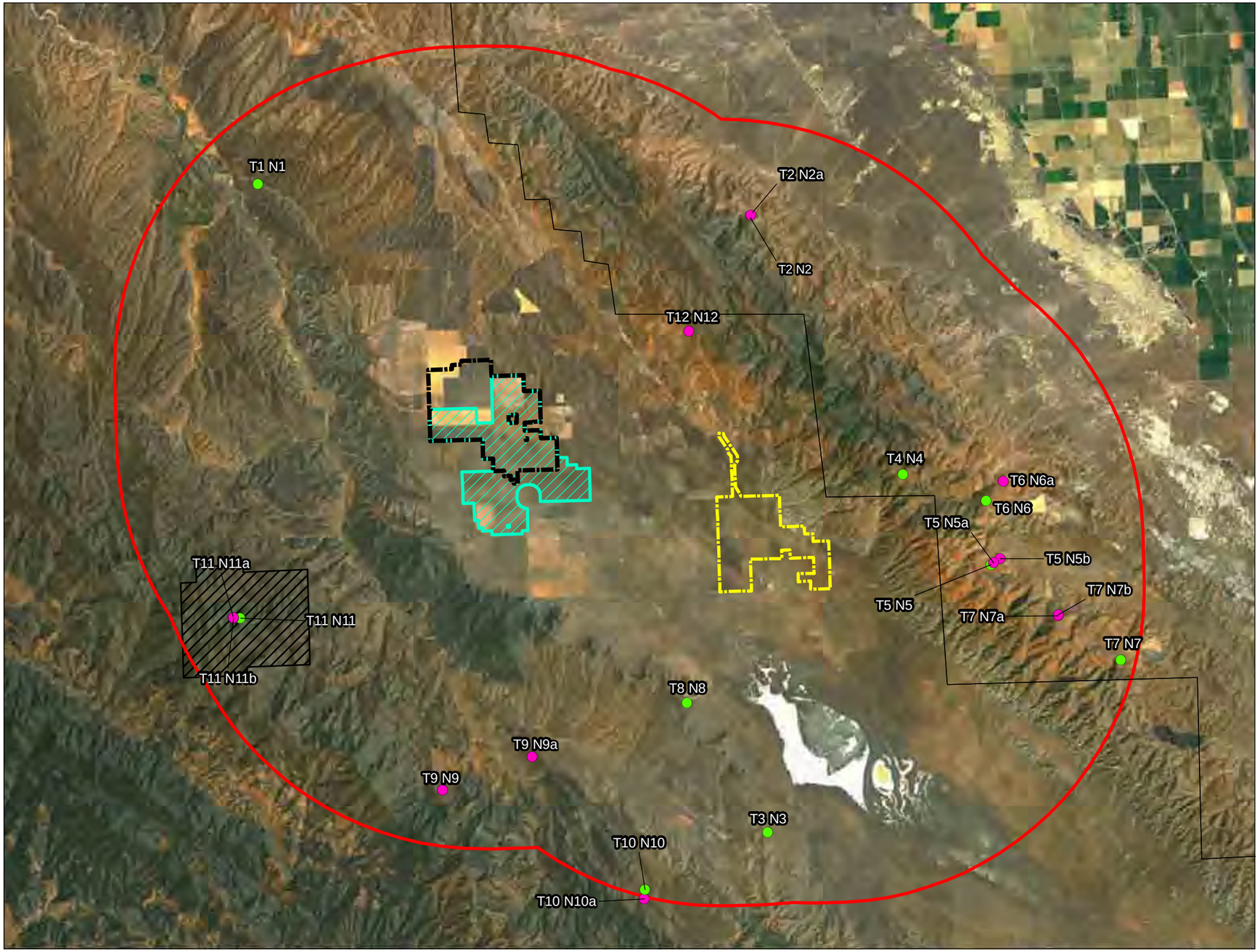
0 0.5 1 2 3 Miles

Topaz Solar Farms LLC
1111 Broadway, 4th Floor
Oakland, CA 94607

2009 San Luis Obispo County
NAIP Aerial Photography
Map Updated July 29, 2010

Althouse and Meade, Inc.
1875 Wellsona Road
Paso Robles, CA 93446

BR Map 11. Golden Eagle Aerial Nest Survey Results



Legend

- Option A Study Area Boundary
- Option B Study Area Boundary
- Sun Power Study Area
- Survey Area (448,647 acres)
- California Condor Critical Habitat
- Active Nest
- Inactive Nest

T1= Eagle Territory Number
N1= Eagle Nest Number

N
W E
S

0 2 4 8 Miles

Aerial nest surveys conducted by:
Brian Latta
Senior Raptor Biologist
230 Ross St.
Santa Cruz, CA 95060

Topaz Solar Farms LLC
1111 Broadway, 4th Floor
Oakland, CA 94607

2005
NAIP Aerial Photography
Map Updated July 27, 2010

Althouse and Meade, Inc.
1875 Wellsona Road
Paso Robles, CA 93446

14.0 Photographs

- **Photo Collection 1 – Land Sections**
- **Photo Collection 2 – Reference Sites**
- **Photo Collection 3 – Habitats**
- **Photo Collection 4 – Plants**
- **Photo Collection 5 – Wildlife**
- **Photo Collection 6 – Vegetation Test**

Photo Collection 1 – Land Sections

1. Section 4, view west of grassland habitat. Photo taken on March 4, 2010.

2. Section 4, view west of grassland habitat. Photo taken on April 23, 2010.

3. Section 5, view east of cropland habitat. Photo taken on April 16, 2010.

4. Section 5, view south of grassland habitat. Photo taken on April 23, 2010.

5. Section 7, view north of cropland habitat. Photo taken on April 6, 2010.

6. Section 8, view north of grassland habitat. Photo taken on April 15, 2008.

Photo Collection 1 – Land Sections

7. Section 15, view north of grassland habitat. Photo taken on March 25, 2010.

8. Section 16, view southwest of grassland habitat. Photo taken on April 15, 2008.

9. Section 17, view west of cropland habitat. Photo taken on March 25, 2010.

10. Section 18, view south of cropland habitat. Photo taken on May 22, 2008.

11. Section 19, view northwest of cropland habitat. Photo taken on April 23, 2009.

12. Section 20, view north of cropland habitat. Photo taken on March 9, 2010.

Photo Collection 1 – Land Sections

13. Section 21, view south of cropland habitat. Photo taken on March 19, 2009.

14. Section 22, view northeast of grassland habitat. Photo taken on March 27, 2009.

15. Section 26, view south of grassland habitat. Photo taken on March 25, 2010.

16. Section 27, view north of cropland habitat. Photo taken on March 10, 2009.

17. Section 28, view west of cropland habitat. Photo taken on February 11, 2010.

18. Section 29, view south of grassland habitat. Photo taken on February 11, 2010.

Photo Collection 1 – Land Sections

19. Section 32, view south of cropland habitat. Photo taken on April 9, 2010.

20. Section 33, view east of cropland habitat. Photo taken on April 10, 2010.

21. Section 34, view north of grassland habitat. Photo taken on March 11, 2010.

22. Section 34, view south of grassland habitat. Photo taken on April 15, 2010.

23. Section 35, view south of grassland habitat. Photo taken on March 11, 2010.

24. Section 35, view southwest of grassland habitat. Photo taken on April 15, 2010.

Photo Collection 2 – Reference Sites

25. Blunt-nosed leopard lizard photographed at Elkhorn Road reference site on May 14, 2008.

26. Nelson's antelope squirrel photographed at Elkhorn Road reference site on May 2, 2008.

27. Giant kangaroo rat precinct photographed at Panorama Road reference site on May 2, 2008.

28. Giant kangaroo rat precinct photographed at Wallace Creek reference site on April 10, 2010.

29. *Delphinium recurvatum* photographed at Belmont Trail reference site on April 6, 2010.

30. *Lasthenia ferrisiae* photographed at Belmont Trail reference site on April 6, 2010.

Photo Collection 2 – Reference Sites

31. *Madia radiata* photographed at San Diego Road reference site on March 26, 2010.

32. *California macrophylla* photographed at San Diego Road reference site on March 26, 2010.

33. *Caulanthus coulteri* var. *lemmonii* photographed at Chimineas Ranch on March 26, 2010.

34. *Monolopia congdonii* photographed in Carrizo Plain National Monument on April 10, 2010.

35. *Lepidium jaredii* photographed at Belmont Trail on March 25, 2010.

36. *Amsinckia vernicosa* var. *furcata* photographed at Highway 58 reference site on April 10, 2010.

Photo Collection 3 – Habitats

37. Cropland, view west within Section 17. Photo taken on February 18, 2010.

38. California Annual Grassland, view northwest within Section 16. Photo taken on April 16, 2008.

39. California Annual Grassland, view north within Section 4. Photo taken on April 23, 2010.

40. Vernal Pool, view southwest within Section 4. Photo taken on April 6, 2010.

41. Vernal Pool, view northwest within Section 4. Photo taken on April 23, 2010.

42. Seasonal Wetland, view southwest of Section 15. Photo taken on May 14, 2009.

Photo Collection 3 – Habitats

43. Ephemeral Wetland Depression, view north within Section 35. Photo taken on April 15, 2010.

44. Natural non-wetland pool, view southwest within Section 4. Photo taken on March 12, 2010.

45. Natural non-wetland pool, view north within Section 20. Photo taken on March 9, 2010.

46. Anthropogenic non-wetland pool, view east within Section 35. Photo taken on February 22, 2010.

47. Agriculture reservoir, view northwest within Section 28. Photo taken on February 11, 2010.

48. Anthropogenic, northeast within Section 28. Photo taken on February 11, 2010.

Photo Collection 4 – Plants

49. *Castilleja exserta* ssp. *exserta*, common wildflower within the PSA. Photo taken on April 15, 2010.

50. *Antirrhinum ovatum* (CNPS List 4.2), Section 5, on clay soils. Photo taken on June 30, 2010.

51. *Myosurus minimus*, found in vernal pool within Section 20. Photo taken on March 25, 2010.

52. *California macrophylla* (CNPS List 1B.1), photographed in Section 33. Photo taken on April 27, 2010.

53. *Layia munzii* (CNPS List 1B.2), found scattered throughout the PSA. Photographed in Section 5 on April 23, 2010.

54. *Eschscholzia rhombipetala* (CNPS List 1B.1), found within Section 5. Photo taken on March 22, 2010.

Photo Collection 4 – Plants

55. *Brodiaea terrestris* ssp. *kernensis*, photographed within Section 4 on April 16, 2010.

56. *Uropappus lindleyi*, found throughout the PSA. Photo taken on April 15, 2010.

57. *Elatine rubella*, a vernal pool endemic, found within Section 4. Photo taken on April 27, 2010.

58. *Psilocarphus brevissimus* var. *brevissimus* photographed in Section 4. Photo taken on April 27, 2010.

59. *Pilularia americana*, photographed within Section 4 on April 27, 2010.

60. *Lupinus microcarpus* var. *microcarpus*, found throughout the PSA. Photo taken on April 16, 2010.

Photo Collection 5 – Wildlife

61. American badger photographed in Section 8 on March 19, 2009.

62. Burrowing owl photographed in Section 22 on May 20, 2009.

63. Pronghorn photographed in Section 20 on May 20, 2009.

64. Gopher snake photographed in Section 33 on April 10, 2010.

65. Golden eagle photographed in Section 28 on January15, 2010.

66. Horned lark nest photographed in Section 16 on April 26, 2010.

Photo Collection 5 – Wildlife

67. Side-blotched lizard photographed in Section 35 on April 15, 2010.

68. Tule elk photographed in Section 15 with motion detection camera on March 16, 2009.

69. Western spadefoot toad metamorph photographed in Section 4 on April 27, 2010.

70. Northern Pacific rattlesnake photographed in Section 33 on April 10, 2010.

71. San Joaquin kit fox photographed in Section 34 on March 11, 2010.

72. McKittrick pocket mouse photographed in Section 34 on April 10, 2010.

Photo Collection 6 – Vegetation Test

73. Vegetation test site in Section 29, view west between module tables that are 80 feet long and about 7.8 feet wide. July 7, 2010.

74. Faux module in Section 29. The bottom edge is about 18 inches off the ground, and the upper edge is about 5 feet high. Photo taken on January 7, 2010.

75. First Solar module installation (not to be connected) during pile driving operations.

76. Vegetation and light detection instruments under faux module. Photo taken June 26, 2010.

77. Section 35, vegetation dominated by filaree. Photo taken March 31, 2010.

78. Section 35, view east at north fence. Photo taken on November 9, 2009.

15.0 References

Advantage Environmental Consultants, LLC. 2009. 90-Day Protocol Survey Report for U.S. Fish and Wildlife Service Listed Vernal Pool Branchiopods. Proposed Topaz Solar Farm, State Highway 58 & Bitterwater Road, California Valley, San Luis Obispo County, California. AEC Project No. 08-102SD, August 7, 2009.

Advantage Environmental Consultants, LLC. J2010. 90-Day Protocol Survey Report for U.S. Fish and Wildlife Service Listed Vernal Pool Branchiopods. Proposed Topaz Solar Farm, Sections 4, 5, 16, 17, 20, 26, 27, 28, 32, 33, 34, and 35, State Highway 58 & Bitterwater Road, California Valley, San Luis Obispo County, California. USFWS File No. 81420-2009-TA-0208. AEC Project No. 09-075SD, June 16, 2010.

Althouse and Meade, Inc. 2009a. Blunt-nosed Leopard Lizard (*Gambelia sila*) Protocol Survey for the Topaz Solar Farm, California Valley, San Luis Obispo County. January.

Althouse and Meade, Inc. 2009b. Biological Report for the Topaz Solar Farm, California Valley, San Luis Obispo County. Prepared for Topaz Solar Farms LLC. October.

Althouse and Meade, Inc. 2010a Blunt-nosed Leopard Lizard (*Gambelia sila*) Protocol Survey for the Topaz Solar Farm, California Valley, San Luis Obispo County. January.

Althouse and Meade, Inc. 2010b. 2010 Biological Report Technical Appendix, Volumes 1 through 3, Topaz Solar Farm, California Valley, San Luis Obispo County, California. June.

Althouse and Meade, Inc. 2010c. Topaz Solar Farm San Joaquin Kit Fox Mitigation and Monitoring Plan. July.

Althouse and Meade, Inc. and Huffman-Broadway Group, Inc. 2010. Investigation of the Presence of Wetlands and Other Waters of the United States, Topaz Solar Farm Project, California Valley, San Luis Obispo County, California. April.

Andres, B. A., and K. L. Stone. 2009. Conservation Plan for the Mountain Plover (*Charadrius montanus*), Version 1.0. Manomet Center for Conservation Sciences, Manomet, Massachusetts.

Arjo, Wendy M., Tim J. Bennett, and Adam Kozlowski. Characteristics of Current and Historical Kit Fox (*Vulpes macrotis*) dens in the Great Basin Desert. Published on the NRC Research Press Web site at http://cjz.nrc.ca on 20 February 2003.

Arnold, Richard A. Ph.D. April 2010. Habitat Assessment and Limited Presence-Absence Surveys for the Threatened Kern Primrose Sphinx Moth at the Proposed Topaz Solar Farm in San Luis Obispo County, CA.

Avian Power Line Interaction Committee (APLIC). 2006. Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006. Edison Electric Institute, APLIC, and the California Energy Commission. Washington D.C. and Sacramento, CA.

Bates, C. 2006. Burrowing Owl (*Athene cunicularia*). *In* The Draft Desert Bird Conservation Plan: a strategy for reversing the decline of desert-associated birds in California. California Partners in Flight. http://www.prbo.org/calpif/htmldocs/desert.html

Beecham, J. J. and M. N. Kochert. 1975. Breeding Biology of the Golden Eagle in Southwestern Idaho. The Wilson Bulletin, Vol. 87, No. 4, December.

Best, Troy L. 1993. Perognathus inornatus. *In* Mammalian Species, No. 450, pp. 1-5, 3 figs., Published 15 November 1993 by The American Society of Mammalogists.

Bureau of Land Management. 2010. Birds of the Carrizo Plain National Monument. http://www.blm.gov/ca/st/en/fo/bakersfield/Programs/carrizo/birds.html Accessed May 7, 2010.

California Burrowing Owl Consortium. 1993. Burrowing Owl Survey Protocol and Mitigation Guidelines. April.

California Department of Fish and Game. 2000. Guidelines for Assessing the Effects of Proposed Projects on Rare, Threatened, and Endangered Plants and Natural Communities. Revised May 8, 2000.

California Department of Fish and Game. May 1994. Approved Survey Methodology for Blunt-Nosed Leopard Lizard. Revised.

California Department of Fish and Game, Natural Diversity Database. July 2009. Special Animals List (883 taxa). State of California, The Resources Agency.

California Department of Fish and Game, Natural Diversity Database. July 2010. Special Vascular Plants, Bryophytes, and Lichens List. Quarterly Publication. 71pp.

California Department of Fish and Game. 2008a. Review of Carrizo Energy Solar Farm Project Application for Certification. Memorandum to Mary Dyas, California Energy Commission, March 26.

California Department of Fish and Game. 2008b. Letter to John McKenzie, County of San Luis Obispo Department of Planning and Building, regarding Notice of Preparation (NOP) for Topaz Solar Farm Conditional Use Permit (SCH No. 2008091026). October 15.

California Department of Fish and Game. April 17, 2008. Meeting with Dave Hacker, CDFG, and Daniel E. Meade, Althouse and Meade, Inc., regarding the Topaz Solar Farm project.

California Department of Fish and Game. 2009. Letter to John McKenzie, County of San Luis Obispo Department of Planning and Building, regarding Notice of Preparation (NOP) for SunPower California Valley Solar Ranch Conditional Use Permit (SCH No. 2009021009). March 3.

California Department of Fish and Game. November 24, 2009. Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities.

California Natural Diversity Database (CNDDB) Rarefind. 2010. The California Department of Fish and Game Natural Diversity Data Base, version 3.1.1 February 28, 2010 data.

California Native Plant Society (CNPS). December 9, 1983, revised June 2, 2001. CNPS Botanical Survey Guidelines. California Native Plant Society.

California Native Plant Society (CNPS). 2010. Inventory of Rare and Endangered Plants (online edition, v7-10b). California Native Plant Society. Sacramento, CA. http://www.cnps.org/inventory

Consortium of California Herbaria website. 2008. Regents of the University of California. Updated March 22, 2008.

Collins, Paul W. 2009. Results of Small Mammal Trapping at the Topaz Solar Farm, California Valley, San Luis Obispo County, California. October 20.

Collins, Paul W. 2010. Results of Small Mammal Trapping on portions of the Topaz Solar Farm Project Site in California Valley, Sections 4, 5, 15, 26, 28, 32-35, San Luis Obispo County, California. April 26.

Cooper, Daniel S. 2004. Important Bird Areas of California. Audubon California, Pasadena, California.

County of San Luis Obispo, Department of Planning and Building, Environmental Division. 2007. Guidelines for Preparation of Biological Reports. Revised December 11.

Cowardin, L. M., V. Carter, F. C. Golet, and E. T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C.

Cypher, Brian L. and Patrick A. Kelly, Daniel L. Williams, Howard O. Clark, Alexander D. Brown, Scott E. Phillips. 2005. Foxes in Farmland: Recovery of the Endangered San Joaquin Kit Fox on Private Lands in California. CSU Stanislaus. 19pp. ESRP, Fresno.

Cypher, B. L., and N. Frost. 1999. Condition of kit foxes in urban and exurban habitats. J. Wildlife Management 63:930-939.

Cypher, B. L., and G. D. Warrick. 1994. Use of human-derived food items by urban kit foxes. Trans. Western Section Wildlife Society 29:34-37.

Cypher, Brian L. and Jerry H. Schrivner. 1992. Coyote Control to Protect Endangered San Juan Kit Foxes at the Naval Petroleum Reserves, California. Vertebrate Pest Conference Proceedings Collection, Proceedings of the Fifteenth Vertebrate Pest Conference 1992, University of Nebraska, Lincoln.

Dart, Jason D. 2010. Field notes for the Topaz Solar Farm LLC, Biological Resources report.

DiTomaso, Joseph and Evelyn Healy. 2007. Weeds of California and Other Western States. Publication 3488. University of California Agriculture and Natural Resources

Earth Systems Southwest. 2009. Prescriptive Criteria for Developing Compacted Test Strips, Topaz Solar Farm, Highway 58 at Bitterwater Road, Carrizo Plain Area of San Luis Obispo County, California, File No.: 11682-01, Doc No.: 09-10-732, dated October 7, 2009.

Flora of North America. March 23, 2010. Alphabetical List of Pteridophyte, Gymnosperm, and Angiosperm Families with Volume Numbers. Available at www.fna.org/families

Germano, David J. 2009. The Number of Census Days Needed to Detect Blunt-nosed Leopard Lizards, *Gambelia sila*. Pp. 106-109, *In* California Fish and Game 95(2):106-109 2009.

Haug, E. A., B. A. Millsap and M. S. Martell. 1993. Burrowing Owl (*Athene cunicularia*), The Birds of North America (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology.

Helm Biological Consulting, LLC. 2008. Dry-Season Sampling for Federally listed Large Branchiopods at the Proposed Topaz Solar Farm. December.

Helm Biological Consulting, LLC. 2009. Additional Dry-Season Sampling for Federally listed Large Branchiopods at the Proposed Topaz Solar Farm. August.

Henry, Tammy and Jesus Maldonado. 2010. Unpublished letter. Center for Conservation and Evolutionary Genetics, National Zoological Park, National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Hickman, James C. 1993. The Jepson Manual. University of California Press, Berkeley and Los Angeles, California.

Holland, V.L. and David J. Keil. 1995. California Vegetation. Kendall/Hunt Publishing Company, Dubuque, Iowa.

Hoover, Robert F. 1970. The Vascular Plants of San Luis Obispo County, California. University of California Press. Berkeley, Los Angeles, and London.

Hunt, W.G., R. E. Jackman, T. L. Hunt, D. E. Driscoll, and L Culp. 1998. A Population Study of Golden Eagles in the Altimont Pass Wind Resource Area: Population Trend Analysis 1997. Report to National Renewable Energy Laboratory, Subcontract XAT-6-16459-01. Predatory Bird Research Group, University of California, Santa Cruz.

H.T. Harvey and Associates, Ecological Consultants and URS. 2009. California Valley Solar Ranch Biological Resource Assessment Report. December.

Ingles, Lloyd G. 1965. Mammals of the Pacific States; California, Oregon, Washington. Stanford University Press, Stanford, California.

Jennings, Charles W., ed. 1959. San Luis Obispo Sheet, 1:250,000 scale. Geologic Map of California (Fifth Printing, 1992). State of California, The Resources Agency, Department of Conservation. Division of Mines and Geology, Sacramento, CA.

Johnsgard, Paul A. 1990. Hawks, Eagles, and Falcons of North America. Smithsonian Institution Press, Washington and London.

Johnson, Leigh A. 2007. Two New Species and a Reassessment of Synonymy in the *Navarretia pubescens* Complex (Polemoniaceae) of Western North America. Novon: A Journal for Botanical Nomenclature 17(4):454-461.

Kays, Roland W. and Don E. Wilson. 2002. Princeton Field Guides, Mammals of North America. Princeton University Press, Princeton and Oxford.

Keeler-Wolf, Todd, Diane R. Elam, Kari Lewis, and Scott A. Flint. 1998. California Vernal Pool Assessment Preliminary Report. State of California, The Resources Agency, Department of Fish and Game. May. Available online at http://www.dfg.ca.gov/biogeodata/wetlands/pdfs/VernalPoolAssessmentPreliminaryReport.pdf.

Lehman, Paul E. 1994. The Birds of Santa Barbara County, California. Vertebrate Museum, University of Santa Barbara.

Murie, Olaus J. 1974. Peterson Field Guides, Animal Tracks. Houghton Mifflin Company, Boston, New York.

Peeters, Hans. 2007. California Natural History Guides. Field Guide to Owls of California and the West. University of California Press, Berkeley, Los Angeles, Lindon.

Princeton University. 2010. WordNet, A Lexical Database for English. Office of Communications, Mahlon Lovett. Last updated November 16, 2008 . [Accessed on: May 19] Online at: http://wordnet.princeton.edu/wordnet/.

Reed, P.B., Jr. 1988. National List of Plant Species that Occur in Wetlands: National Summary. U.S. Fish and Wildlife Service Biological Report 88(24).

Reid, D.A., R.C. Graham, C. Amrhein, and R.J. Southard. 1993. Slickspot Soil Genesis in the Carrizo Plain, California. Soil Sci. Soc. Am. J. 57:162-168.

OptiSolar Inc. 2008. Draft Topaz Plain Photovoltaic Solar Project Plan of Development. January 18, 2008.

OptiSolar Inc. December 2008. Personal communications via email between Althouse and Meade, Inc. and OptiSolar Inc. staff regarding percent cover of land area within the project site.

Pagel, J.E., D.M. Whittington, and G.T. Allen. 2010. Interim Golden Eagle technical guidance: inventory and monitoring protocols; and other recommendations in support of eagle management and permit issuance. Division of Migratory Bird Management, U.S. Fish and Wildlife Service.

Preston, Robert and David Keil. 2009. Personal Communication regarding *Eryngium spinosepalum* taxonomy, status, and distribution. Electronic mail.

Rosenberg, D.K., L. A. Trulio, D. Catlin, D. Chromczack, J. A. Gervais, N. Ronan, and K. A. Haley. 2007. The ecology of the Burrowing Owl in California. Unpubl. report to Bureau of Land Management.

San Luis Obispo County, Planning and Development Department. 2006a. Draft County of San Luis Obispo Mitigation and Monitoring Plans. Revised June 20, 2006.

San Luis Obispo County, Planning and Development Department. 2006b. Draft County of San Luis Obispo Guidelines For Revegetation/Restoration Plans. Revised June 20, 2006.

Sawyer, John O. and Todd Keeler-Wolf. 1995. A Manual of California Vegetation. California Native Plant Society, Sacramento, California.

Schlising, Robert A. and Douglas G. Alexander, Department of Biological Sciences, California State University, Chico. 2007. Vernal Pool Landscapes. Studies from the Herbarium, Number 14, California State University, Chico.

Schuford, David W. and Thomas Gardali, Editors. 2008. California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Bids of Immediate Conservation Concern in California. Studies of Western Birds No. 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.

Sibley, David Allen. 2001. The Sibley Guide to Bird Life & Behavior. National Audubon Society. Alfred A. Knopf, New York.

Smith, D. and Alice Whitelaw. 2010. Scat Detection Dog Surveys for the Endangered San Joaquin Kit Fox (Vulpes macrotis mutica) on Topaz Solar Farm Properties in San Luis Obispo County, California. January 22.

Solomesch, Ayzik, and Michael Barbour. 2008. Key to Vernal Pool Plant Associations. Presented at CNPS Vernal Pool Workshop, March, 2008.

Soukup, D. (Reid). 2008. Personal communications via email with Althouse and Meade, Inc. biologist M. Perry. June.

Stafford, Bob. 2008. Personal communication at County pre-application meeting, County of San Luis Obispo,.

Stebbins, Robert C. 2003. Peterson Field Guides Western Reptiles and Amphibians, 3rd edition. Houghton Mifflin Company, Boston, New York.

Thomsen, C. D., W. A. Williams, M. P. Vayssieres, C. E. Turner and W. T. Lanini. 1996. Yellow starthistle biology and control. University of California. Publication 21541.

United States Department of Agriculture, National Cooperative Soil Survey. 2003. Soil Survey of San Luis Obispo County, California, Carrizo Plain Area.

United States Department of Agriculture-Farm Service Agency, Aerial Photography Field Office. 2006a. San Luis Obispo County. Online at: http://datagateway.nrcs.usda.gov /NextPage.aspx?ProductIDs=205^& ProductCounts=1+map+3613.012+MB^&MBytes=3613.01&Progress=2&HitTab =3&AValue=1&ExtentMinX=-125.5&ExtentM inY=16.35&ExtentMaxX=-65.0&ExtentMaxY=59.0&AoiMinX=&AoiMinY=&AoiMaxX=&AoiMaxY=&QuickCounty=San+Luis+Obispo&QuickState=California. National Agriculture Imagery Program (NAIP). June 26. Image Date: May 6.

United States Department of Agriculture-Farm Service Agency, Aerial Photography Field Office. 2006b. San Luis Obispo County. Online at: http://atlas.ca.gov/casil/imagery BaseMapsLandCover/imagery/ naip/naip_2005/county_mosaics/San_Luis_Obispo/. National Agriculture Imagery Program (NAIP). March 22, 2006. Image Date: June 4, 2005.

United States Department of Agriculture-Farm Service Agency, Aerial Photography Field Office. 2009. San Luis Obispo County. Online at: http://atlas.ca.gov/casil/ imageryBaseMapsLandCover/imagery/naip/naip_2009/2009_NAIP_sid_county_compressions/SanLuisObispo/. National Agriculture Imagery Program (NAIP). August 13. Image Date: June 17.

U.S. Department of Agriculture, Natural Resources Conservation Service. 2010. Plants Database. Website: http://plants.usda.gov.

United States Fish and Wildlife Service. 2005. Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon. Portland, Oregon. xxvi +606 pages. Available online at:

http://www.fws.gov/sacramento/es/recovery_plans/vp_recovery_plan_links.htm

United States Fish and Wildlife Service. 1996a. Interim Survey Guidelines to Permittees for Recovery Permits under Section 10(a)(1)(A) of the Endangered Species Act for the Listed Vernal Pool Branchiopods. April 19.

United States Fish and Wildlife Service. 1996b. Recovery Plan for the California Condor, Third Revision. Portland, Oregon.

United States Fish and Wildlife Service. 1996c. Programmatic Formal Endangered Species Act Consultation on Issuance of 404 Permits for Projects with Relatively Small Effects on Listed Vernal Pool Crustaceans Within the Jurisdiction of the Sacramento Field Office, California. 1-1-96-F-1. Available online at: http://www.fws.gov/sacramento/es/documents/vp_programatic.pdf

United States Fish and Wildlife Service. 1998. Recovery Plan for Upland Species of the San Joaquin Valley, California. Region 1, Portland, OR. Fed. Register Notice, U.S. Fish and Wildlife Service.

United States Fish and Wildlife Service. 1999. Endangered and Threatened Wildlife and Plants: Proposed Threatened Status for the Mountain Plover. Federal Register 64:7587-7601.

United States Fish and Wildlife Service. January 2000. Guidelines for Conducting and Reporting Botanical Inventories for Federally, Proposed, and Candidate Species.

United States Fish and Wildlife Service. 2005. Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon.

United States Army Corps of Engineers. 2008a. Regional supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0). Ed. J.S. Wakeley, R.W. Lichvar, and C.V. Noble. ERDC/EL TR-08-28. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

United States Army Corps of Engineers. 2008b. A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States: A Delineation Manual. Ed. R. W. Lichvar and S.M. McColley. ERDC/CRREL TR-08-12. Hanover, NH: U.S. Army Engineer Research and Development Center.

URS Corp. September 24, 2007. Biological Assessment and Wetland Delineation, Carrizo Energy Solar Farm Project. Updated September 10, 2008.

URS Corp. October 10, 2008. Carrizo Energy Solar Farm (07-AFC-8), 2008 Biological Surveys Letter Report, URS Project No. 27658060

Vanherweg, Bill. 2008. Topaz Solar Energy Project Nocturnal Small Mammal Trapping Survey. Prepared for OptiSolar Inc.

Weatherwax, Margriet and David Keil. May 6, 2010. Personal Communication regarding *Castilleja* spp. taxonomy for specimens collected in Carrizo Plain. Electronic mail.

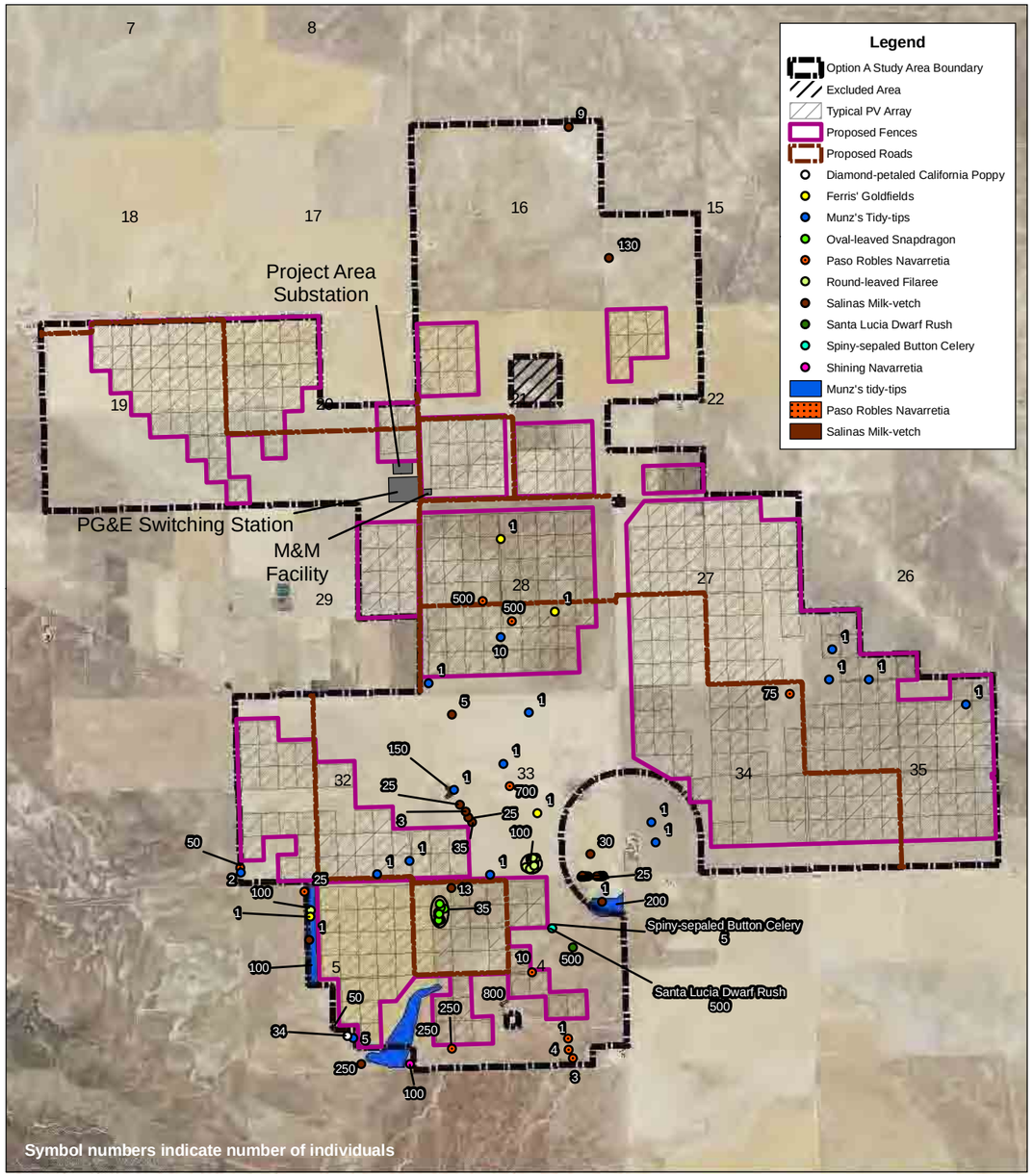
Williams, Daniel F. 1992. Geographic Distribution and Population Status of the Giant Kangaroo Rat, *Dipodomys ingens* (Rodentia, Heteromyidae). Pp. 301-328. *In* Endangered and Sensitive Species of the San Joaquin Valley, California: Their Biology, Management and Conservation. (D. F. Williams, S. Byrne, and T. A. Rado eds.). California Energy Commission, Sacramento, CA. 403 pp.

Williams, Daniel F. and Adam C. Harpster. 2001. Status of the Buena Vista Lake Shrew (*Sorex inornatus relictus*), Final Report in Partial Fulfillment of the Central Valley Project Improvement Act Section 3406(B)(1). October 29.

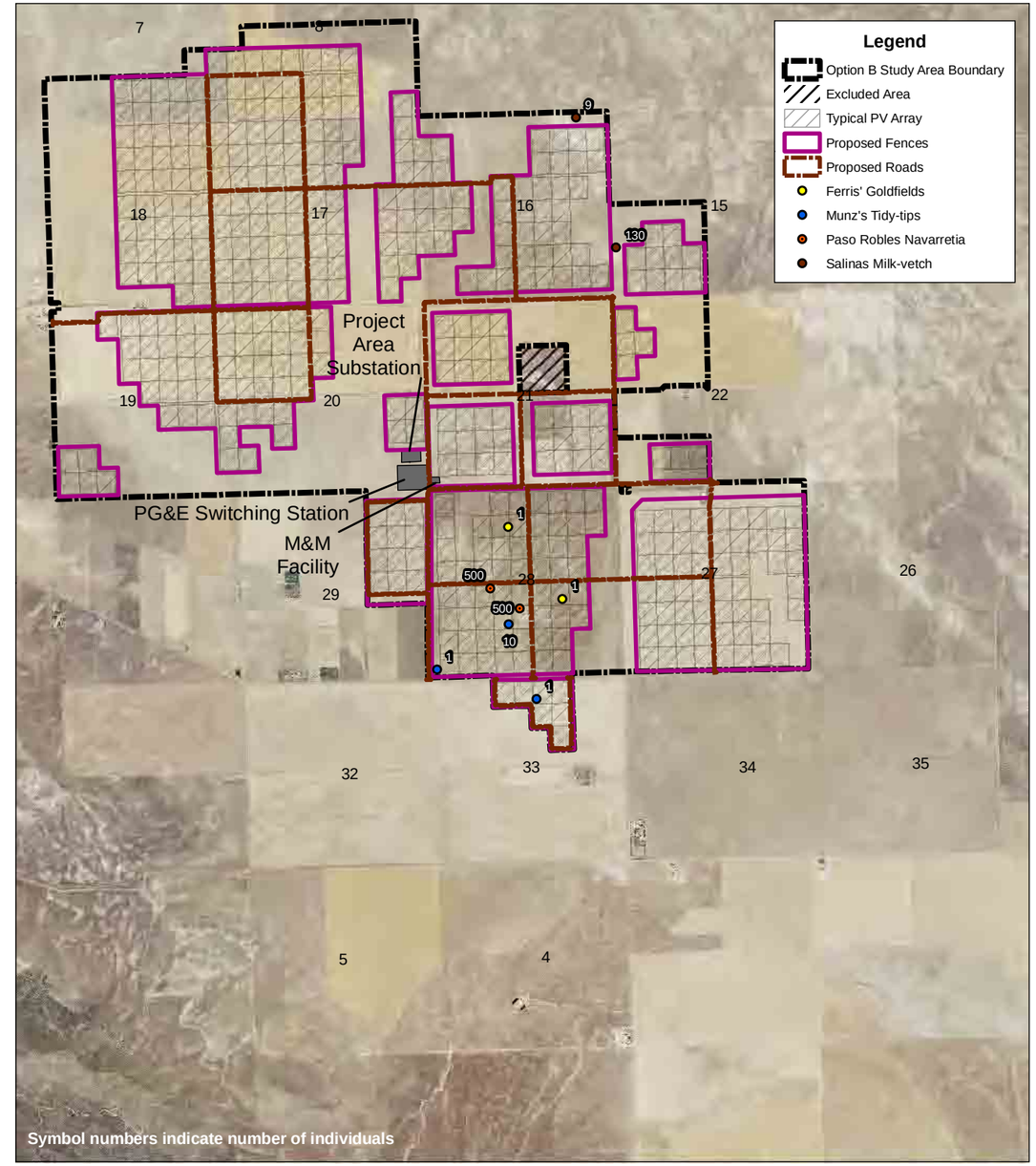
TOPAZ BIOLOGICAL ASSESSMENT (CONTINUED)

Appendix A

Dry Season Sampling (2010) For Federally Listed Large Branchiopods at the Proposed Topaz Solar Farm. July 2010.



Option A



Option B

N W E S

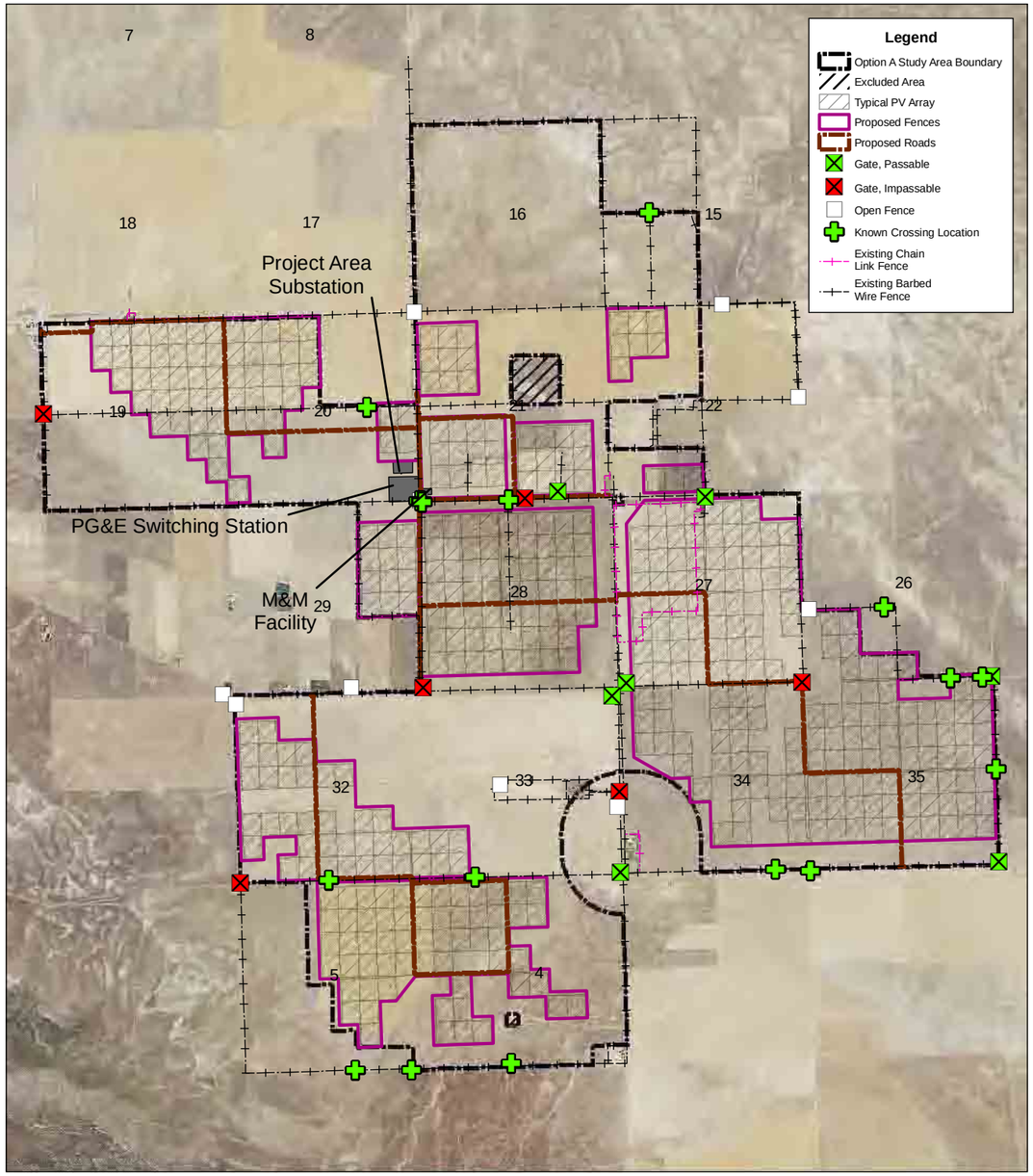
0 0.5 1 2 3 Miles

BR Map 12. Special Status Plants

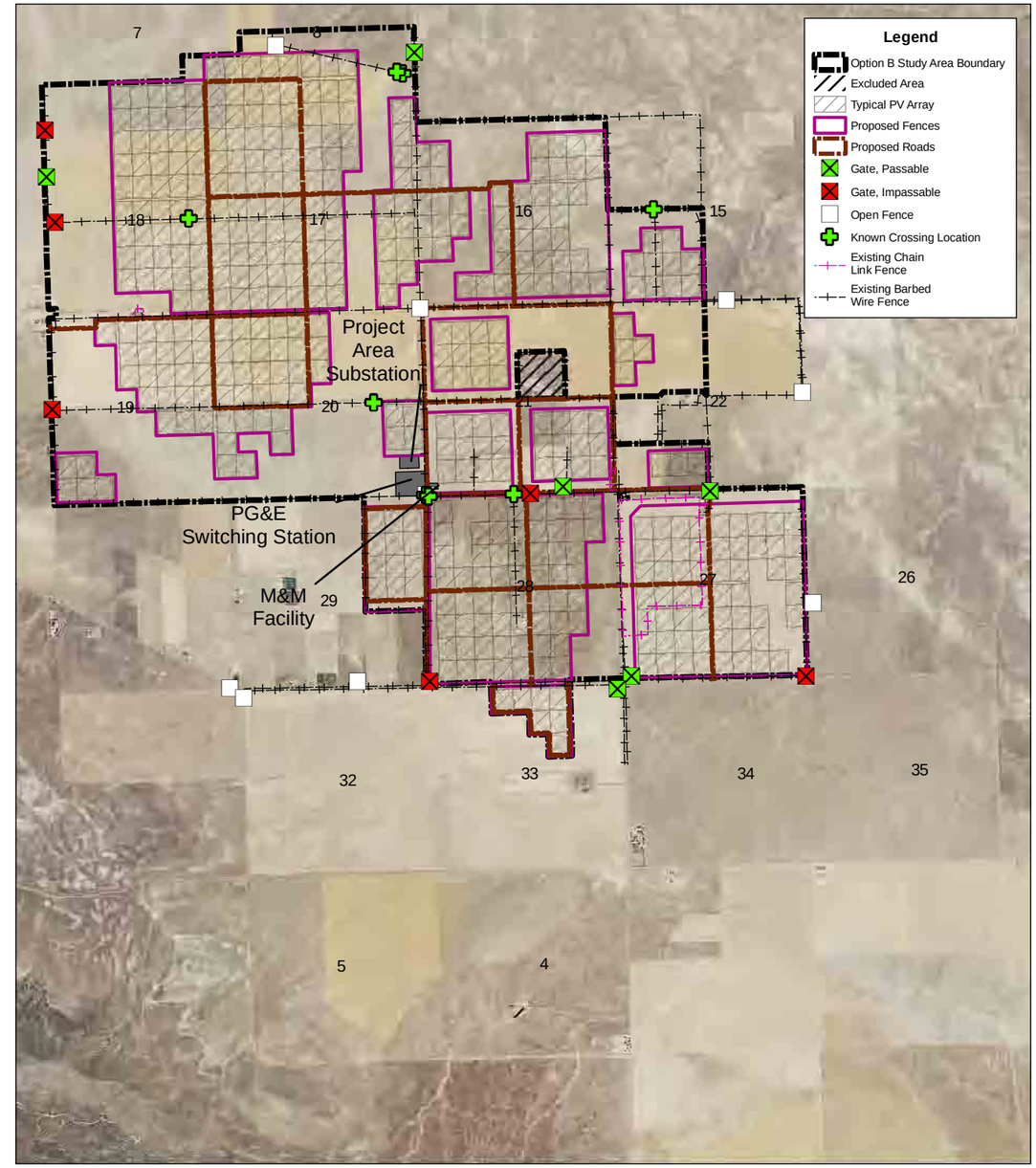
Topaz Solar Farms LLC
1111 Broadway, 4th Floor
Oakland, CA 94607

2009 San Luis Obispo County
NAIP Aerial Photography
Map Updated July 29, 2010

Althouse and Meade, Inc.
1875 Wellsona Road
Paso Robles, CA 93446



Option A



Option B

N
W E
S

0 0.5 1 2 3 Miles

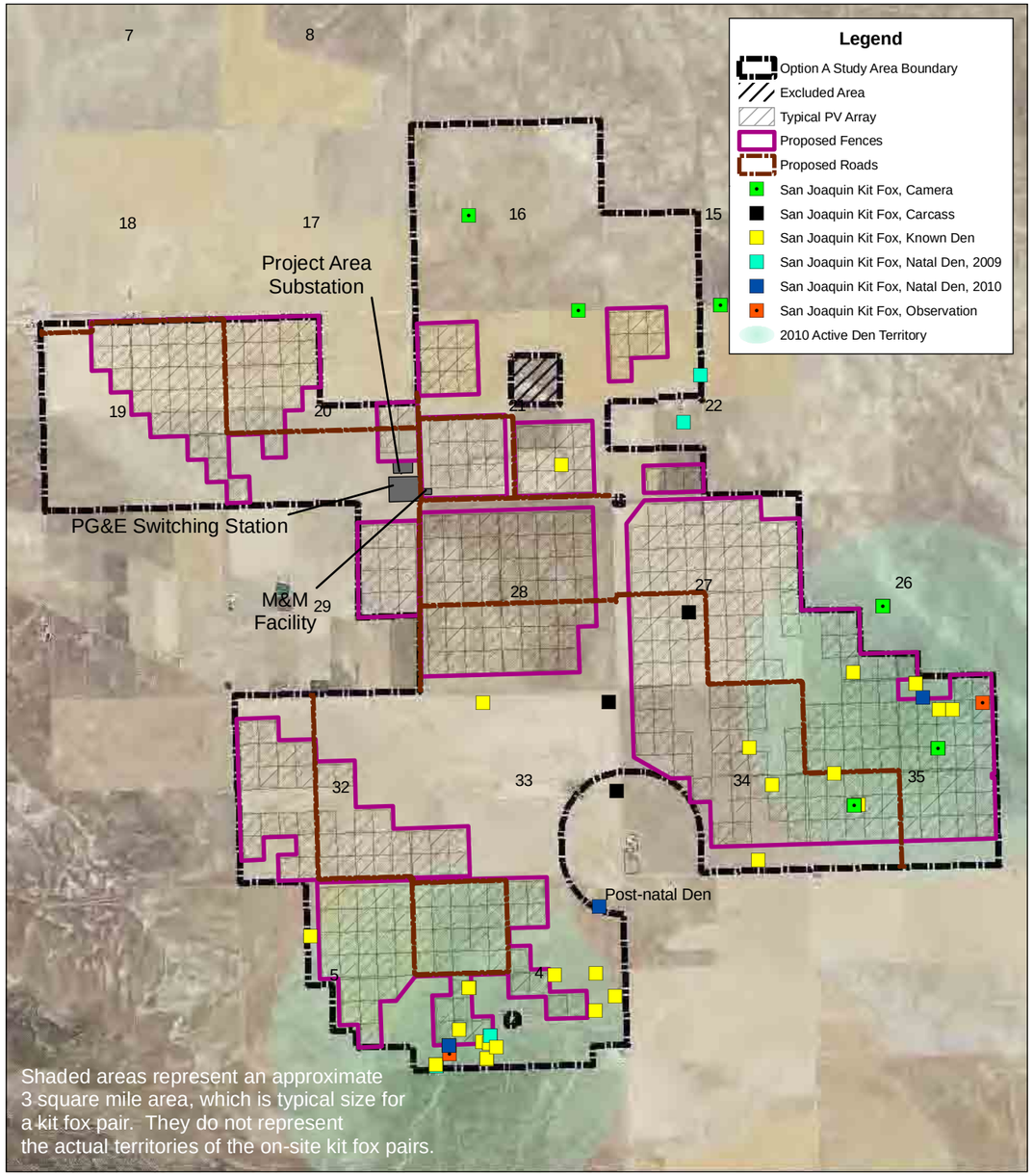
BR Map 13. Pronghorn Movement

Topaz Solar Farms LLC
1111 Broadway, 4th Floor
Oakland, CA 94607

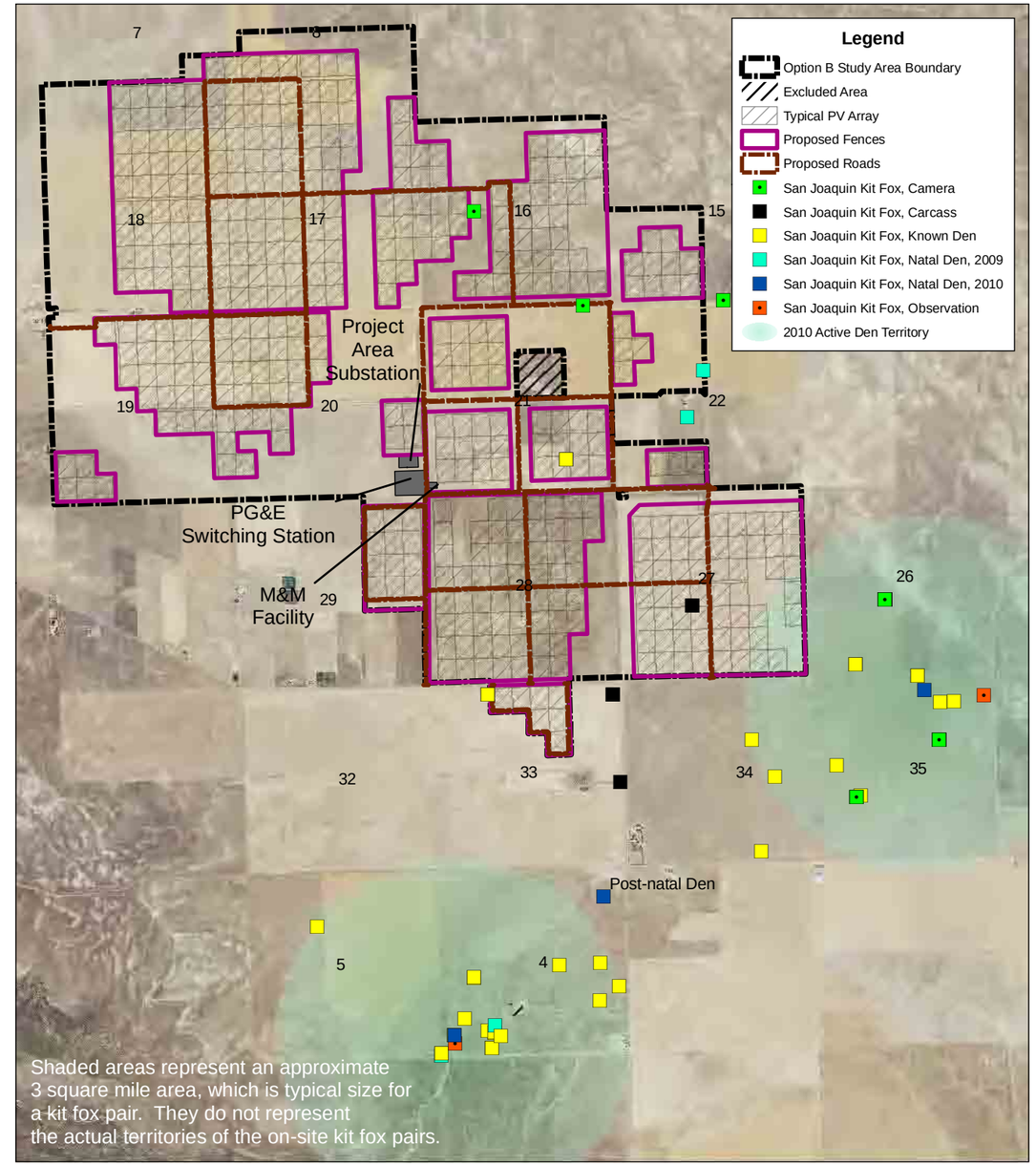
2009 San Luis Obispo County
NAIP Aerial Photography
Map Updated July 29, 2010

Althouse and Meade, Inc.
1875 Wellsona Road
Paso Robles, CA 93446

BR Map 14. San Joaquin Kit Fox Active Den Territories



Option A



Option B

N W E S

0 0.5 1 2 3 Miles

Topaz Solar Farms LLC
1111 Broadway, 4th Floor
Oakland, CA 94607

2009 San Luis Obispo County
NAIP Aerial Photography
Map Updated July 29, 2010

Althouse and Meade, Inc.
1875 Wellsona Road
Paso Robles, CA 93446

DRY-SEASON SAMPLING (2010)
FOR
FEDERALLY LISTED LARGE BRANCHIOPODS
AT THE
PROPOSED TOPAZ SOLAR FARM

Prepared for: **ALTHOUSE & MEADE, INC.**
1875 Wellsona Road
Paso Robles, CA 93446
Contact: Daniel E. Meade, Ph.D.
(805) 467-1041

Prepared by: **HELM BIOLOGICAL CONSULTING**
2273 Nolen Drive
Lincoln, CA 95648
Contact: Brent Helm
(916) 543-7397

July 2010

HELM
BIOLOGICAL CONSULTING
2273 Nolen Drive, Lincoln, CA 95648

"I certify that the information in this survey report and attached exhibits fully and accurately represent my work."

Todd F. Wood Signature _____ Date 7-28-10

DRY-SEASON SAMPLING (2010) FOR FEDERALLY LISTED LARGE BRANCHIOPODS AT THE PROPOSED TOPAZ SOLAR FARM

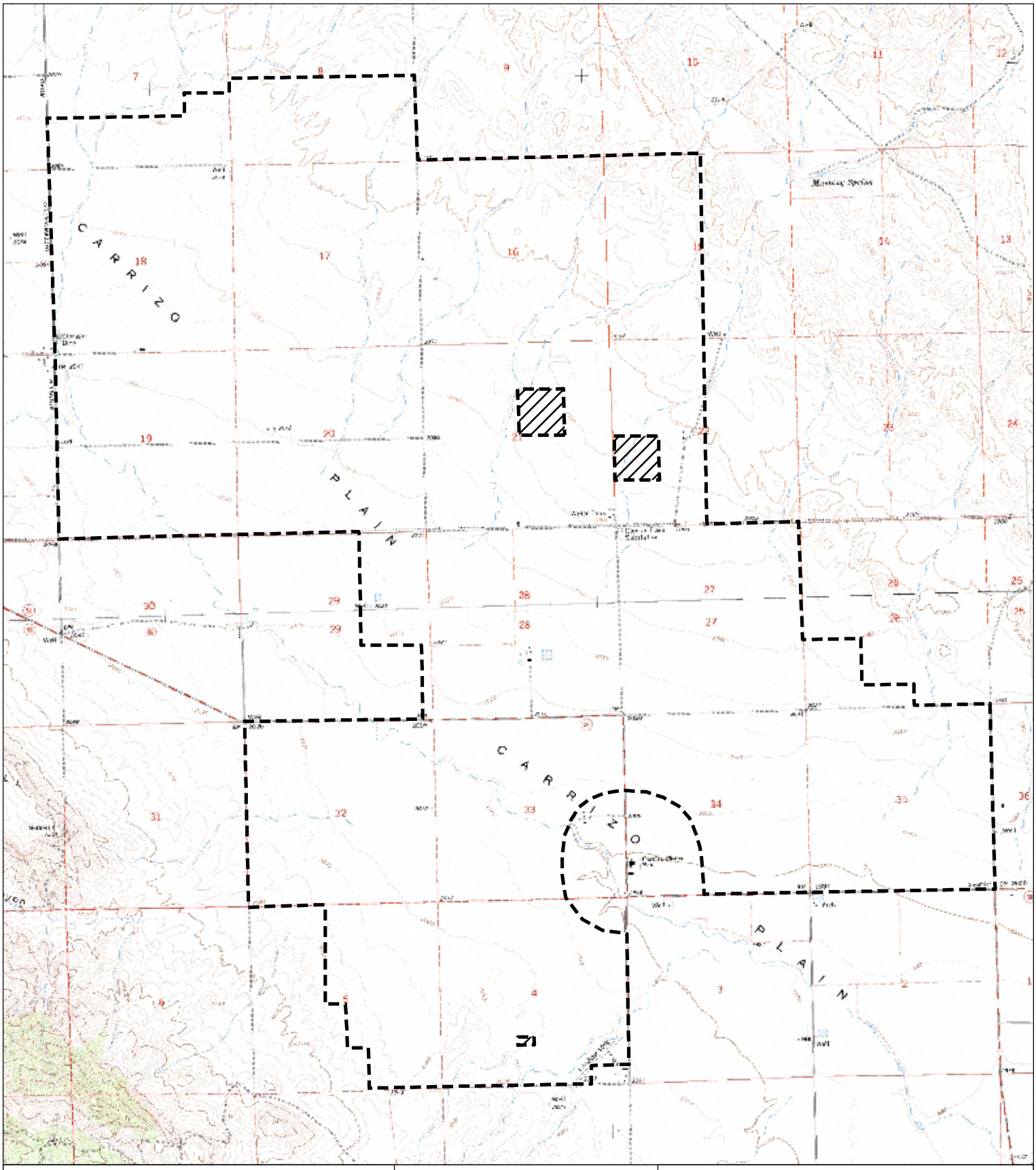
INTRODUCTION

Helm Biological Consulting (HBC) was contracted by Althouse and Meade, Inc. to conduct dry-season sampling for large branchiopods (fairy shrimp, tadpole shrimp, and clam shrimp) that are listed as threatened or endangered under the federal Endangered Species Act (ESA) (e.g., vernal pool fairy shrimp [*Branchinecta lynchi*] and longhorn fairy shrimp [*Branchinecta longiantenna*]) at the Proposed Topaz Solar Farm.

The Proposed Topaz Solar Farm is located north of State Highway 58 on the Carrizo Plain, San Luis Obispo, California. More specifically, the Proposed Topaz Solar Farm is located in Sections 27, 28, 32, and 35 and in portions of Sections 4, 5, 29, 33, and 34 of Township 29 South, and Range 18 East (Mount Diablo Meridian [MDM]) of the California Valley 7.5 minute U.S. Geological Survey topographic quadrangle map (USGS map), and in Sections 16, 17, 18, 19, and 20 and in portions of Sections 7, 8, 15, 21, and 22 of Township 29 South, and Range 18 East (MDM) of the La Panza 7.5 minute USGS map (Center coordinates in North American Datum 1983 Universal Transverse Mercator Zone 10 North: Northing 3919117.8 and Easting 767591.9) (Figure 1).

HBC conducted dry-season sampling in 2008 and 2009 at the Proposed Topaz Solar Farm. Since the 2008 and 2009 sampling, additional areas have been included within the study area. During the 2009-2010 wet-season, Althouse and Meade, Inc. and Mr. Chris Powers of Advantage Environmental Consultants, LLC identified numerous basins that have the potential to support federally listed large branchiopods within the additional areas. Mr. Powers conducted wet-season sampling for federally listed large branchiopods in 2009-2010 within these additional basins and observed large branchiopods in approximately 50% of the them (Powers pers comm.).

This report discusses the methods and results of the dry-season sampling efforts for federally listed large branchiopods within the additional at the Proposed Topaz Solar Farm.



Property Center Coordinates in NAD UTM Zone 10 N
Northing 3919117.8 **Easting** 767591.9

1:45,000
1 inch equals 3,750 feet

Approximate Study Area
Excluded Area

Prepared By:
Date: 8-18-08
Revised: 6-18-09
Revised: 7-1-10

HELM BIOLOGICAL CONSULTING
2273 Nolen Drive, Lincoln, CA 95648

Figure 1. Proposed Topaz Solar Farm Location

(Source: U.S. Geological Survey La Panza NE and California Valley 7.5 minute Topographical Quadrangle Map)

METHODS

Mr. Todd Wood conducted dry-season sampling on July 22, 2009 as authorized by the U.S. Fish and Wildlife Service (USFWS) (Appendix A). Mr. Wood assisted by Mr. Powers Sampling was conducted under permit TE-795930-6 of Section 10(a)(1)(A) of the federal Endangered Species Act, 16 U.S.C. 1531 *et seq*., and its implementing regulations. Methods generally followed *USFWS's Interim Survey Guidelines to Permittees for Recovery Permits under Section 10(a)(1)(A) of the Endangered Species Act for the Listed Vernal Pool Branchiopods* (1996) and are described below.

Dry-season sampling involved the collection of a minimum of ten sub-samples of soil, mainly from the lowest topographic areas within each basin considered potential habitat on site. Soils were collected from only those basins where no large branchiopods were observed during the 2009-2010 wet-season efforts (Powers pers. comm.). Soil samples were placed in liter size plastic freezer bags and marked with the project name, basin number, and date. The soil was then transported to HBC's laboratory for processing and analysis.

In the laboratory, a brine solution was prepared by mixing table salt (NaCl) with lukewarm tap water in a large container. The collected soil material was placed in the brine solution. The soil material was then gently worked by hand to breakdown any persistent soil structure. The organic material rising to the top of the brine solution was skimmed off and placed in a 710-micron diameter pore-size sieve stacked atop a 75-micron diameter pore-size sieve. The soil material was processed through the top sieve by flushing it with lukewarm tap water while gently rubbing it with a soft-bristle brush. The soil retained from the 75-micron diameter pore size sieve was then removed and thinly (≈1.0 mm) spread into plastic petri dishes.

The contents of each petri dish were examined under a 10 to 252-power zoom binocular microscope. A minimum of 0.5-hour was spent searching the contents of each petri dish for large branchiopod cysts (embryonic eggs). HBC's large branchiopod cyst reference collection and scanning electron micrographs of cysts (Hill and Shepard 1998, Mura 1991, and Gilchrist 1978) were used to identify and compare any cysts observed within the soil samples.

RESULTS

A total of 56 basins were sampled using dry-season techniques in 2010 (Figures 2-6). One basin (38) contained water during the sampling visit and was not sampled. Cysts belonging to the genus *Branchinecta* were observed in soils collected from approximately 55% of the basins sampled on site (Table 1). Representative photographs of the basins on site are in Appendix B.

DISCUSSION

Several species within the genus Branchinecta are listed as threatened or endangered under the ESA. However, given the geographic location of the project and the types of habitats sampled, the *Branchinecta* cysts most likely belong to one or more of the following species: the non-listed versatile fairy shrimp (*Branchinecta lindahli*), the federally listed as threatened vernal pool fairy shrimp, or the federally listed as endangered longhorn fairy shrimp.

LITERATURE CITED

Gilchrist, B. M. 1978. Scanning electron microscope studies of the egg shell in some Anostraca (Crustacea: Branchiopoda). Cell Tiss. Res. 193: 337-351.

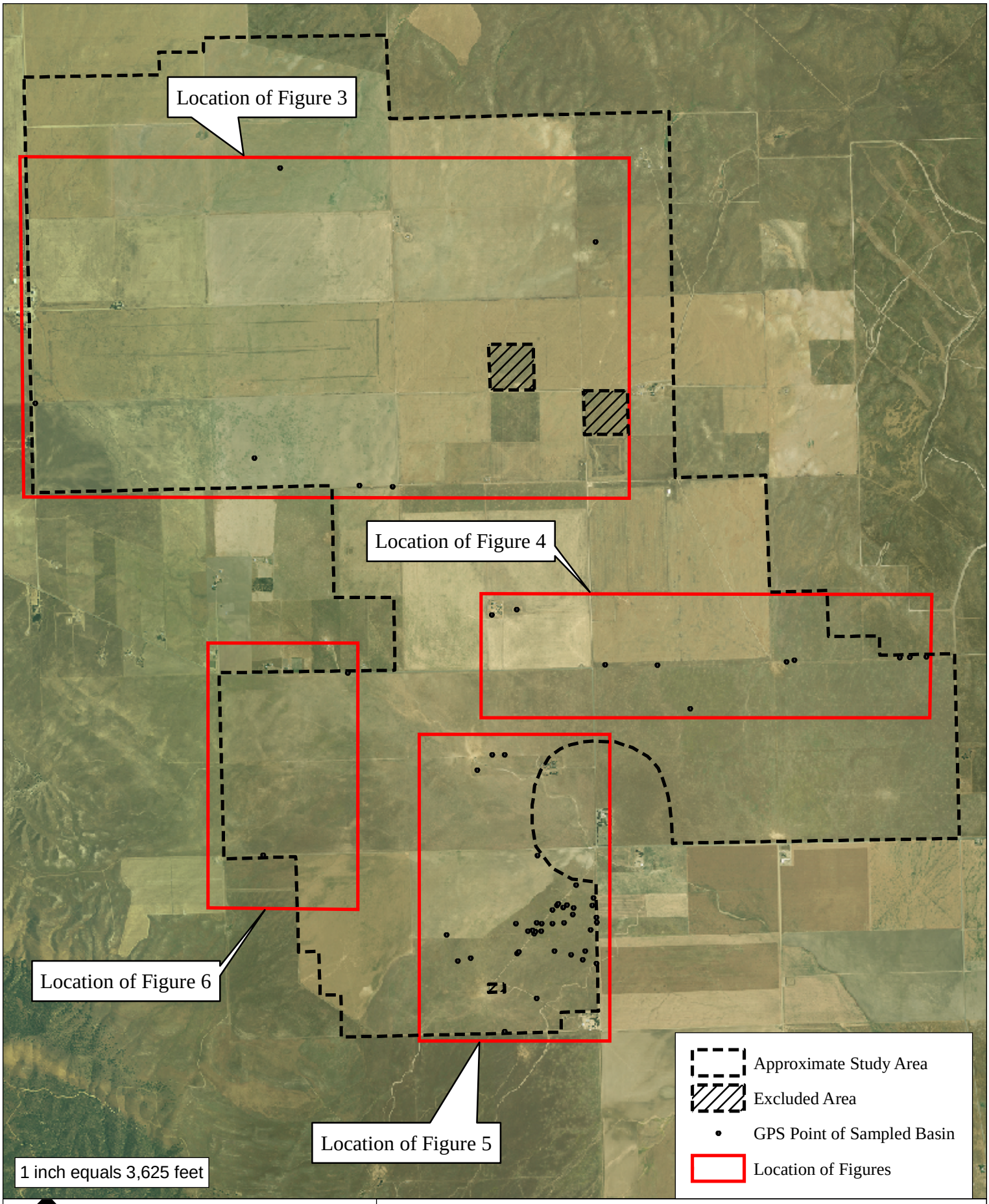
Hill, R. E., and W. D. Shepard. 1998. Observation on the identification of California anostracan cysts. Hydrobiologia 359: 113-123.

Mura, G. 1991. SEM morphology of resting eggs in the species of the genus *Branchinecta* from North America. J. Crust. Biol. 11: 432-436.

U. S. Fish and Wildlife Service. 1996. Interim Survey Guidelines to Permittees for Recovery Permits under Section 10 (a)(1)(A) of the Endangered Species Act for the Listed Vernal Pool Branchiopods. 11 pp.

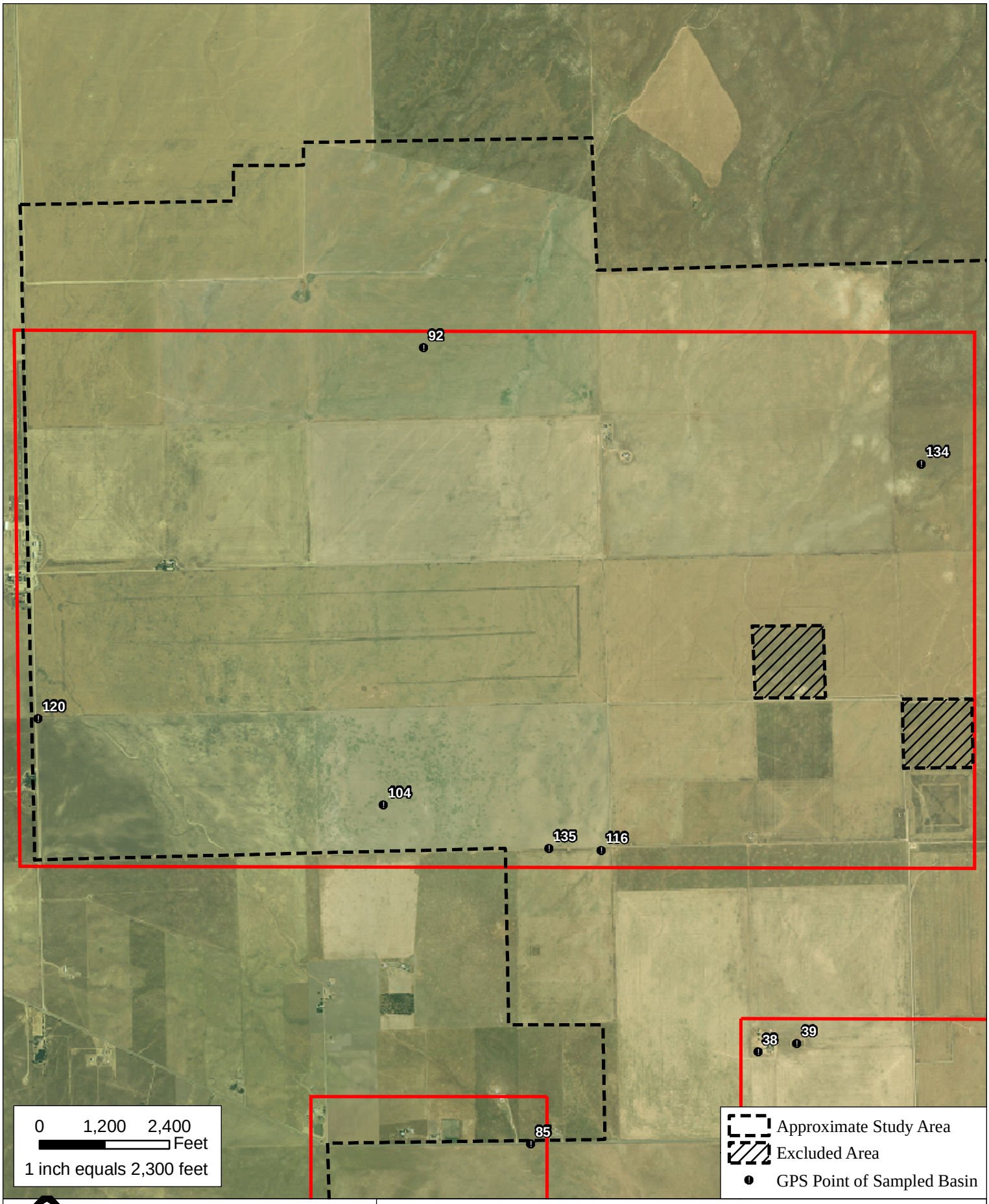
PERSONAL COMMUNICATION

Powers, Chris. Biologist. Advantage Environmental Consultants, LLC. July 22, 2009 – conversation during dry-season sampling.



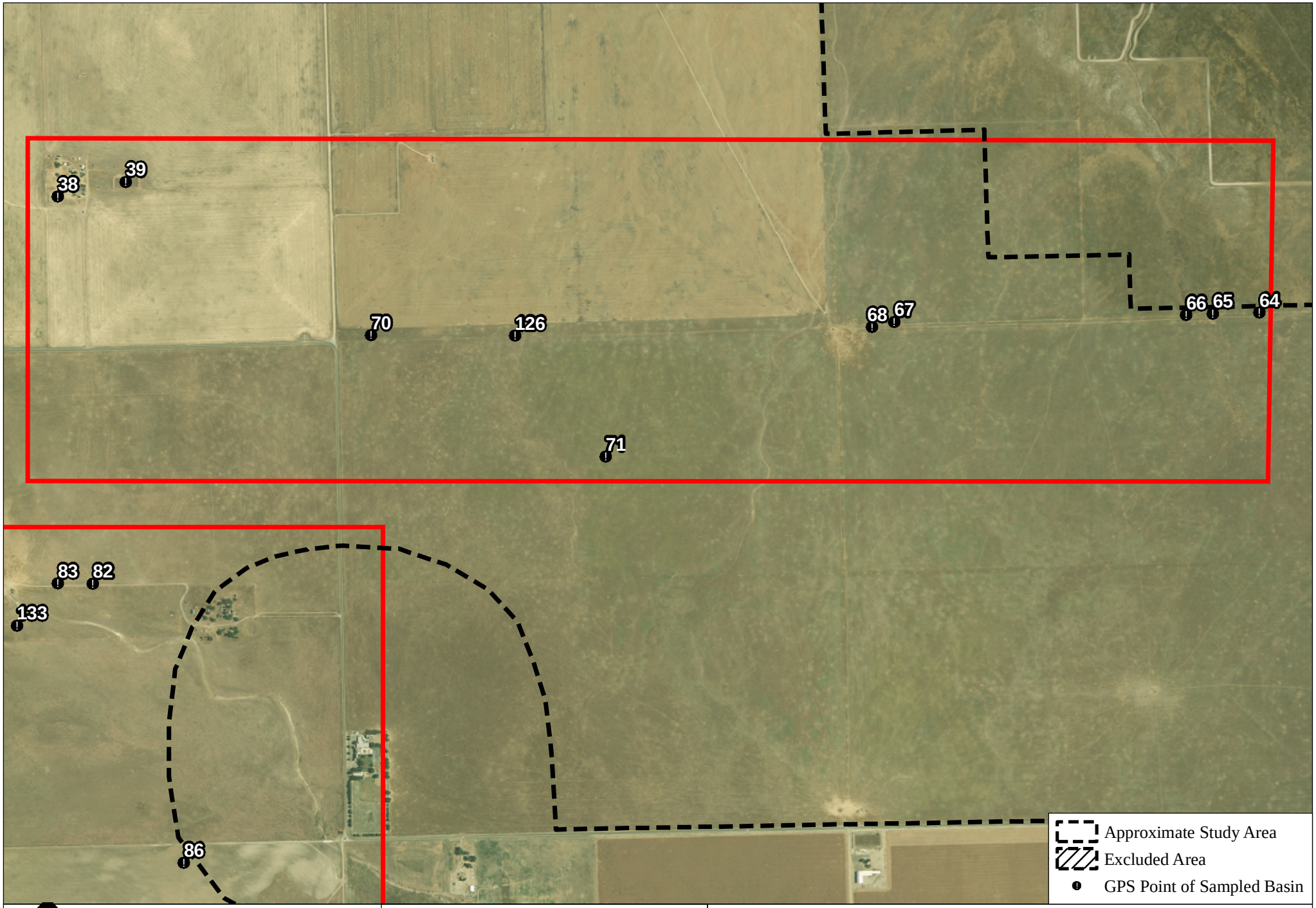
Prepared By:
Date: 7-27-10
HELM BIOLOGICAL CONSULTING
2273 Nolen Drive, Lincoln, CA 95648
(Aerial Photograph Provided by NAIP 2005)

Figure 2. Federally Listed Large Branchiopod Dry-Season Sampling (2010) Overview Map at the Proposed Topaz Solar Farm



Prepared By: HELM Biological Consulting
2273 Nolen Drive, Lincoln, CA 95648
Date: 7-27-10
(Aerial Photograph Provided by NAIP 2005)

Figure 3. Basins Dry-Season Sampled (2010) for Federally Listed Large Branchiopods at the Proposed Topaz Solar Farm



Prepared By: HELM Biological Consulting
2273 Nolen Drive, Lincoln, CA 95648
Date: 7-27-10
(Aerial Photograph Provided by NAIP 2005)

0 650 1,300 Feet
1 inch equals 1,300 feet

Figure 4. Basins Dry-Season Sampled (2010) for Federally Listed Large Branchiopods at the Proposed Topaz Solar Farm

Prepared By: HELM Biological Consulting, 2273 Nolen Drive, Lincoln, CA 95648

Date: 7-27-10

(Aerial Photograph Provided by NAIP 2005)

Figure 5. Basins Dry-Season Sampled (2010) for Federally Listed Large Branchiopods at the Proposed Topaz Solar Farm

Prepared By: HELM Biological Consulting, 2273 Nolen Drive, Lincoln, CA 95648

Date: 7-27-10

(Aerial Photograph Provided by NAIP 2005)

Figure 6. Basins Dry-Season Sampled (2010) for Federally Listed Large Branchiopods at the Proposed Topaz Solar Farm

Table 1. Results of Soil Examinations

Basin No.	Insect Exo-Skeletons	Micro-Turbellaria Cysts	Cladocera Ephippia	Ostracods Live/Cysts/ Carapaces	Large Branchiopod Cysts *Branchinecta* sp.
8	X				2
10	X				1
13					
17	X				
19					
20			X		
22					
23	X				2
24	X	X			12
28					4
30	X				
31	X	X			1
35	X				1
39	X	X	X		
40	X				1
41	X				>50
42	X				approx. 20
43	X				>100
44	X				approx. 30
45	X				
47	X		X		>100
50	X				14
51	X	X			
53	X		X		>100
54	X				
55	X				approx. 20
56	X				>50
57	X				17
59					
60	X				2
61	X				
62	X				2
64	X				
65	X				
66	X	X			1
67	X	X	X		>100
68	X				approx. 30
69	X				
70	X				
71	X				
79	X	X			1
82					
83	X				
85	X				
86	X		X		19
87	X				>100
88	X				>100
92					
104	X				8
116	X				
120	X	X	X	X	>50
126	X				
132	X				approx. 30
133					
134	X				
135	X				>50

APPENDIX A. USFWS AUTHORIZATION LETTER

SmartZone Communications Center

tfwood@comcast.net

+ Font size -

Authorization to conduct dry season survey of VPb at the proposed Topaz Solar Farm site

From : David Kelly <David_Kelly@fws.gov> Wed Jul 21 2010 9:24:17 AM

Subject : Authorization to conduct dry season survey of VPb at the proposed Topaz Solar Farm site

To : BHelm69485@aol.com, tfwood@comcast.net

Cc : Kenneth Sanchez <Kenneth_Sanchez@fws.gov>, Michael Welsh <Michael_Welsh@fws.gov>, Josh Hull <Josh_Hull@fws.gov>

Brent Helm and Todd Wood,

By this email message, you are authorized to conduct a dry season survey for federally-listed vernal pool branchiopods, per the conditions of recovery permit, TE-795930, and as specified in your July 19, 2010 request letter. The surveys will be conducted at the proposed Topaz Solar Farm site in San Luis Obispo County, California. Your request is to sample from depressional seasonal wetlands, including vernal pools and swales located on-site that are within areas not previously considered for use in the solar project. Surveys may be conducted within each of the features within the described property. Additional wetland features identified on site that may provide suitable vernal pool crustacean habitat may also be sampled under this authorization.

Please remember to carry a copy of your permit while doing the work, and to follow the terms and conditions of the permit and the survey guidelines, including the reporting requirements. In your report, please include which surveys were authorized, the names of all persons involved in the surveys, their recovery permit numbers, if applicable, and the date of this authorization, to help ensure that we correctly record the fulfillment of the reporting requirement under this authorization. Please let us know if the surveys are not performed as authorized, or if they are done by a different permittee under a separate authorization. Please note that federally listed vernal pool branchiopods have been found at the project site during previous surveys and a negative finding from this survey may not be used to conclude an absence of listed branchiopods at this site.

Please send one copy of the report(s) to David Kelly, of our Recovery Branch, and send a separate copy to Ken Sanchez.

Please reference Service File No. 81420-2009-TA-0208 in all future correspondence with this office regarding this authorization.

David Lee Kelly
Biologist, Recovery Branch
US Fish and Wildlife Service
2800 Cottage Way, W-2605
Sacramento, CA 95825
Ph. (916) 414-6492

APPENDIX B. REPRESENTATIVE PHOTOGRAPHS

Proposed Topaz Solar Farm – Basin 86

Proposed Topaz Solar Farm – Basin 69

Proposed Topaz Solar Farm – Basin 8

Proposed Topaz Solar Farm – Basin 13

Proposed Topaz Solar Farm – Basin 132

Proposed Topaz Solar Farm – Basin 88

Proposed Topaz Solar Farm – Basin 20

Proposed Topaz Solar Farm – Basin 47

Proposed Topaz Solar Farm – Basin 41

Proposed Topaz Solar Farm – Basin 50

Proposed Topaz Solar Farm – Basin 51

Proposed Topaz Solar Farm – Basin 53

San Joaquin Kit Fox
Conservation and Monitoring Plan

Topaz Solar Farm

San Joaquin Kit Fox Conservation and Monitoring Plan

Althouse and Meade, Inc.

1875 Wellsona Road

Paso Robles, CA 93446

805-467-1041

February 2011

Table of Contents

Synopsis 1
1.0 Introduction 4
1.1 Authorship 4
2.0 Habitat Assessment 5
2.1 Regional Population 5
2.2 Onsite Population 6
3.0 SJKF Protection and Enhancement Design Features 12
4.0 Impact Assessment 13
4.1 Habitat Evaluation 14
4.2 Temporary Impacts 18
4.3 Traffic 18
5.0 Conservation Plan 19
5.1 Site Enhancement and Conservation Measure Summary 19
5.2 Conservation Goals and Objectives 20
5.3 Conservation Site Selection and Justification 21
5.4 Conservation Outcome 27
5.5 Conservation Measures 30
6.0 Habitat Enhancement 34
6.1 Examples of Habitat Enhancement Programs 34
6.1.1 Seven Oaks Golf Course 34
6.1.2 Paramount Farming Company 34
6.2 Known Enhancement Practices 34
6.3 Habitat Enhancement Implementation Work Plan 35
6.3.1 Fencing 35
6.3.2 Artificial dens 36
6.4 Site Protection and Maintenance (APMs) 41
6.4.1 Dens 41
6.4.2 Site management 41
6.4.3 Speed limits 41
6.4.4 Rodenticides and herbicides 41

6.4.5 Pets 41
6.4.6 Lighting 42
6.4.7 Education 42
6.4.8 Budget 42
6.4.9 Fences and artificial dens 42
6.4.10 Monitoring and research 42
6.4.11 Maintenance 43
6.4.12 Financial assurances 43
6.4.13 Monitoring plan 43
6.4.14 Adaptive management plan 44
6.4.15 Performance standards 44
6.4.16 Monitoring reports 45
7.0 Figures 46
8.0 References 56
Exhibit A - USFWS Kit Fox Protection Recommendations 60
Exhibit B: Fence Design for Kit Fox Passage 69

List of Tables

TABLE 1. PROJECT AREA ACREAGES BY USE 16
TABLE 2. TIERED PROJECT CONSERVATION RATIOS 17
TABLE 3. OFFSITE CONSERVATION LANDS UNDER CONSIDERATION 24

Synopsis

The Topaz Solar Farm (TSF) Project (Project) is a 550 megawatt photovoltaic (PV) power facility proposed by Topaz Solar Farms LLC (Applicant) that would be constructed on approximately 3,500 acres of land in the northern California Valley area of the Carrizo Plain in San Luis Obispo County (Figure 1). A Final Environmental Impact Report (FEIR) is currently being prepared by San Luis Obispo County that includes two TSF Project layout options: Option A and Option B, and several alternatives, including Alternative 3B. In addition, the U.S. Department of Energy (DOE) is currently preparing a Draft Environmental Impact Statement (EIS) that will evaluate Option A and Option B within two alternative study areas

Alternative 3B is a 3,500 acre environmentally superior alternative that is an alternative to the Option A layout, and is situated within the Option A Study Area. The total land area included in baseline studies conducted for this report includes the combined Option A and Option B Project Study Areas (together, referred to as Project Site) of approximately 10,000 acres (refer to Figure 2). This San Joaquin Kit Fox Conservation and Monitoring Plan (CMP) provides conservation measures that address effects to this federally listed species that may result from installation and operation of Alternative 3B.

The San Joaquin Kit Fox

The San Joaquin kit fox (*Vulpes macrotis mutica*) is a federally listed endangered and state listed threatened species that is known to inhabit the Project Site. Kit fox presence was verified by DNA analysis of fecal samples (scat) collected throughout the Project Site (Althouse and Meade 2010a, Smith 2010, Maldonado 2010). Kit fox presence was also assessed by direct observations of kit fox at active dens, remote camera capture of kit fox, and occurrence of active and inactive dens observed during transect surveys (Althouse and Meade, Inc. 2010a).

The Project Site is located near the Carrizo Plain National Monument core SJKF population, which is one of three core populations in California. All three core populations are geographically distinct, and together with about a dozen smaller satellite populations comprise the entire SJKF metapopulation. The United States Fish and Wildlife Service (USFWS) recognizes that recovery of the SJKF requires simultaneous action on two tracks: 1) habitat protection and enhancement of core populations and movement corridors, and 2) continued research on population ecology and management strategies (USFWS 1998). The CMP proposes measures to meet both of these goals within and in the vicinity of the TSF Project by establishing prescribed management for kit fox on thousands of acres and conducting an innovative scat study of the kit fox population as part of the kit fox monitoring program (Section 6.4.13).

Conservation Strategy

The TSF Project could potentially result in adverse effects to the SJKF and its habitat. To off-set the potentially adverse effects of the project on SJKF, the Applicant has worked with regional SJKF experts (the TSF Project Kit Fox Conservation Team) to develop a multi-level conservation strategy that consists of avoiding and minimizing Project effects on SJKF by utilizing SJKF friendly design features, implementing a SJKF protection plan during construction, installing on-site habitat enhancements, monitoring on-site kit fox, and protecting off-site SJKF habitat in perpetuity.

The multi-level conservation strategy protects kit fox during construction, provides movement corridors and porous boundaries to facilitate long-range dispersal and short-range movements through and around the TSF Project, and provides a safe haven for SJKF habitation within the TSF Project footprint. It also contemplates conservation of off-site lands to compensate for actual and potential loss of usable SJKF habitat. Some of these off-site lands provided for SJKF conservation may also meet conservation goals for other rare and endangered species, assuming the land is compatible for multiple species. A monitoring and research program to track SJKF use of the TSF Project described in this document will provide important information for management of SJKF on the TSF Project lands. This strategy is consistent with USFWS recovery goals for SJKF.

SJKF Design Features

Early in the planning process the Applicant decided to design a project to accommodate SJKF movement through, and habitation within, the TSF Project footprint. Consultation with the TSF Project Kit Fox Conservation Team confirmed that it would be possible to create a porous TSF Project design to achieve these goals. The TSF Project description in this document includes detailed information on fence design, kit fox passages, kit fox dens, predator exclusion, and movement corridors. These are considered Applicant Proposed Measures (APMs) in the TSF Project's EIS being prepared during the National Environmental Policy Act (NEPA) process and in the FEIR being prepared in the California Environmental Quality Act (CEQA) process.

SJKF Protection Plan

Since SJKF are known to occupy the Project Site, construction of the TSF Project potentially could result in take of kit fox. A thorough SJKF Protection Plan is provided within this document that outlines a phased pre-construction survey approach to identify areas of kit fox activity in proposed construction blocks to facilitate construction planning. Also included in the SJKF Protection Plan are details regarding setbacks from occupied dens, on-site biological monitoring, and an array of daily construction requirements to minimize the potential for take of SJKF.

On-Site Habitat Enhancements

The passive nature of the TSF Project provides opportunity for SJKF to inhabit the solar array areas. To increase the potential for SJKF habitation of the TSF Project site, the TSF Project Kit Fox Conservation Team developed a suite of on-site habitat enhancement features designed to provide SJKF with a safe haven with natural vegetation, sufficient prey base, and a variety of permanent and artificial denning structures.

Off-Site Conservation

The TSF Project has an estimated operational period of 25 years or more. At the end of the operational period, it is possible that the Project would be repowered for an additional operational term. After the productive life of the TSF Project, the solar facility and associated infrastructure would be removed. During the operational period, the Applicant intends to facilitate habitation of SJKF within the Project's fenced area, thereby reducing the potential negative effect of the TSF Project on SJKF. Nevertheless, the TSF Project could result in loss or degradation of SJKF habitat during the operational period. Conservation for potential loss or degradation of SJKF habitat would be achieved by off-site conservation easements or land purchases to protect in perpetuity suitable SJKF habitat in the Carrizo Plain core population region. Offsite conservation lands would be acquired in sufficient quantity and quality to fully compensate for habitat impacts resulting from the TSF Project installation.

Monitoring Plan

Monitoring of SJKF within the TSF Project would be conducted as part of the Project conditions of approval included with a Conditional Use Permit to be issued by the County of San Luis Obispo. Monitoring would be sufficient to track use of the solar array areas by kit fox and provide current information to TSF Project management so that kit fox dens could be avoided and animals protected.

1.0 Introduction

Topaz Solar Farms, LLC (the Applicant) is proposing to construct a 550 megawatt photovoltaic power facility (the TSF Project) on approximately 3,500 acres in the northern California Valley area of the Carrizo Plain (Figure 1, Section 7.0). The TSF Project would be built in a location where San Joaquin kit fox, a federally endangered and state threatened species, occurs. Alternative 3B, the environmentally superior Project alternative designed by the Applicant at the request of the County and wildlife agencies, avoids kit fox natal dens and high use areas. In addition, the Applicant proposes to avoid, minimize and compensate for any potential effects on kit fox caused by the TSF Project construction, operation and decommissioning. This Conservation and Monitoring Plan (CMP) provides information regarding assessment of Project effects on San Joaquin kit fox, and includes conservation measures and recommendations to reduce Project effects on San Joaquin kit fox.

There are two proposed Project Options being evaluated in the Environmental Impact Statement (EIS) (EMPSI 2011, in prep.): Option A and Option B. Alternative 3B, which is located entirely within the Option A Study Area, is a Project alternative that was developed by the Applicant at the request of the County of San Luis Obispo (County) after preparation of the Draft Environmental Impact Report in response to input provided by local, state, and federal agencies. Options A and B and Alternative 3B are among the alternatives that will be included in the Final EIR being proposed by the County. Alternative 3B should be considered the environmentally superior alternative. Therefore, this CMP considers impacts and conservation measures applicable to Alternative 3B.

1.1 Authorship

This Conservation and Monitoring Plan was produced by Daniel E. Meade, Ph.D., Principal Scientist at Althouse and Meade, Inc., in collaboration with three kit fox experts (the TSF Project Kit Fox Conservation Team): Brian Cypher, Ph.D., Associate Director and Research Ecologist, Endangered Species Recovery Program, California State University, Stanislaus; Paul W. Collins, Curator of Vertebrate Zoology, Santa Barbara Museum of Natural History; and Thomas E. Olson, M.S., Wildlife Biologist, Thomas Olson Biological Consulting. The February 2011 version of this plan, with the addition of specific parcels considered for conservation, will be reviewed by the TSF Project Kit Fox Conservation Team in early 2011.

2.0 Habitat Assessment

2.1 Regional Population

The Carrizo Plain National Monument supports one of three core populations of San Joaquin kit fox. Potential effects of the proposed TSF Project could include disruption of kit fox activities on the Project site during construction, reduction in available habitat following construction due to infrastructure (buildings, inverter pads, posts), reduction in use of grassland/grazing land due to the presence of the solar arrays, and change in movement patterns across the Project's array areas. A potential beneficial effect may be the discontinuation of farming on the Project site.

One concern regarding the regional population is whether the presence of the TSF Project would block or significantly alter movement patterns of kit fox as they disperse from the core population area into other areas. The USFWS San Joaquin Kit Fox Recovery Plan (Recovery Plan) identifies three core areas: Carrizo Plain, Western Kern County, and Ciervo-Panoche area. A recovery action identified in the Recovery Plan is to "protect and enhance corridors of movement of kit foxes through the Salinas-Pajaro Region and from the Salinas Valley to the Carrizo Plain and San Joaquin Valley." Although paths taken by dispersing kit fox are not well understood, nor is the dispersal range well documented, it is most likely important that the northern Carrizo Plain not be blocked for kit fox movement. A few kit foxes have been detected in the Shandon area, near the San Juan Creek to the northwest of the site, and north of the site on Pinole Ranch. Kit fox are present along Bitterwater Valley Road and in the Bitterwater Valley, although it is not known how many of these foxes are resident, or whether they more frequently connect with closer fox populations to the east, rather than with the Carrizo population to the south.

Movement opportunity around the TSF Project would continue to be present after the Project is built, and the site would have improvements to enhance kit fox movement and survival. Improvements would include removal of some existing fencing that could inhibit kit fox movement, and installation of escape dens. Examples of existing fencing that would be removed from the TSF Project site include approximately 12,000 feet of cyclone fence around the former Arco solar farm site within Section 27. Fencing would be installed around all of the solar arrays and would have a five to six inch gap at the base for the entire length of the fence to allow kit fox passage, while excluding larger canids (refer to Figures 3 and 4 for the proposed fence layouts and Appendix A for a study on kit fox fencing). Escape dens would also be provided both outside and inside of the array areas.

Habitat within the Project area is in four classes: active cropland, recently fallowed cropland, grazing land dominated by non-grass species, and annual grassland dominated by introduced grass species.

2.2 Onsite Population

There is a high variation in habitat quality for kit fox utilization in the Project Site, ranging from good to poor. Areas in the northwest portion of the Project Site, consisting of Sections 17, 18, 19, 20, 21 and portions of Sections 7 and 8, are poor quality. These parcels have been in cropland production for about 70 years. Better quality habitat occurs in the eastern and southern portions of the Project Site consisting of all or portions of Sections 22, 26, 27, 28, 34, 35, 4 and 5. These areas contain habitat that has not been cropped for up to 25 years. Sections 34 and 35 had relatively low abundance of kit fox prey, possibly due to grazing practices that reduce the naturalized seed crop. Sections 4 and 5 had low small mammal abundance that is partially attributable to a shallow to moderately deep bedrock layer (25 to 100 cm) that causes water to perch and flood burrows. These conditions seem to limit small mammals from being able to establish populations on these Sections despite the absence of tilled agriculture for more than 25 years. Although prey abundance was low on Sections 4 and 5, several kit fox dens were detected there. Section 16 is improving grassland habitat following the end of crop production in 2006, and Section 15 contains good grassland habitat. The location of kit fox sign is consistent with habitat quality in the Project Site (Figures 3 and 4).

Presence of San Joaquin kit fox in the Project Site was examined by a 2009 scat survey conducted by Dr. Debbie Smith and Alice Whitelaw of Working Dogs for Conservation Foundation (Smith 2010), and DNA analysis by Dr. Jesus Maldonado and Tammy Henry at the Center for Conservation and Evolutionary Genetics, Smithsonian Institution (Maldonado 2010). A total of 64.19 miles (103.31 kilometers) of transects were surveyed in 2009 using dogs trained to locate kit fox scat. Survey routes were determined by Dr. Smith to provide complete coverage of the Project Site, and detect scat of every kit fox that utilized the property during the eight day survey period. Two separate surveys were conducted, one in August and September 2009 and one in November 2009. Scat locations were determined with hand held GPS units. A total of 414 kit fox scats were detected. One-hundred fifty-three (153) fresh scats (eight days old or less) were collected and sent to the genetics laboratory at the Smithsonian Institution, National Zoological Park in Washington, D.C. for analysis. Coordinates of each scat sample collected were entered into a GIS map of the Project Site (refer to Smith 2010, in Althouse and Meade, Inc. 2010b).

A repetition of the kit fox scat survey was conducted in November 2010 to track the baseline kit fox population. Since the 2009 scat surveys were completed for different portions of the Project Site a few months apart, the August/September 2009 survey likely

included many kit fox pups that had not yet dispersed, while the November 2009 survey likely occurred after some pups had either dispersed or died. November is a more appropriate time of year to determine a baseline number of resident kit fox because dispersal and early mortality are more likely to have occurred and breeding foxes are not yet sequestered in their dens (Cypher et al. 2000, Smith 2010 pers. com). A November survey from year to year is more likely to have lower variability, can be more easily repeated, and provides a better picture of how many resident foxes are supported. In addition, because the 2009 survey was necessarily split between August and November, the calculation of population size using the capture-recapture methodology could not be performed since a split study period is not consistent with statistical assumptions of that analysis. A one bout scat survey allows calculation of population size.

The number of fresh kit fox scats detected in the November 2010 survey was 63, and there were 199 old scats found. Genetic analysis to confirm kit fox identity to species is complete for the 63 samples. Results for individual genetic identity will be complete in February 2010. The 2010 scat survey found less than half the number of scat as were found in 2009, reflecting the time of the year (November) that the survey was conducted (the 2010 survey did not include an August to September survey). Results of the genetic analysis will provide additional information regarding population structure in the Project Site and will be used to establish the baseline kit fox population.

The 2009 scat study found evidence of kit fox predominately on eastern and southern areas of the Project Site (Figure 4). Other areas of the Project Site had fewer detections (one or more scats), and Sections 7, 16, 17 and 18 in the northern and western portion of the Project Site had no detections. Scat surveys were conducted from August 18 through September 1, and from November 11 - 21. The August survey period occurred during a time when annual population numbers tend to be high, and when family groups are still together prior to dispersal (Brian Cypher, pers. com. 2010; Maldonado 2010).

A total of 19 individual kit fox were detected within the survey area in the 2009 survey. After field work was conducted, a portion of the survey area was removed from potential project use, leaving 18 individual foxes detected within the current Project Site. Genetic analysis found that all 19 foxes were significantly related to other foxes in the study area. The genetic analysis allows potential family groups to be described. A potential family group was found centered near Section 22 that consisted of eight individuals (two parents and six offspring). We observed this family during the spring and summer surveys, and observed at least three pups with parents in 2009. Local residents said there were four pups with this family in 2009, although we observed only three. Kit fox can have up to nine pups in a litter (Table 5.3 in Cypher 2010b). However, the additional individuals could have been previous year pups, including a helper offspring that is still part of the family group assisting with pups.

A second family group was detected in the southern portion of the Project Site. This group has nine related individuals with two different matings by one male fox. Three of these individuals are also strongly related to the first family group. One mother was detected in Section 26, and another mother in Section 5. Offspring are likely from the same father, who was detected in Section 4. Another group of four individuals was related to the second family group through a male fox. The high degree of relatedness suggests that the number of foxes detected in the Project Site includes offspring prior to dispersal.

Future surveys should also be conducted during the same time of year (November), so that results are comparable to the baseline condition established prior to construction.

Of these eighteen foxes occurring within the Project Site in 2009, three were detected ten or more times, eight were detected five to nine times, and seven were detected one to four times. There were no detections of transient foxes that were not related to the residents. The foxes that were detected only one to four times may have most of their home range outside the Project Site.

In 2009, 14 individual kit foxes were detected within and adjacent to TSF Project Alternative 3B (Figure 4). The 2009 scat detections in Alternative 3B were in the southern two-thirds of the Project, with no detections in the Project area north of the high-voltage power lines along Tracy Lane. Scat survey detections in 2010 were in the southern third of the Project with the exception of one detection along Tracy Lane above section 27. Other scat detections were east of Alternative 3B in sections 34 and 35 (Figure 3). The northwest portion of the Project Site, where active croplands are dominant, had no detections of kit fox (Figure 3). The survey results demonstrate that kit fox utilize the Project Site, with most activity occurring in the southern and eastern portions.

Since the end of the 2009 scat survey, we found the remains of two kit fox (cause of morality unknown) within the Project Site, located in sections 33 and 27. Kit fox juvenile survival reported for the Carrizo Plain is 64 percent, ranging from 50 percent to 74 percent for the years 1989 – 1991 (Cypher 2010). In Lokern, a wide range of juvenile survival has been documented ranging between 20 percent and 81 percent (Cypher et al. 2000). Factors contributing to kit fox survival include precipitation amounts and prey availability (Cypher et al. 2000, Cypher 2010).

Prey abundance is directly related to abundance and reproductive success of SJKF (Egoscue 1975). Prey abundance was generally low across the Project Site as determined by small mammal trapping (URS 2008, Vanherweg 2008, Collins 2009, Collins 2010). Trap success, the ratio of captures to trap nights, was approximately 5% in 2008 (1600 trap nights), 11.78% in 2009 (720 trap nights), and 5.56% in 2010 (1220 trap nights), all of which are extremely low. Capture rates for small mammal trappings in the Cuyama area within a few days of the 2010 TSF Project study were 62.5% (Paul Collins, pers.

com). Normal capture rates for small mammals in valley grassland and grassland-scrub habitats in the region can range from 25%-60% on untilled lands (P. Collins, unpubl. data). This capture rate drops off dramatically depending on the subject property's frequency of tilling, intensity of grazing, and time since it was last tilled. Small mammal abundance is also affected by season of the year, with highest abundance in late spring and summer following the recruitment of young. Trapping studies were conducted on the Project Site in August 2008, September 2009, and April 2010. Trap success increases in these dry grasslands as grazing intensity declines and thatch accumulates in the habitat.

Vegetation types within the 10,000 acre Project Site include cropland (6,163 acres), California annual grassland (3,769 acres), vernal pool (2.12 acres), ephemeral wetland depression (0.57 acres), natural non-wetland pool (0.35 acres), anthropogenic non-wetland pool (0.07 acres), agricultural reservoir (0.04 acres) and anthropogenic (43 acres). Kit fox primarily utilize two of these habitat types: croplands and California annual grasslands. Cropland areas within the Project Site are typically plowed every year and planted to crops on alternate years. After harvest, the croplands are grazed by cattle. Grazing land and grasslands are grazed by stock every year (every three years for lands in the Conservation Reserve Program). Different dominant vegetation types occur in parcels that are heavily grazed (see Photo 1, below) and parcels that are not heavily grazed (Photo 2). Plant diversity in heavily grazed parcels is low, with little grass across many acres in 2010. Within the Project Site, cropland and fallow cropland habitat types had few SJKF detections, while areas near grazing/pasture land and annual grassland had more SJKF detections.

In the Carrizo Plain region, kit fox density is estimated to be one fox pair per 3 to 6 square miles in average habitat areas and one pair per 2 square miles in highest quality habitat area (Brian Cypher, pers. com.). Factors controlling kit fox density include territorial spacing, the ratio of adults to juveniles, and food availability (White and Garrott 1999; Cypher, B.L. et al. 2000). During the spring and summer, each kit fox pair can typically have a family group consisting of three pups and a helper offspring, or six foxes.

Agricultural and grazing operations appear to have reduced habitat value for SJKF within the Project Site. The ongoing cropland disturbance regime consisting of plowing, spraying, harvesting, heavy grazing of stubble (remnant vegetation after harvest), and plowing appears to bias utilization of the Project Site by kit fox to the eastern and southern portions (Figures 3 and 4). Cropland on the Project Site provides usable habitat for kit for movement and some prey (e.g. ground squirrels), but is not equivalent to natural grassland with respect to prey diversity and abundance, denning opportunities, or protection from predators and disturbance.

The conservation measures proposed by the Applicant for long-term impacts to kit fox may result in an equivalent or greater number of kit fox utilizing the TSF Project Site

after construction as before construction, with no adverse affect to kit fox connectivity or off-site kit fox populations. If an equivalent number of kit fox do not utilize the TSF Project site after construction, offsite conservation areas would supplement or enhance kit fox abundance to achieve an equivalent population of kit fox as were present before TSF Project site disturbance.

The conservation and enhancement of land proposed by the Applicant would permanently protect a movement corridor east of the Project, from the vicinity of Highway 58 to the northwest edge of the Carrizo Plain. This conservation measure would protect lands from detrimental land uses or installation of barriers, and would provide certainty that a wildlife movement path will remain open. In combination with proposed enhancement, the Applicant would reclaim thousands of acres currently in crop production and convert it to natural grassland, a significant improvement to habitat and a beneficial effect for kit fox.

Photo 1. Section 35, eastern portion, dominated by *Erodium cicutarium* (filaree). Photo taken March 12, 2010. Example of area that has been grazed for many years.

Photo 2. Section 28, dominated by *Hordeum murinum* (foxtail barley) and *Vulpia myuros* (rat-tail fescue). Photo taken March 15, 2010. Example of area not heavily grazed.

3.0 SJKF Protection and Enhancement Design Features

A primary goal of TSF Project design and construction methodology is to avoid take of kit fox. Project design incorporates the following measures to reduce the impact on San Joaquin kit fox:

- Perimeter fencing around solar arrays would be constructed to provide a 5 to 6 inch gap at the bottom for the entire length of the fence. This will provide excellent kit fox passage into and through the TSF Project. No interior fences within the perimeter fencing would be present.
- Construction activities would be adjusted to avoid active dens.
- Escape dens would be located both inside and outside the Project fences.
- Artificial dens capable of supporting kit fox pairs and pups would be located in every section (or square mile) of TSF Project.
- Solar arrays mounted on steel posts with lower edge of modules at least 18 inches above the ground to would allow kit foxes to see under the arrays.
- The ground under and between the solar arrays would be vegetated with a dominant cover of grasses and herbs to promote a more natural habitat that supports kit fox prey. Vegetation height would be controlled by pulse grazing sheep or other means not hazardous to kit fox.
- Cross fencing and wildlife wire fencing would be removed from corridors outside of the solar arrays where feasible.
- The TSF Project would reduce cropland production that regularly disturbs the land by plowing, seeding, harvesting, and spraying, and is therefore currently dangerous to kit fox. Kit fox use may increase with change from cultivated agriculture to the TSF Project.

4.0 Impact Assessment

The TSF Project potentially would have short-term and long-term effects on San Joaquin kit fox. Potential short-term effects are likely to include displacement of foxes from portions of the Project where they are known to be present, changes in daily movement and hunting patterns of individual foxes, removal of denning sites, and potential injury or death to individual kit foxes due to construction activities. Potential long-term effects include a change in the habitat structure in the area which could alternatively result in, 1) a decrease in kit fox numbers utilizing the TSF Project lands, 2) maintenance of kit fox numbers using the TSF Project lands, or 3) an increase in kit fox numbers using the TSF Project lands. A decrease in kit fox numbers would result if rodent populations decrease in the TSF Project's solar array areas or the surrounding grasslands, if active burrows and dens are filled, or if foxes do not den near solar arrays. An increase in kit fox numbers utilizing the TSF Project lands could occur if release from current farming operations creates usable habitat, if foxes adjust to solar arrays and take up residence within the array fences, if vegetative cover in the solar arrays is sufficient to support and increase rodent prey, and if array fencing provides a refuge to kit foxes from predation. The goal of this SJKF Conservation and Monitoring Plan is to facilitate the latter scenario. Kit foxes have successfully utilized other modified habitats (Cypher 2010), and examples of this are provided in Section 6.1, entitled "Examples of Habitat Enhancement Programs."

Blockage of movement pathways out of the Carrizo Plain could affect dispersing kit fox. Currently, kit fox occupy dens in the eastern and southern portions of the Project Site. Evidence of kit fox has been detected in the northwestern portion of the site but is far less frequent than in the southeast (Figures 3 and 4). Kit fox have been detected to the east of the Project (Figure 3). Preservation of conservation land near the Project and the use of kit fox permeable fencing would ensure the preservation of these potential movement pathways for SJKF.

Potential short-term effects of the TSF Project:

- Ground disturbance includes limited grading, smoothing ground surface, driving support rods, assembling arrays, and trenching that could displace kit fox.
- Potential for SJKF take without careful monitoring
- Potential exclusion from work area during TSF Project construction
- Potential displacement of denning foxes

Potential long-term effects of the TSF Project:

- Could create safe haven for SJKF
- Vegetative cover could increase prey abundance for SJKF

- Change in the habitat structure in the area which could result in a decrease in kit fox numbers utilizing the TSF Project lands
- End of farming within the solar array and conservation areas would open many square miles for SJKF use and increase prey abundance
- Conservation easements on adjacent parcels could result in agricultural uses less disturbing to SJKF
- SJKF movement would not be blocked by fences
- Project kit fox enhancement measures
    - Artificial dens – as per Endangered Species Recovery Program (ESRP) guidelines
    - Escape dens – might also be used by other species, such as burrowing owl
    - Fencing that allows kit fox entrance but discourages entrance by coyotes

The TSF Project would utilize driven support posts for the PV modules that have eliminated any need for the previously proposed on-ground concrete ballasts. This would allow line of sight for small mammals and leave a greater area open for use within the solar arrays.

Fencing is intended to provide security for solar arrays and would consist of a six foot cyclone fence topped with barbed wire. A 5 to 6 inch gap would be created between two bottom rails, extending the entire length of the fence, for kit fox passage into and through the TSF Project.

Traffic increases from the TSF Project would occur during the construction phase. Construction traffic is estimated by the Applicant at 107 roundtrips per day, including six trips per day for gravel trucks traveling locally within the valley. Construction worker trips would total 78 per day. Trucks bringing material to the site would account for 29 trips per day. The DEIR Transportation chapter found that approximately 340 trips per day occurred along Highway 58 east of Bitterwater Road in the current condition. Since kit fox are nocturnal, remaining in or very close to their dens during the day, an increase in traffic during daylight hours would not result in an increase in kit fox mortality. This plan includes a recommendation to limit most worker and construction traffic to daylight hours.

4.1 Habitat Evaluation

Projects in San Luis Obispo County have utilized the San Joaquin Kit Fox Habitat Evaluation Form created by the California Department of Fish and Game (CDFG) in cooperation with USFWS to determine appropriate off-site conservation. Off-site conservation options for other projects have included acquisition of fee or a conservation easement of suitable kit fox habitat, or the purchase of kit fox credits in a kit fox conservation bank, or payment of an in-lieu fee. The SJKF Habitat Evaluation Form is

utilized to determine habitat quality on a project site. The land to be conserved is then calculated based on the project area actually removed from use by kit fox.

The TSF Project and its passive solar farm design are not typical of projects that have utilized the SJKF Habitat Evaluation Form. Therefore, an impact assessment specific to the TSF Project is appropriate.

To determine appropriate acreage for off-site conservation land the existing habitat type and proposed project use were examined. Areas that would be developed with TSF Project PV module posts, buildings, hard surface roads, inverter pads, and other hard surfaces would not be used by kit fox (unless they dig under edges). Areas under solar arrays are shaded and may be utilized but may not be as desirable as open areas. The entire fenced array area contains open space along the fence line and roads that may be utilized. Open space areas outside the perimeter fence are likely to be utilized. Each of these areas has a different probability of being utilized by kit fox. However, to provide a robust and conservative conservation program, all of the areas within the TSF Project fence are considered affected, and therefore are included in the calculation of conservation acres (Table 2).

The Project design has progressed through much iteration that incorporated agency input and reduced the overall footprint, concentrated arrays, and protected wildlife corridor areas to the east and west of the Project. The result is Alternative 3B, an improved design that reduces Project effects relative to previous designs. Tables 1 and 2 provide acreages for Alternative 3B, and for comparison, provide acreages for Options A and B.

The Alternative 3B plan has a total area of 3, acres within the fenced area. Cropland areas that will be converted to grassland habitat are 2,718 acres within the solar array fenced area. Grassland habitat within the fenced area totals 785 acres. Of the 785 acres of grassland within the Project, 535 acres are of low quality for San Joaquin kit fox due to farming in 2004 and 2005, and subsequent weedy vegetation.

TABLE 1. PROJECT AREA ACREAGES BY USE. Acreages may vary slightly on final plans.

		Option A acres	**Option A % of fenced area**	**Option B acres**	**Option B % of fenced area**	**Alternative 3B acres** (approximate)	**Alternative 3B % of fenced area**
1	Area fenced*	4,104	100.0%	4,007	100.0%	3,526	100.0%
2	Area of panels	1,353	32.9%	1,353	33.6%	1,424	40.4%
3	Area within fence in cropland	2,375	57.9%	2,870	71.6%	2,718	77.0%
	Area of roads outside array fence	-	-	-	-	13	na
4	Area within fence in grassland	1,719	41.9%	1,124	28.1%	785	22.3%
5	Area of arrays	3,339	81.2%	3,339	82.9%	3,274	92.8%
6	Area of piles /fence posts	4	<0.1%	4	<0.1%	4	0.1%
7	Area of substations, PCS's, PVCS's**	15	<0.4%	15	<0.4%	15	0.4%
8	Area of roads	42	1.0%	65	1.6%	71	2.0%

*Also includes roads and power line areas outside of fences

**PCS = Power Conversion Stations. PVCS = Photo Voltaic Combining Switchgear housing. These project components are placed on concrete foundations within arrays.

Habitat protection and enhancement is a primary recovery action under the Recovery Plan (USFWS 1998, Recovery Plan, page 134). Appropriate land use management of kit fox habitat is essential for successful habitat protection and enhancement. The TSF Project proposes to acquire property by fee purchase or establish conservation easements that provide for appropriate management of land for the conservation of SJKF. Table 2 shows the acreages of each type of effect and the level of effect of the proposed TSF Project.

Proposed conservation ratios in Table 2 are based on recommendations provided in the Draft Environmental Impact Report (DEIR) for the TSF Project (Aspen 2010). Grassland is scored as 4 to 1 ratio and cropland is scored as a 1 to 1 ratio. In addition, because cropland near historic natal den locations could provide movement opportunity in some seasons, and may provide some habitat value, those cropland areas within a three square

mile area around kit fox natal dens observed in 2010 as shown in Figure C.6-4 of the DEIR are scored as 2 to 1 ratio conservation area.

Even though lands within the TSF Project array fences are likely to be utilized by SJKF, and may provide a refuge for SJKF that improves survival, acquisition of additional land for conservation is suggested as a contingency in case lower levels of use occur within the TSF Project fences than under current baseline conditions.

The County has calculated lands for mitigation under CEQA with the following formula: (A × 4) + (B × 1) - C + (C × 2) = Total Mitigation Acres, where A = impacted grassland acres, B = impacted cropland as shown on Figure C.6-4 of the DEIR, and C = impacted cropland acres within natal den territory as shown on Figure C.6-4 of the DEIR. CEQA mitigation requirements would be satisfied for Alternative 3B with 6,422 acres of land (Table 2).

Lands outside of the array fence on parcels adjacent to the TSF Project will be enhanced and managed for SJKF use and are included in the Topaz compensation package. These lands are included in Table 3.

TABLE 2. PROJECT CONSERVATION RATIOS. Lines 1, 2, and 3 include roads outside of fences, monitoring and maintenance facility, substation, and switching station.

	Impact level	**Option A**	**Option B**	**Alternative 3B**	**Net effect**	**Ratio**	**Total Conservation Acres A, B, Alt 3B**
1	Land within fences in cropland (excludes acres in line 3) plus any Project components outside fences	1,845	2,773	2,180	Habitat may be improved for kit fox	1:1	A: 1,845 B: 2,773 3B: 2,180
2	Land within fences in grassland	1,719	1,124	785	Habitat may be used by kit fox	4:1	A: 6,876 B: 4,496 3B: 3,140
3	Land within fences in cropland near natal dens	530	97	551	Habitat may be used by kit fox	2:1	A: 1,060 B: 194 3B: 1,102
4	Conservation land needed, sum				Enhancement or protection		A: 9,781 B: 7,463 3B: 6,422

The ratios presented in Table 2 are calculated based on recommendations in the EIR, and are not applicable to the "take" permit process through the USFWS. They are presented here for information only. Refer to Section 7.0 (below) for conservation measures.

4.2 Temporary Impacts

Work activities that may occur outside of the array areas that cause minor disturbance, such as driving across grassland or plowed fields, are temporary effects. Temporary effects could occur throughout the fenced areas of the TSF Project. This Conservation Plan includes all areas within the fences as Project areas. Therefore, areas of temporary impact, outside of the PV arrays but within the fences, are included in the permanent effect compensation calculation. No areas outside of the fence line will be permanently affected for the Project with the exception of access roads and the electrical collection system. Accordingly, the acreage for access roads and the electrical collection system is included in the fenced area calculation (Table 1).

4.3 Traffic

Traffic is a minor cause of kit fox mortality in non-urban populations. Kit fox populations in the Naval Petroleum Reserve in Kern County, a grassland and arid shrub land habitat, experienced predation responsible for 56 percent of kit fox deaths, with vehicle strikes accounting for 9 percent of kit fox deaths (Cypher et al. 2000). In Lokern Natural Area, an area with more roads than the Carrizo Plain, including Highways 58, 33, and Lokern Road, no significant effect on the demographics and population of kit fox could be attributed to vehicle strikes (Cypher, Bjurlin and Nelson 2009) with about 8,000 vehicle trips per day. Estimated daily trips on Highway 58 in the Carrizo Plain are 340 (Aspen 2010). In four other studies (see Cypher, Bjurlin and Nelson 2005, pg 12), kit fox mortality from vehicles was found to be very low as was mortality from vehicles to swift fox, a similar species. In Bakersfield, an urban environment, 26.9 percent of kit fox deaths documented were caused by vehicle strikes, and 16.7 percent were caused by predation. This higher level of vehicular strikes is consistent with much higher traffic volume. Mean traffic volume for locations where strikes were documented in Bakersfield was 21,861 trips per day, or approximately 73 times the current traffic rate in the Carrizo Plain and 54 times the expected TSF Project construction period traffic rate (estimated by adding the current traffic rate to the TSF Project construction daily vehicle trips).

Kit fox are primarily nocturnal animals that spend their days, every day, in dens (Cypher 2010b). Most vehicle strikes of kit fox occur at night (Bjurlin 2004). Limiting most traffic to and from the Topaz Solar Farm to daylight hours will effectively prevent vehicular strikes from significantly increasing mortality among the Carrizo Plain kit fox population.

5.0 Conservation Plan

The proposed on-site measures outlined above would constitute important TSF Project components that reduce the need for off-site conservation. TSF Project plans and monitoring measures provide a high potential for avoidance of injury to or death of kit fox. The Conservation Plan is designed to compensate for actual ground lost, to improve habitat conditions to compensate for temporary impacts and potential loss of use of habitat within the solar arrays, to enhance habitat within the solar array site, to enhance open space areas through and around the fenced solar arrays, and to establish off-site protected habitat to promote conservation of the species.

5.1 Site Enhancement and Conservation Measure Summary

- TSF Project on-site habitat enhancements would include establishment and maintenance of natural vegetation and artificial dens. The goal is to provide accessible and appropriate habitat attractive to kit fox. Enhancements utilized would be based on successful enhancement programs currently in place in other communities and habitat areas, as detailed in the section "Examples of Habitat Enhancement Programs" in Section 6.1 of this Plan.
- Off-site lands will be restored to annual grassland or maintained as annual grassland, included in a conservation easement or equivalent mechanism, and managed to promote kit fox and other native species. This will be achieved either through fee purchase or dedication with a conservation easement, along with appropriate enhancement and endowment funds.
- A three-stage survey protocol and protection program will be utilized to prevent injury or death of kit fox during TSF Project construction.
- Fencing around the TSF Project solar arrays will provide kit fox passage and exclude large animals.
- At least 12 artificial dens (two per square mile) and 28 artificial escape dens will be installed within the solar array fences at appropriate locations.
- Artificial escape dens will be installed outside of the TSF Project fences to provide refuge locations.
- Management practices will avoid the use of rodenticides.
- A monitoring program will determine if kit fox take up residence and re-establish use of the TSF Project site at levels equivalent to or better than existing use.
- The TSF Project site will be made available for research projects approved by the USFWS if approved by the Applicant in advance and accompanied by necessary protections and indemnities.

- Worker education programs regarding SJKF identification, life history and habits, population status, and protection measures, and penalties for unauthorized take of SJKF will be provided for all construction and operational employees.
- Public education material will be provided to all TSF Project guests and visitors. Signage will be placed at the Solar Energy Learning Center and the Operations and Maintenance building to provide education regarding kit fox and other rare species.
- Pets will not be allowed on the TSF Project.
- TSF Project night lighting will be minimized so as to not illuminate open space areas.
- During construction, survey and monitoring measures will be conducted specific to the TSF Project that meet or exceed the standard San Joaquin kit fox CEQA mitigation measures approved by the County of San Luis Obispo and CDFG, as well as the USFWS standardized recommendations for protection of San Joaquin kit fox prior to or during ground disturbance.
- Scheduled construction traffic will be limited to daylight hours, within one-half hour after sunset or before sunrise. Speed limits on-site will be strictly enforced.

5.2 Conservation Goals and Objectives

The goals of the Conservation Plan are to have an equivalent or greater number of kit fox on the TSF Project site after completion of the TSF Project as were present before the TSF Project. Further objectives of these conservation recommendations are to prevent loss of kit fox during construction and facility operation, to improve habitat in the area so that kit fox survival and breeding success will be enhanced, and to provide certainty with respect to the ability of kit fox to connect with core habitat areas. A conservation benefit would be accomplished if the number of kit fox utilizing the TSF Project site after construction are equivalent to or greater than the number of kit fox utilizing the TSF Project site before construction, and the off-site habitats are enhanced for kit fox.

Nevertheless, the TSF Project could result in loss or degradation of SJKF habitat during the operational period. Acquisition of off-site conservation easements or land purchases to protect in perpetuity suitable SJKF habitat in the Carrizo Plain core population region would compensate for the effect of potential loss or degradation of SJKF habitat. Offsite conservation lands would be acquired in sufficient quantity to compensate for permanent habitat impacts resulting from the TSF Project. Therefore, even if an equivalent number of kit fox do not utilize the TSF Project site after construction, conservation would still have been achieved by setting aside offsite conservation areas to supplement or enhance kit fox abundance to achieve an equivalent or greater population of kit fox as were present before TSF Project site disturbance. In addition, offsite acquisition of conservation lands would provide certainty with respect to preserving an avenue for kit fox movement across ranch and farm land. This would occur by protecting movement

corridor lands from detrimental land uses that degrade habitat, and by preventing barriers, such as wildlife fencing, chain link fencing or structures, from being installed on the properties.

The TSF Project design is intended to provide denning opportunities within the site, and to allow transient kit fox opportunity to move through the Project. Fences would be designed to provide readily accessible passage for kit fox. Easy passage for kit fox through the fence is more important than exclusion of coyotes (B. Cypher, pers. com., 2010). The fencing plan proposed by the Applicant has a 5-6 inch opening at the base of fences that provides easy passage for kit fox. Den sites would be provided within the TSF Project and escape dens would be provided on adjacent land outside the array fences. Monitoring would document presence of SJKF and provide information to the TSF Project manager so that SJKF is protected. The proposed protective measures would prevent injury to kit fox during construction, would maintain access to the TSF Project site by kit fox once construction is complete, and would provide an enhanced and protective habitat for kit fox while increasing understanding of kit fox biology.

Conservation measures protecting offsite lands would compensate for acreage removed from use, protect kit fox habitat in perpetuity, improve land management for kit fox and other listed species, and result in a conservation benefit for kit fox. Habitat enhancement outside of the project footprint would include installation of escape dens and improved habitat management for kit fox. Enhancement of existing habitat on site will provide increased protection and denning habitat for the foxes. Installation of artificial dens, escape dens, visitor and worker education programs, kit fox friendly management practices, monitoring on site, and large areas of open space would reduce the effects of modification of 3,526 acres of kit fox habitat within the TSF Project Alternative 3B fences. The offsite conservation measures proposed are intended to fully compensate for effects of the action. Onsite conservation measures, while not credited toward compensatory conservation, would benefit kit fox and other native species.

5.3 Conservation Site Selection and Justification

The Applicant's selection of conservation lands to be secured by the TSF Project, which has been done in consultation with USFWS and CDFG, has been directed at meeting recovery plan goals of habitat protection and population interchange. Therefore, the proposed off-site conservation lands 1) provide habitat appropriate to sustain resident kit fox, and/or, 2) protect and enhance corridors for movement into and out of the Carrizo Plain region. If conservation lands can provide both of these services, a higher value for kit fox recovery could be achieved per conservation acre.

An additional benefit of conservation lands would be inclusion of other rare or sensitive species habitat. Benefits to other species are discussed further in the comprehensive Biological Report (Althouse and Meade, Inc. 2010). Proposed off-site conservation lands

are located in close proximity to the TSF Project, or else have significant beneficial value that compensates for impacts at the TSF Project site, or potential cumulative impacts in the region. Potential for enhancement of land areas for SJKF that result in improved habitat add to conservation land value.

Most of the proposed conservation lands are contiguous to the TSF Project site. These areas include grassland and cropland habitats. Much of this land has been surveyed for biological resources by Althouse and Meade, Inc. Survey data shows that current utilization of these potential conservation lands by kit fox varies by habitat quality and is expected to change to the benefit of kit fox if land use is changed from cropland or heavily grazed land to properly-managed grassland.

An index score was created to evaluate potential conservation lands according to factors that contribute to conservation value (Table 3). Factors include (Table 3 columns from left to right):

1) suitability of existing habitat
2) enhancement potential
3) kit fox presence
4) importance to movement corridor
5) location as per the SC Wildlands habitat suitability model
6) location as per the Phillips-Cypher habitat suitability model
7) slope of the parcel

This ranking provides an index to compare Project Site properties and to gauge how the selected conservation properties compare with onsite land being impacted (reference sites from within the Project Site are included in Table 3). The ranking exercise shows that selected offsite conservation parcels provide a range of habitat quality comparable to or better than the TSF Project areas. The acres of conservation land proposed (11,979) is more than 5,000 acres more than recommended in the DEIR formulation for Alternative 3B (6,422). Conservation lands consist of approximately 7,073 acres of grassland and 4,906 acres of cropland (Table 3). Cropland areas provide the opportunity for recovery of these lands to usable kit fox habitat within a few years. The conversion of some cropland to grassland would increase the acreage of quality habitat for kit fox and other species in the region.

Up to 2,800 acres of cropland included within the conservation land package may be placed in agricultural conservation easements and may retain the potential to be planted with crops, in order to meet County requirements for mitigating impacts to agricultural resources. The locations of these agricultural easement properties within the conservation land package will be determined in discussion with USFWS and CDFG. Agricultural easements will not allow development of these parcels, and the lands will remain open for kit fox movement during part of the year, as they are in the existing condition. Some agricultural lands are currently considered important parts of the wildlife movement corridors near the TSF Project site.

Twenty-three parcels are offered as conservation lands. Habitat types found on these parcels range from well-maintained California annual grassland to plowed cropland. Conservation properties with grassland habitat are primarily (88.4%) on flat ground (slopes 0 to 10 percent), and support kit fox. Conservation properties on cropland are also mostly on flat ground (75.7%). The conservation lands under consideration are shown in Figures 5 through 9, in Section 7.0.

As described in Table 1, Topaz Solar Farm Alternative 3B would utilize 3,526 acres of land, of which 77.0% is cropland, 22.3% is grassland, and less than 0.3% is anthropogenic habitat. Alternative 3B has approximately 3,263 acres of lower suitability habitat (with and index score less than 75), and approximately 250 acres of higher suitability habitat (index score higher than 75).

Table 3 shows habitat rankings for conservation lands under consideration. Of the total of 11,979 acres under consideration, 52.8%, or 6,320 acres are higher suitability and 47.2%, or 5,659 acres are lower suitability when a ranking of 75 is utilized as the break between higher and lower suitability. The ratio of higher to lower value conservation lands is therefore 1.12 for all the conservation lands under consideration. A larger number means that more of the area under examination is of higher suitability. Using grassland and cropland habitat types as a general proxy for suitability in project areas, the ratio of 1.12 for conservation land compares favorably with a higher to lower suitability ratio of 0.07 for Alternative 3B. Therefore, the potential conservation lands have more area of higher suitability than the Project areas. In addition, many of the lower suitability lands used for conservation will be enhanced from currently disturbed conditions to higher quality grassland habitat, resulting in additional higher suitability conservation lands.

TABLE 3. OFFSITE CONSERVATION LANDS. Conservation lands as shown in Figure 5. Factors that contribute to conservation land value for wildlife are listed in top row. Total Index Score (column 2) provides a relative habitat quality ranking for each parcel. Desirable conservation land is not just the highest scored parcels. Low scoring parcels may present high opportunity for habitat enhancement. Rankings show that offsite conservation lands contain similar habitat to lands in the TSF project areas. Parcels listed by section number at the bottom of the table are within the Topaz Project; these are not proposed conservation lands, they are listed for comparison to the proposed conservation lands. Note, up to 2,800 acres of cropland included within the conservation land package may be placed in agricultural conservation easements and may retain the potential to be planted with crops, in order to meet County requirements for mitigating impacts to agricultural resources.

Map Label (Figure 5)	**Total Index Score 100 pts maximum**	**Site-Specific Habitat Suitability (Althouse & Meade) 40 pts**	**Enhance-ment Potential 10 pts**	**Kit Fox Presence 10 pts (5 if not surveyed, 0 if absent in surveys)**	**Within Movement Corridor 10 pts**	**SC Wildlands Suitability Map 10 pts**	**Phillips-Cypher Suitability Map 10 pts**	**Slope 10 pts (10=flat)**	**Notes**	**Conservation Land acres**
J4	89	40	2	8	10	10	10	9	Grassland, mostly flat	40
I	89	40	2	10	10	9	10	8	Grassland with kit fox, low hills	2,680
J1	89	40	2	8	10	10	10	9	Grassland, mostly flat	80
J2	89	40	2	8	10	10	10	9	Grassland, mostly flat	160
J3	89	40	2	8	10	10	10	9	Grassland, mostly flat	40
C2	86	35	6	10	10	7	10	8	Grassland, low hills, kit fox present	40
G	84	40	2	10	10	10	2	10	Grassland with kit fox, flat	920

Map Label (Figure 5)	**Total Index Score 100 pts maximum**	**Site-Specific Habitat Suitability (Althouse & Meade) 40 pts**	**Enhance-ment Potential 10 pts**	**Kit Fox Presence 10 pts (5 if not surveyed, 0 if absent in surveys)**	**Within Movement Corridor 10 pts**	**SC Wildlands Suitability Map 10 pts**	**Phillips-Cypher Suitability Map 10 pts**	**Slope 10 pts (10=flat)**	**Notes**	**Conservation Land acres**
H1	83	40	2	8	10	5	8	10	Grassland, flat	350
D	83	38	3	10	9	7	6	10	Grassland, small cropland areas, flat	1,040
C3	83	35	5	8	10	5	10	10	Grassland, flat	80
F	82	40	2	10	6	10	8	6	Grassland with kit fox, some hills	640
H2	78	30	6	10	10	6	6	10	Cropland and grassland with kit fox, flat	250
C1	74	30	5	10	10	3	8	8	Grassland with kit fox, tall grass	640
E1	73	40	2	10	5	3	3	10	Grassland	98
H6	65	20	5	5	10	5	10	10	Half grass, half crop	80
H4	63	10	10	10	10	3	10	10	Cropland, flat	40
A	59	12	10	5	10	4	8	10	Cropland with small grassland area, flat	1,280
B	59	15	8	10	8	3	5	10	Cropland with smaller grassland area, flat	2,655

Map Label (Figure 5)	**Total Index Score 100 pts maximum**	**Site-Specific Habitat Suitability (Althouse & Meade) 40 pts**	**Enhance-ment Potential 10 pts**	**Kit Fox Presence 10 pts (5 if not surveyed, 0 if absent in surveys)**	**Within Movement Corridor 10 pts**	**SC Wildlands Suitability Map 10 pts**	**Phillips-Cypher Suitability Map 10 pts**	**Slope 10 pts (10=flat)**	**Notes**	**Conservation Land acres**
H5	59	10	10	10	10	3	8	8	Cropland, low hills	160
C4	54	10	10	10	10	3	3	8	Cropland with kit fox	160
H3	53	10	10	10	10	3	3	7	Cropland, hilly	160
K	50	10	10	5	10	3	2	10	Cropland, flat	320
E2	46	10	10	5	5	3	3	10	Cropland	66
									Total Acres of Conservation Land	**11,979**
Topaz Section 34	85	40	2	10	10	10	3	10	Grassland with kit fox, flat	
Topaz Section 28	72	25	10	10	10	4	3	10	Grassland with kit fox, flat	
Topaz Section 33	67	20	8	10	10	2	7	10	Cropland with kit fox, flat	
Topaz Section 27	67	20	8	10	10	2	7	10	Cropland with kit fox, flat	
Topaz Section 32	56	10	10	10	10	3	3	10	Cropland with kit fox, flat	
Topaz Section 19	53	10	10	10	7	3	3	10	Cropland with kit fox, flat	

5.4 Conservation Outcome

The population of kit fox measured within the Project Site (an area less than the total kit fox study area) in August-September and November of 2009 was 18 individuals (Smith 2010, Henry and Maldonado 2010). These individuals were found most commonly in the eastern and southern portions of the Project Site (Figures 3 and 4). The 2009 kit fox scat survey was done when kit fox individuals were at or near the annual peak, including adults and juveniles. The survey area was 16 square miles (42 square kilometers). The density of kit fox individuals across the entire kit fox survey area (an area larger than the Project Site) was 19 foxes per 16 square miles, or 1.19 foxes per square mile. Only 18 individual kit foxes were detected within the Project Site boundaries, which equals 1.16 foxes per square mile. The survey data therefore demonstrates that habitat within the 3,-acre (5.5 square mile) fenced area for Alternative 3B could have supported 6.4 foxes if average density is used (Figure 4). Because a low percent of Alternative 3B land is high quality kit fox habitat (7 percent) the average density overestimates the actual value of the project site for kit fox use. Fourteen individual foxes were detected within the Alternative 3B Project area, but are likely to have been also utilizing higher quality habitat to the east and south of the proposed Project fences. Results from the 2010 kit fox survey will be available in February 2010 and will be used to set baseline number for kit fox in the Project area.

The scat survey methodology provides a robust and complete estimate of individuals, a method that is shown to be more thorough than other population estimate methods (Kohn, et al. 1999, Harrison et al. 2002, Smith et al. 2003, Smith et al, 2005, and Smith and Whitelaw 2010). Although variation in number of individuals from year to year is normal, a kit fox scat survey, conducted in a similar manner that detects the same or greater number of individuals after TSF Project completion, would support a conclusion that on-site conditions provide good habitat for kit fox (although off-site conservation measures will be relied upon to provide certainty of compensation for project effects). The proposed TSF Project would allow large areas of cropland to revert to naturalized grassland, and would reduce impacts from overgrazing on other areas of grassland. It is very likely that land within the array fences would be utilized by kit fox.

In November 2010, a second kit fox scat survey was conducted over the entire Project Site. Kit fox scat was detected, and genetic identification to species was completed in January 2011 (Figure 3). Kit fox scat was found 63 times during the survey, close to one-half of the 123 number found in 2009. Individual identification from DNA analysis will be available shortly.

Kit fox surveys that identify individuals utilizing the Project area will be conducted in November every year for five years to determine if an equal or greater number of kit fox persist within Project. If so, the utilization of the Project by kit fox will be an additional benefit to kit fox beyond the conservation value achieved by protection and enhancement

of off-site kit fox habitat. Protection and improvement of this kit fox habitat within protected areas outside of the TSF Project fenced areas would compensate for take of kit fox during Project construction and for the project area if kit fox do not use areas within Project fences following completion. Operation of the TSF Project through several decades is not expected to result in any take of kit fox because it is a passive solar facility with only rare isolated maintenance activities occurring.

An equal or greater number of kit fox utilizing the project site would also meet the TSF Project goal of fully mitigating any impacts to kit fox ("full mitigation" is a CESA requirement). Full mitigation would be achieved for the TSF Project in one or both of the following ways:

1. Full mitigation would be achieved if the number of kit foxes utilizing the TSF Project site after construction is equivalent to the number of kit fox utilizing the TSF Project site before construction (see Section 2.2).
2. Full mitigation would be achieved through protection and enhancement of thousands of acres of off-site kit fox habitat, some of which would be located in important wildlife movement corridors.

As described above, in the event that kit fox do not re-populate the completed TSF Project at pre-project density, lands set aside as part of the conservation program would provide improved and protected habitat to fully compensate for project effects. Eleven-thousand-nine-hundred-seventy-nine (11,979) acres would be protected outside of the TSF Project fenced areas (Table 2), not including some potentially usable habitat between the fenced areas. At the kit fox density discovered in the Project Site during the 2009 survey (1.16 per square mile), this would mean that habitat utilized by 21.7 foxes would be protected on conservation lands. Conservation lands include areas of grassland and cropland (see Table 3, Conservation Land Categories). Kit fox density per square mile over the entire kit fox survey area was 1.19 in 2009, reflecting the low level of use found in cropland areas. Kit fox density in the 2010 survey is likely to be lower based on the number of scats found (63 compared to 123 in 2009); however genetic individual identification has not been completed. It is likely that density in recovered cropland areas would be higher than existing conditions across the entire kit fox survey area.

Since seven kit fox individuals were detected only one to four times in 2009, the density estimates presented above include both resident kit fox and kit fox that may be at the edge of their home range and just occasional within the study area. Some of these animals probably have a larger proportion of their home range outside of the study area than in the study area. Therefore, these density estimates do not mean that the kit fox individuals observed are completely supported by the habitat within the survey areas.

Some agricultural lands in California Valley North within and close to the Project Site could be enhanced for SJKF use, and would provide excellent conservation value. This

value would be obtained not just by providing useable habitat, but by changing use from agricultural practices that are potentially dangerous to SJKF, such as chisel plowing, to agricultural uses that are benign or beneficial, such as managed grazing. The Applicant has worked with the TSF Project Kit Fox Conservation Team, CDFG, and USFWS to determine the most appropriate offsite conservation land for the TSF Project.

5.5 Conservation Measures

The following specific conservation measures (CM) are recommended to address potential TSF Project impacts to SJKF.

Through implementation of CM-1 a total of 11,979 acres for Alternative 3B would be protected and preserved for kit fox in perpetuity (Tables 3).

CM-1 Prior to issuance of grading and/or construction permits, the applicant shall submit evidence to the USFWS and the County of San Luis Obispo, Department of Planning and Building, Environmental and Resource Management Division (County) that states that the following San Joaquin kit fox conservation measure has been implemented:

A) Provide for the protection in perpetuity, through acquisition of fee or a conservation easement of 11,979 acres identified above (Table 3) within San Luis Obispo County kit fox habitat and/or within the potential movement area linking the Carrizo Plain to other habitat to the north, and provide for a non-wasting endowment to provide for management and monitoring of the property in perpetuity. Up to 2,800 acres of cropland included within the conservation land package may have to be placed in agricultural conservation easements and may retain the potential to be planted with crops, in order to meet County requirements for mitigating impacts to agricultural resources. Lands to be conserved shall be subject to the review and approval of the United States Fish and Wildlife Service, the California Department of Fish and Game, and the County of San Luis Obispo.

CM-2 Prior to issuance of grading and/or construction permits, the applicant shall provide evidence that they have retained a qualified TSF Project biologist acceptable to the County. The biologist shall perform the following monitoring activities before and during construction activities:

A) Pre-construction surveys for San Joaquin kit fox shall consist of three phases: den location surveys, work area clearance surveys, and daily work area surveys.

B) Den location surveys shall be conducted up to several months in advance of any proposed site disturbance and shall locate all dens or potential kit fox dens within the TSF Project site. The goal of these surveys is to establish locations of current kit fox dens on the TSF Project site. A combination of scat survey information, walking transect surveys, tracks, motion detecting cameras, and spotlighting will be utilized to determine kit fox den locations. If natal dens are located, the USFWS will be contacted and appropriate setback areas will be established based on this consultation. Potential kit fox dens on the TSF Project site shall be monitored to determine use. Locations of kit fox found on the TSF Project site shall be recorded and provided to the USFWS and the DFG within 48 hours of detection.

C) Work area clearance surveys shall be conducted up to one month in advance of any proposed TSF Project construction activity, including site disturbance activities, and will completely cover all ground surfaces within proposed work areas. The purpose of this survey is to locate kit fox dens sufficiently in advance of construction activities to adjust work locations or clear areas. The survey will locate and identify inhabitants of all burrows or dens capable of containing kit fox. Burrows and dens not in use, as verified by the project biologist using tracking medium or motion detecting camera, may be closed to prevent occupation by kit fox. If denning kit fox are located, a motion sensing camera shall be placed to observe the den entrance(s), or tracking powder shall be placed around the den entrance(s), and the den location shall be protected from activity by a 100 foot buffer area until it is established that the kit fox has moved from the den. Once the qualified biologist has established that no kit fox occupy the den, the den may be closed by careful excavation with hand tools and filling. If active natal dens are located the USFWS will be notified and consulted regarding setbacks and protective measures. Standard protective measures (see Exhibit A) shall be utilized unless the USFWS determines additional measures are appropriate. Locations of kit fox natal dens found on the TSF Project site during this survey shall be recorded and provided to the USFWS and the DFG within 24 hours.

D) Daily work area surveys shall be conducted every morning before any construction activities that could disturb the site are performed. Surveys will cover all ground surfaces within an area where work will occur that day. The survey will establish that there are no possible denning sites for San Joaquin kit fox in or within 150 feet of any proposed disturbance, construction work, vehicular traffic, or other ground disturbing activities that can occur that day on the TSF Project site. If a potential kit fox den is discovered, it shall be protected from any disturbance within 100 feet and observed using cameras and tracking medium for three days to determine that it is not occupied by kit fox. If a non-natal den is occupied by kit fox, a 50 foot setback shall be observed until the fox moves out of the den. Locations of kit fox found on the TSF Project site shall be recorded and provided to the USFWS and the DFG within 48 hours. Any injury or harm done to a kit fox in the course of TSF Project on-site activities will be reported immediately to USFWS and the DFG.

.

CM-3 Implement all pre-construction surveys and conditions for protection of San Joaquin kit fox required in the USFWS biological opinion regarding work at the TSF Project site. At a minimum the following measures shall be followed.

A) Prior to issuance of grading and/or construction permits, the applicant shall clearly delineate the following as a note on the TSF Project plans: "*Speed signs of 25 mph (or lower) shall be posted for all onsite construction traffic to minimize the probability of road mortality of the San Joaquin kit fox".* Speed

limit signs shall be installed on the TSF Project site within 30 days prior to initiation of construction, including site disturbance activities.

B) During the construction phase, any site disturbance activities after dusk shall be prohibited unless coordinated through the County, during which additional kit fox conservation measures may be required. Workers and worker shuttles shall be instructed to arrive at the construction site no earlier than one-half hour before sunrise and depart from the site no later than one-half hour after sunset. Some electrical connection work will be allowed after dark. Delivery of materials by truck shall be restricted to daylight hours between sunrise and sunset.

C) Prior to issuance of grading and/or construction permits and within 30 days prior to initiation of site disturbance and/or construction, all personnel associated with the TSF Project shall attend a worker education training program, conducted by TSF Project biologist, to avoid or reduce impacts on sensitive biological resources (i.e. San Joaquin kit fox). At a minimum, as the program relates to the kit fox, the training shall include the kit fox's life history, legal status, penalties associated with unauthorized take, all conservation measures specified by the County, and information regarding the local kit fox population. The applicant shall notify the County shortly prior to this meeting. A kit fox fact sheet shall also be developed prior to the training program, and distributed at the training program to all contractors, employees, and other personnel involved with the construction of the TSF Project. Protection of kit fox shall be emphasized as a TSF Project priority.

D) During the site-disturbance and/or construction phase, to prevent entrapment of the San Joaquin kit fox, all excavations, steep-walled holes and trenches in excess of two feet in depth shall be covered at the close of each working day by plywood or similar materials, or provided with one or more escape ramps constructed of earth fill or wooden planks. Trenches shall also be inspected for entrapped kit fox each morning prior to onset of field activities and immediately prior to covering with plywood at the end of each working day. Before such holes or trenches are filled, they shall be thoroughly inspected for entrapped kit fox. Any kit fox so discovered shall be allowed to escape before field activities resume, or removed from the trench or hole by a qualified biologist and allowed to escape unimpeded.

E) During the site-disturbance and/or construction phase, any pipes, culverts, or similar structures with a diameter of four inches or greater, stored overnight at the TSF Project site shall be thoroughly inspected for trapped San Joaquin kit foxes before the subject pipe is subsequently buried, capped, or otherwise used or moved in any way. If, during the construction phase, a kit fox is discovered inside a pipe, that section of pipe will not be moved. If necessary, the pipe may be moved only once to remove it from the path of activity, until the kit fox has escaped.

F) During the site-disturbance and/or construction phase, all food-related trash items such as wrappers, cans, bottles, and food scraps shall be disposed of

only in closed containers. These containers shall be regularly removed from the site. Food items may attract San Joaquin kit foxes onto the project site, consequently exposing such animals to increased risk of injury or mortality. No deliberate feeding of wildlife shall be allowed.

G) Prior to, during and after the site-disturbance and/or construction phase, use of pesticides or herbicides by the applicant shall be in compliance with all local, State, and Federal regulations. Use of rodenticides would be prohibited. This is necessary to minimize the probability of primary or secondary poisoning of endangered species utilizing adjacent habitats, and the depletion of prey upon which San Joaquin kit foxes depend.

H) During the construction phase, including site disturbance**,** any contractor or employee that inadvertently kills or injures a San Joaquin kit fox or who finds any such animal either, dead, injured, or entrapped on the TSF Project site shall be required to report the incident immediately to the applicant and County. In the event that any observations are made of injured or dead kit fox, the applicant shall immediately notify the USFWS and CDFG by telephone. In addition, formal notification shall be provided in writing within three working days of the finding of any such animal(s). Notification shall include the date, time, location and circumstances of the incident. Any threatened or endangered species found dead or injured shall be turned over immediately to CDFG for care, analysis, or disposition.

I) Should any long internal or perimeter fencing be proposed or installed, the applicant shall do the following to provide for kit fox passage:

i. Fences around PV arrays shall provide a 5 to 6-inch tall space at the bottom of the fence.
ii. Upon fence installation, the applicant shall notify the County to verify proper installation. Any fencing constructed by the TSF Project, with the exception of the TSF Project substation fencing and PG&E's switching station fencing, shall follow the above guidelines.

6.0 Habitat Enhancement

This section describes examples of habitat enhancement measures for San Joaquin kit fox similar to those proposed for implementation on the TSF Project site. The examples of successful enhancement programs described below demonstrate the credibility of proposed habitat enhancement measures and are provided as evidence in support of an enhancement program at the TSF Project.

6.1 Examples of Habitat Enhancement Programs

6.1.1 Seven Oaks Golf Course

Four artificial dens were voluntarily installed on the Seven Oaks Country Club golf course in Bakersfield, as part of a habitat enhancement program. The four dens have been very successful and are currently occupied by kit fox (Brian Cypher, pers. com. 2009). The presence of kit fox on the golf course has been met with appreciation by users of the facility, even though a kit fox occasionally steals a ball from play. Brian Cypher monitors kit fox activity on this property, and suggested that twice the number of dens would probably be occupied at all times if available.

6.1.2 Paramount Farming Company

San Joaquin kit fox refugia were created in 2000 by installing twenty-one escape structures and four artificial dens on the Paramount Farming Company property. The site is located approximately 10 miles north of Highway 46, immediately west of the California aqueduct in Kern County. The installation was part of an experiment in cooperation with the Endangered Species Recovery Program (ESRP), and Environmental Defense Fund in Washington, D.C. The dens were installed in a linear configuration near access roads within the farm property. Agricultural activities at the time of refugia creation consisted of orchard and field crop, and are presently almost entirely orchard. The program was enrolled in a Safe Harbor Agreement with the USFWS. The artificial refugia were utilized by kit fox in an agricultural setting and provided escape and denning habitat for kit fox (Cypher, et al. 2005). The local population of kit fox has since disappeared at this location, but the project showed that artificial dens would be utilized in an agricultural production area (Brian Cypher, pers. com. 2010).

6.2 Known Enhancement Practices

The Topaz Solar Farm CMP incorporates elements recommended in the Metropolitan Bakersfield Habitat Conservation Plan and the Carrizo Plan National Monument management plan. These elements include installation of artificial dens, control of herbicides and pesticides, and potential utilization of grazing to manage vegetation. The following excerpts are from these two plans.

The Metropolitan Bakersfield Habitat Conservation Plan includes resource management and habitat enhancement measures for SJKF.

> Specifically, resource management can include conducting controlled burn programs, grazing programs, exotic species control, erosion control, native community enhancement, sensitive species enhancement (such as constructing artificial dens), coyote control, control of pesticides, herbicides and rodenticide on preserve land and on adjacent lands and coordination of any research conducted within the preserves by outside groups. A copy of all research documents produced pertaining to the preserves should be obtained and kept as part of the documentation on the preserve.
>
> Metropolitan Bakersfield Habitat Conservation Plan, 1994. Page 86

The Carrizo Plain National Monument Proposed Resource Management Plan (October 2009) specifies that "Management of prey populations and an open low grass structure of vegetation have been the primary focus of kit fox management." The plan goes on to specify that grazing or burning is being utilized "to maintain kit fox prey populations in the occasional years of high vegetation biomass."(pages 3-15).

6.3 Habitat Enhancement Implementation Work Plan

6.3.1 Fencing

All solar array fencing at the TSF Project will incorporate a continuous kit fox passage along the base of the fence between posts providing a 5 to 6 inch opening. The opening would be between two narrow metal pipes, one on the ground. This would allow kit fox to move easily through the fence and the TSF Project, and would discourage larger animals from entering the project site. Openings would be constructed so that no sharp edges are present and so that the opening size cannot be forced open by larger animals. Fencing would be erected by the Applicant. Fencing of the portion of the TSF Project being completed would be accomplished prior to its commencement of operation.

Movement corridors would remain outside of the fenced solar array areas of the TSF Project, but would also be available through the solar arrays for kit fox. The entire TSF Project solar array area would be accessible to kit fox once they enter the perimeter fence. Kit fox movement on TSF Project site would be across open space areas within the fenced area, along road ways, under solar modules, and along rows within solar arrays. Kit fox could move across the TSF Project site, or could remain within the fenced solar array areas.

Complete exclusion of coyotes from the solar array areas is not a necessary goal for kit fox protection. Human presence and activities may discourage coyotes from entering the solar array area, and kit fox would be likely to avoid them within the array area by utilizing natural and artificial dens (Cypher, pers. com. 2009).

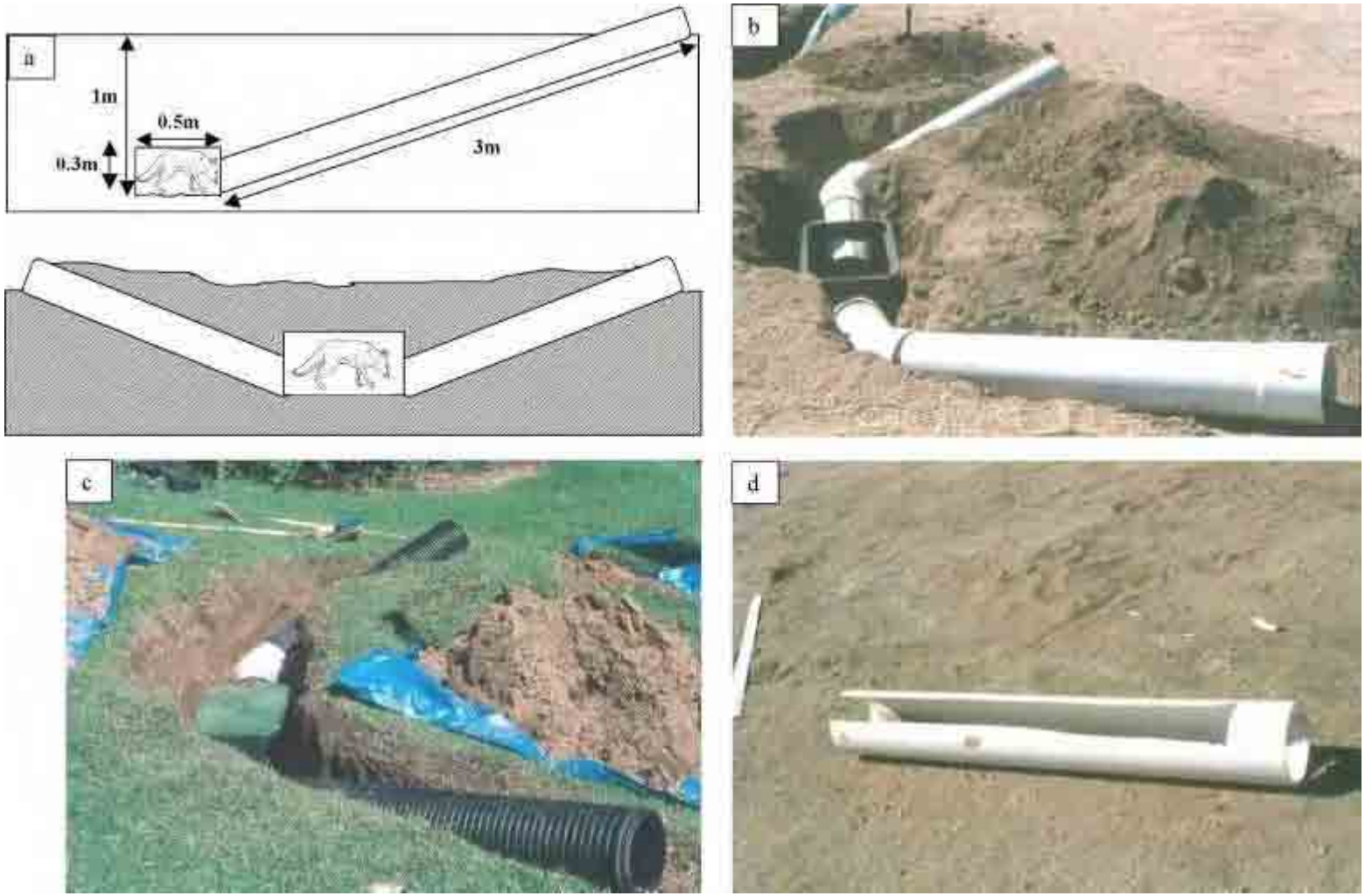
6.3.2 Artificial dens

Locations will be selected for installation of artificial kit fox dens once the TSF Project layout option is finalized and final design details are prepared. We recommend that two-chambered dens be installed for each square mile, and at least four escape dens installed per square mile. Also, escape dens should be installed near the perimeter fence at a rate of one den per 1,000 feet. See plans and photos below for construction methods. Locations will be selected to provide denning sites that will be attractive to San Joaquin kit fox. Criteria for location selection include distance from buildings or regularly maintained infrastructure, open grassland habitat, distance from nearest den, relatively flat topography, and potential prey base. Dens would only be constructed in places that do not flood.

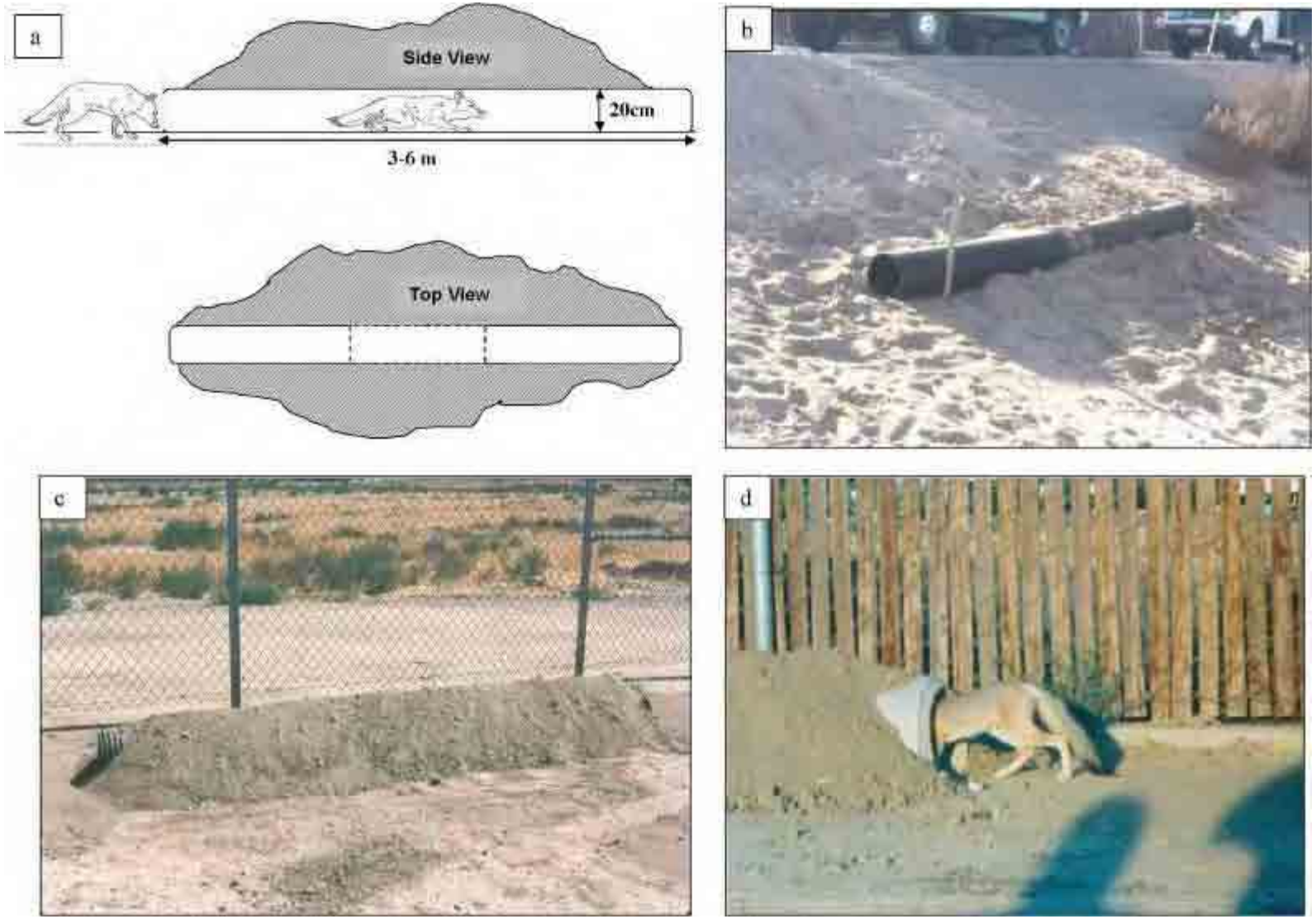
Dens shall be installed under the direction of a qualified kit fox biologist as per the specifications provided by the Endangered Species Recovery Program. Work will involve excavating a trench for chambered dens, placing the pipes and den box, and covering the den with soil. Grassland species can be planted over and around the den, with entrances left exposed. Escape dens consist of pipes placed on the ground and covered with soil.

Pipe used can be corrugated plastic pipe. Studies have demonstrated that corrugated plastic pipe works as well as other pipe types, and is less expensive (B. Cypher, pers. com. 2009).

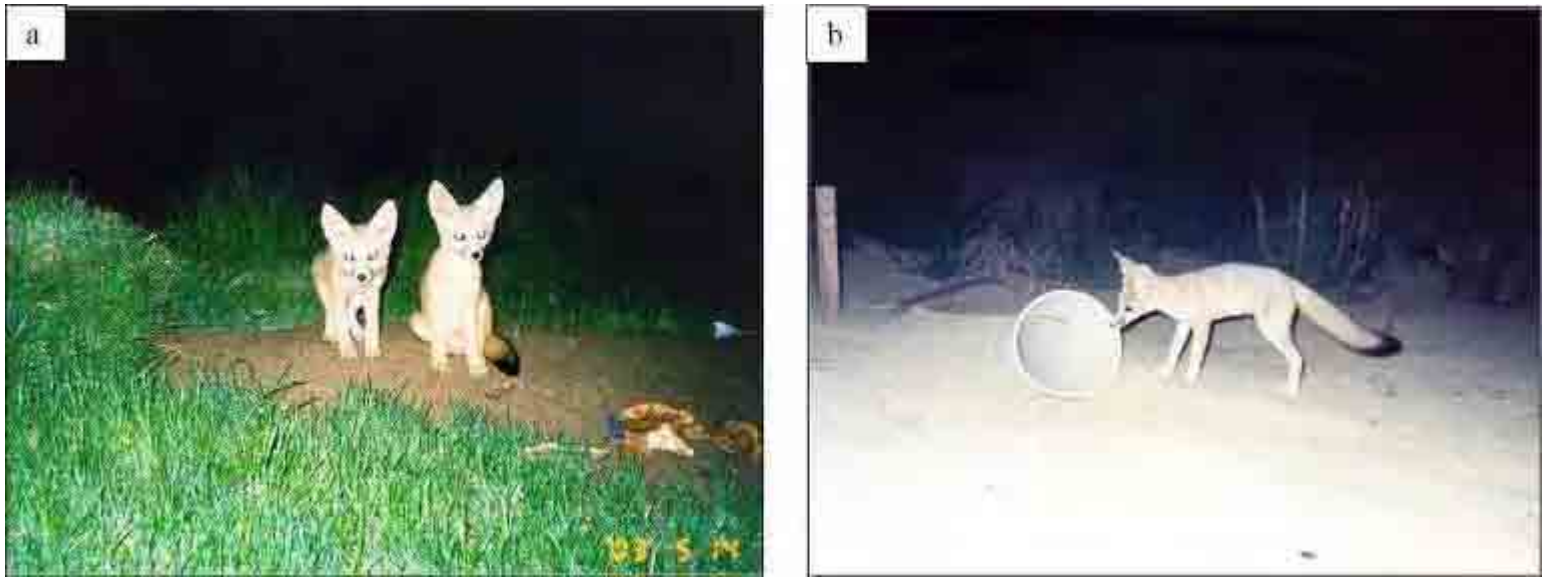
Artificial Dens; specifications by Brian Cypher, ESRP, CSU Stanislaus.



Artificial subterranean dens for San Joaquin kit fox at Bakersfield, CA. a) Artificial den schematic. b) PVC two-entrance chamber den under construction. c) High-density polyethylene two-entrance den. d) PVC tunnel with floor removed longitudinally.



Artificial escape dens for San Joaquin kit fox at Bakersfield, CA. a) Escape den schematic. b) High-density polyethylene escape den under construction. c) Completed den. d) Kit fox entering escape den.



Kit fox pups at artificial subterranean dens at a golf course (a) and drainage basin (b) in Bakersfield, CA.

Artificial Den Designs

Escape dens

Designed to provide escape cover for kit foxes. Two different lengths were used to determine whether kit foxes preferred the greater seclusion associated with a longer den.

#1: A 10-ft long length of pipe placed on the surface of the ground and covered with several inches of dirt to provide thermal insulation.

#2: A 20-ft long length of pipe placed on the surface of the ground and covered with several inches of dirt to provide thermal insulation.

Subterranean dens

Designed to provide escape cover as well as diurnal resting cover for kit foxes. The 2 designs used will determine preference by foxes for 1 versus 2 entrances.

#3: A 10-ft length of pipe with one end at the surface and one end buried approximately 3 ft underground. Underground end is open to allow foxes to expand the den and even create new entrances.

#4: A 3-ft length of pipe buried approximately 3 ft underground and accessed by 2 5-ft long entrance pipes.

Chambered dens

Designed to provide escape cover and diurnal resting cover for kit foxes, and also provides a chamber for resting or reproduction. The 2 designs used will determine preference by foxes for 1 versus 2 entrances. Also, 2 different chamber designs were used to determine whether foxes exhibit any preference among designs.

#5: A chamber buried approximately 3 ft deep with one 5-ft long entrance pipe.

#6: A chamber buried approximately 3 ft deep with two 5-ft long entrance pipes.

Artificial dens all were constructed by hand. All complexes of 2-3 dens required approximately 8-10 person hours for construction, including the transportation of materials to each site. At 6 of the 11 sites, the holes for placement of the dens were excavated by hand. At the 5 other sites, the Bakersfield Water Resources Department provided a backhoe and crew to excavate den holes.

Artificial Den Materials

A goal of this project was to test the use of easily obtainable, relatively inexpensive materials to construct artificial dens. Using such materials will reduce costs of artificial dens thereby increasing the potential use of this conservation strategy.

Den tunnels

Four materials were used for den tunnels:

8”-diameter PVC pipe

8”-diameter corrugated galvanized pipe

8”-diameter corrugated plastic pipe

10”-diameter concrete pipe (8” not available)

In some dens, strips were cut from the bottom of PVC and plastic pipes to facilitate drainage.

For bends in tunnels, 45-degree or 90-degree elbows made of either PVC, plastic or aluminum were used. Any openings around joints were covered with a piece of thick “carpet runner” plastic to exclude dirt.

Den chambers

Two types of chamber structures were used:

Plastic irrigation value boxes (approximately 30” long, 20” wide, 20” tall)

Igloo-style dog house (approximately 30” diameter at base, 24” tall)

Both chamber designs have open bottoms. Holes were cut into the sides of the chambers where tunnel pipes entered.

6.4 Site Protection and Maintenance (APMs)

6.4.1 Dens

Artificial dens will be inspected annually by a qualified kit fox biologist for the life of the TSF Project. If repairs are necessary, they will be carried out by the TSF Project after consultation with the CDFG and the USFWS and under the direction of the qualified kit fox biologist. The kit fox habitat enhancement measures will remain in place for the life of the TSF Project, unless it is determined by the CDFG and USFWS that they are ineffective or unnecessary.

6.4.2 Site management

TSF Project workers will avoid kit fox dens. If kit foxes create denning sites on the TSF Project property they will not be filled or disturbed. Mowing or weed whipping within 25 feet of active dens will be prohibited. However, grazing will be allowed within 25 feet of dens. Artificial den placement will be more than 25 feet from any TSF Project components.

6.4.3 Speed limits

To avoid accidental injury to animals, a speed limit of 25 miles per hour shall be enforced on TSF Project property for all vehicles at all times. Speed limits shall be posted at the entrance gate and throughout roadways on the property.

6.4.4 Rodenticides and herbicides

Use of rodenticides on the TSF Project should be prohibited and herbicides should be restricted. This is necessary to prevent primary or secondary poisoning of kit foxes and the depletion of prey populations on which they depend. All uses of such compounds should observe labels and other restrictions, mandated by the U.S. Environmental Protection Agency, California Department of Food and Agriculture, and other State and Federal legislation, as well as any additional TSF Project-specific restrictions deemed necessary by the Service. Kangaroo rats, mice, large insects, occasional gophers, and ground squirrels will provide prey for SJKF, therefore rodent and insect control measures will be avoided to the extent practicable. Use of herbicides should be consistent with the projects weed management plan and would be utilized only for control of invasive weeds when necessary.

6.4.5 Pets

Pets would not be allowed on the TSF Project. No pets would be allowed in the open space areas.

6.4.6 Lighting

All exterior lighting would be placed or shielded to avoid lighting open space and solar array areas. No permanent night lighting would be allowed, except for the TSF Project's Solar Energy Learning Center, substation, and monitoring and maintenance facility. PG&E's on-site switching station would be lighted as well. Maintenance and repair, as well as limited construction activities for the TSF Project will be conducted with limited temporary task lighting.

6.4.7 Education

All managers and workers for the TSF Project will be required to attend a kit fox education meeting. The meeting will be conducted by a qualified kit fox biologist and will discuss: the protections afforded kit fox as specified under state and federal Endangered Species Acts; the biology and life history of kit fox; distribution and population structure of kit fox in California and on the TSF Project site; and protective measures including protection and avoidance of disturbance of denning sites and individual kit fox.

A public education program shall provide TSF Project visitors with an informational hand out that describes the protection of kit fox as specified under state and federal endangered species acts, the biology and life history of kit fox, distribution and population structure of kit fox in California, and on-site protective measures including protection and avoidance of disturbance of denning sites and individual kit fox. Educational signage shall be located at the TSF Project's Solar Energy Learning Center. Signage shall describe the protection afforded kit fox, and provide information regarding the characteristics of the species, and potential for occurrence on site. All educational material and signage shall be approved by a qualified biologist.

6.4.8 Budget

The TSF Project shall be responsible for all costs related to the conservation program as part of Operation and Maintenance (O&M) practices. The following components described in this section are proposed conservation costs.

6.4.9 Fences and artificial dens

Fencing and artificial dens will be installed as part of the TSF Project construction. Fence and den maintenance and inspections will be part of Operation and Maintenance (O&M) practices.

6.4.10 Monitoring and research

Camera monitoring and other monitoring of the TSF Project will occur regularly as described below. In addition, the TSF Project biologist will monitor kit fox usage of the site on a monthly basis, compiling camera and other sighting information, and making agency contacts as necessary, and will prepare an annual report summarizing findings.

Budget items include initial set up for cameras and equipment. Monitoring is to be conducted for the life of the project.

6.4.11 Maintenance

Over the 20 year life span of artificial dens, replacement cost is estimated to be approximately $100 per year.

6.4.12 Financial assurances

The TSF Project will be responsible for all costs to install artificial dens and fund the monitoring program.

6.4.13 Monitoring plan

The goal of the monitoring program will be to determine whether San Joaquin kit fox is using the TSF Project site, how many SJKF are on the TSF Project site, and where they are located. To avoid disturbance to kit fox, the primary method of survey will be remote cameras. Wireless digital cameras with active link to a base station will be used. A qualified kit fox biologist will establish remote camera stations at artificial dens and at selected roads. Camera locations will be adjusted as necessary to optimize results. Cameras will be checked weekly and images downloaded. Wildlife captured on photos will be tallied and numbers included in monitoring reports. Any occurrence of kit fox will be reported within one week to DFG and USFWS.

Kit fox scat surveys will be conducted to include the entire TSF Project site once per year for five years.

Monitoring of den sites will be conducted by the qualified kit fox biologist once per month for the first five years of the TSF project. Workers on site will be instructed to report any activity observed at den sites to the kit fox biologist. Dens will be inspected monthly to determine use. Records will be kept of den locations with respect to TSF Project components (e.g. solar arrays), fences, vegetation type and height, and adjacent open spaces. An annual survey of the TSF Project will be conducted by the qualified biologist to check fence passageways and to inspect the open space areas for sign of kit fox.

The recovery plan (USFWS 1998) specifies research of SJKF population ecology and management as one of the two necessary recovery actions. The TSF Project site provides an opportunity, through the monitoring program, to investigate many of the research topics identified in the recovery plan.

Table 4. Monitoring schedule.

Task	Type	Equipment	Monitoring Frequency	Personnel	Reporting
Artificial den condition	Visual inspection, surface and fiber optic		Once annually	Kit fox biologist	Annual report
Den utilization	Remote camera	14 cameras, base station, computer	Weekly download, monthly maintenance	O&M	Data, all images to kit fox biologist. Information included in annual report
New dens	Visual inspection		Normal daily operations	O&M, kit fox biologist	Information included in annual report
Kit fox population	Scat survey, DNA analysis		Annual	Scat dogs, Center for Conservation and Evolutionary Genetics (or alternate organization with comparable expertise)	Written annual report

6.4.14 Adaptive management plan

Because there is no precedent for use of a solar farm by kit fox, it is not known if kit foxes will use the TSF Project site. Adaptive management of den sites and fence passages will be conducted when new information concerning kit fox use of the TSF Project site is obtained. Recommendations consistent with the Habitat Mitigation and Management Plan (to be prepared by Applicant as described in NEPA and CEQA documents) regarding management methods will be incorporated into the annual monitoring report and implemented as feasible.

6.4.15 Performance standards

Onsite conservation measures shall be considered to be performing their designed function if passageways through fences remain open and passable and artificial dens remain open and intact. Blockages shall be cleared immediately upon discovery. Documentation of kit foxes within the solar array fence, or passing through fenced solar array areas would constitute evidence of successful fence installation. As a contingency, in case these performance standards are not determined to be fully achieved after five years, the Applicant has proposed in this CMP to provide offsite conservation lands, as described in Table 3, and CM-1, prior to securing County grading or construction permits.

SJKF utilization of the TSF Project site at the same or higher density level for five years after final completion of construction when compared to utilization levels prior to TSF Project construction will indicate a successful conservation program. If kit fox do not occur on the TSF Project site at the same density as before construction, off-site conservation lands will still constitute a successful conservation program if habitat conditions on conservation lands are consistent with the Habitat Mitigation and Management Plan.

6.4.16 Monitoring reports

A qualified kit fox biologist will submit annual monitoring reports to the County, the California Department of Fish and Game, and the U.S. Fish and Wildlife Service. Any kit fox located within fenced solar array areas will be reported to CDFG, USFWS, and the County within one week of sighting. Monitoring reports will include date of all site visits, survey methods, survey results, and recommendations.

7.0 Figures

- **Figure 1. Location Map**
- **Figure 2. Habitat Map**
- **Figure 3. Genetic Analysis Identity Results, Alt 3B, 2010**
- **Figure 4. Genetic Analysis Identity Results, Alt 3B, 2009**
- **Figure 5. SJKF Conservation Lands**
- **Figure 6. SJKF Conservation Lands and Philips-Cypher Habitat Suitability Data**
- **Figure 7. SJKF Conservation Lands and SC Wildlands Habitat Suitability Data**
- **Figure 8. SJKF Conservation Lands and SC Wildlands Terrain Ruggedness Data**
- **Figure 9. SJKF Conservation Lands and Slope Data**

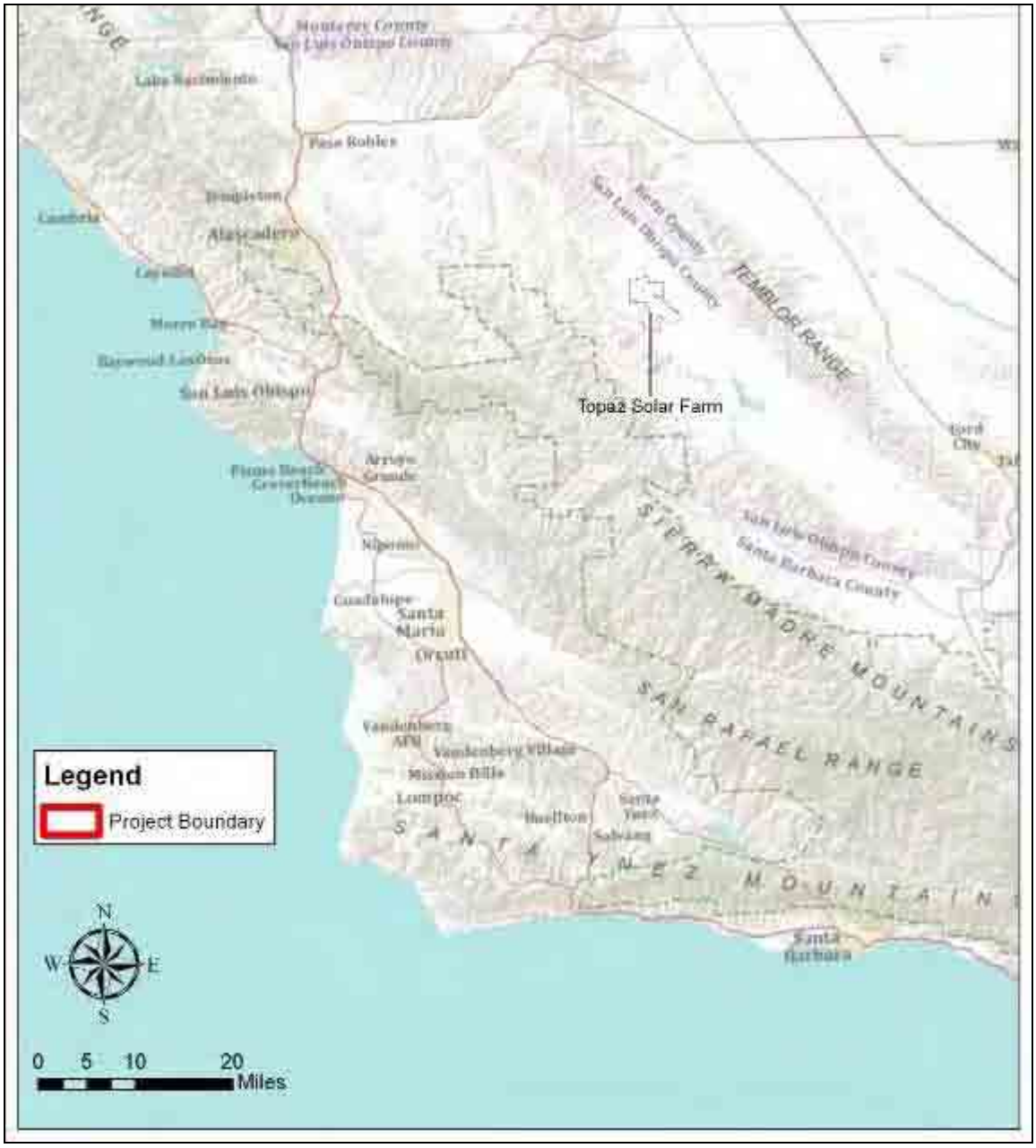


Figure 1. Location Map. The Project Site is approximately 10,000 acres in size, located in the Carrizo Plain, San Luis Obispo County. The proposed Project would be built on 3,526 acres.

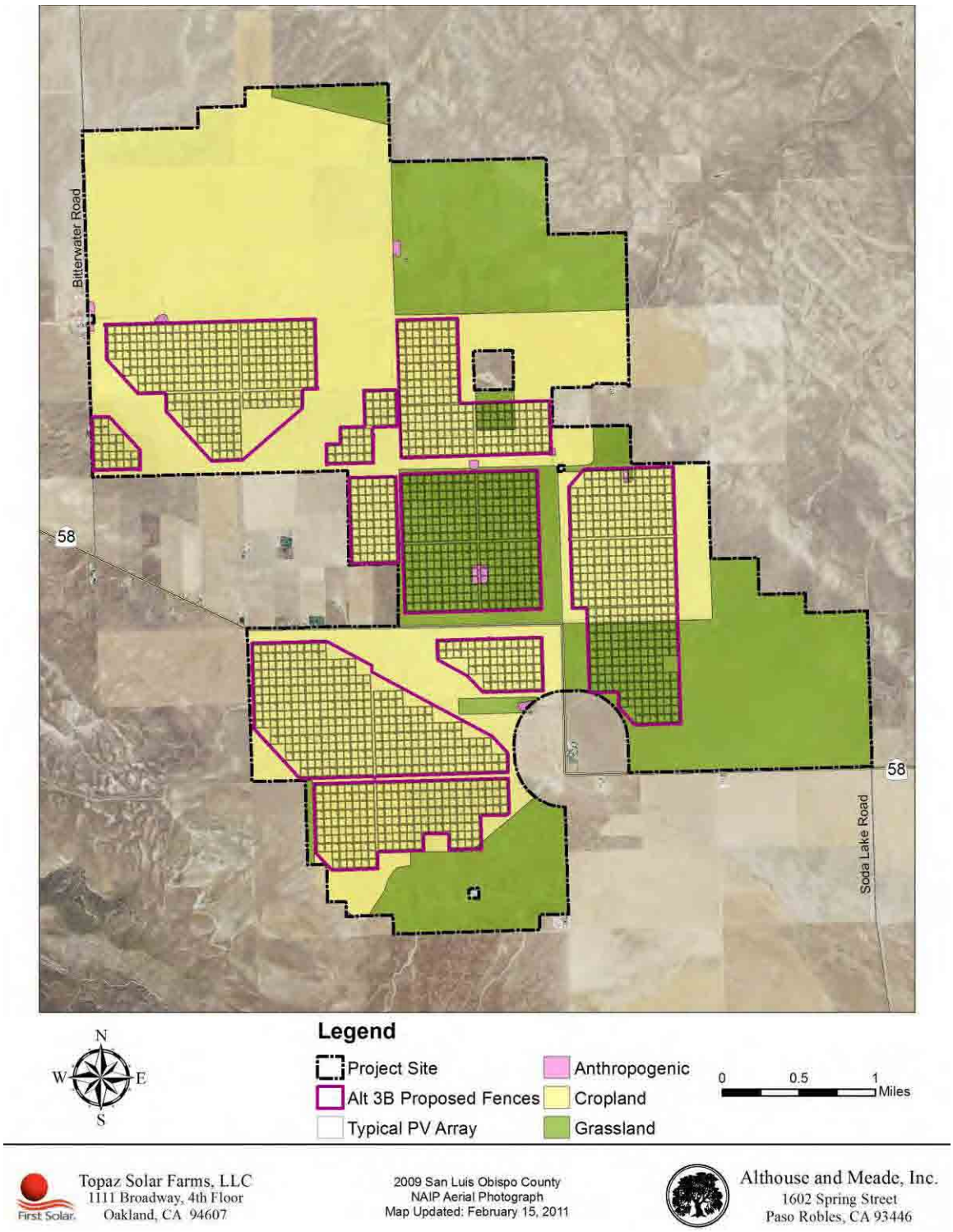


Figure 2. Habitat Map. The Project Study Area (Project Site) included all lands proposed for use in several alternatives considered. This map shows the approximately 10,000 acre Project Site. Alternative 3B final layout would be smaller, approximately 3,526 acres within the Project Site.

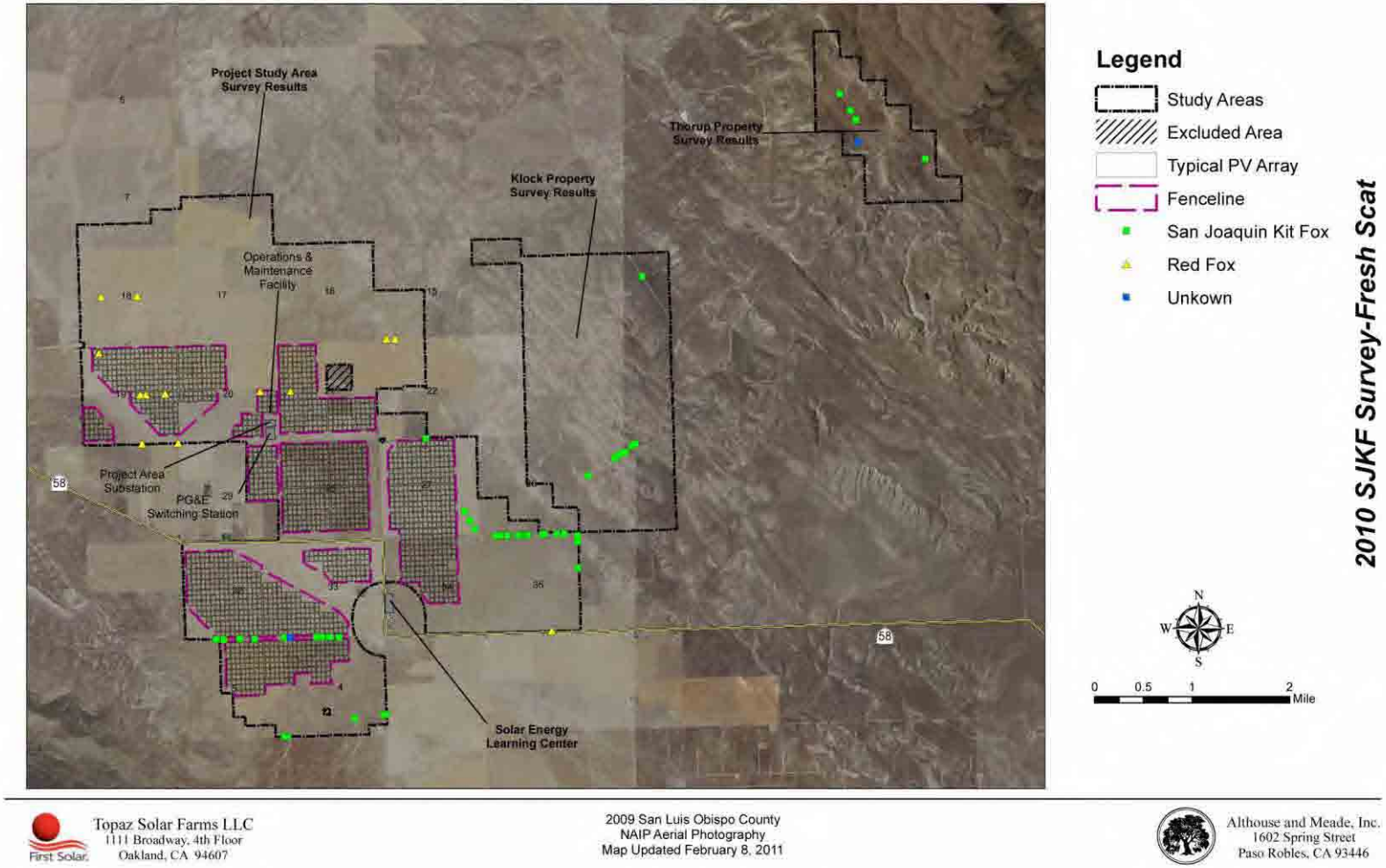
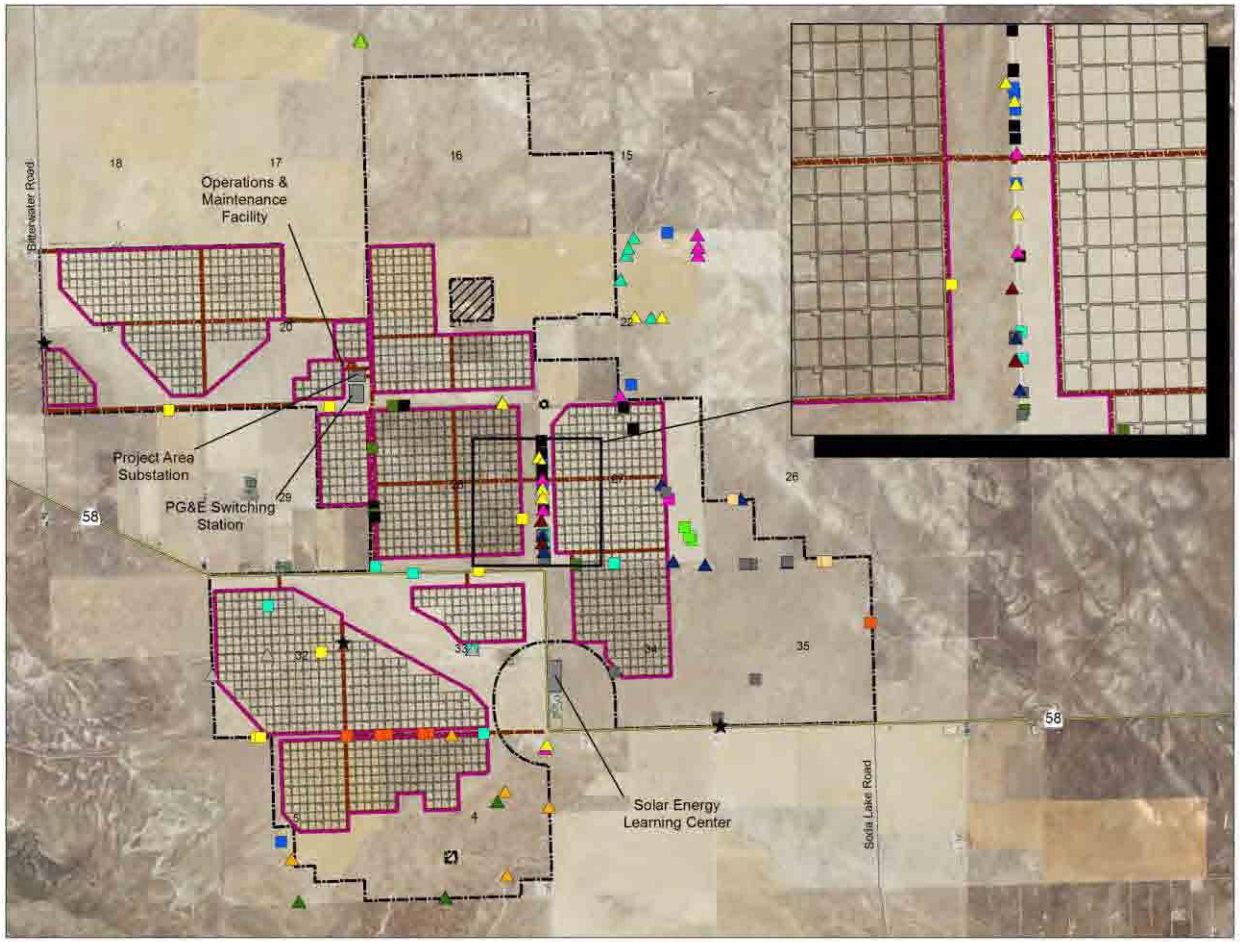


Figure 3. Genetic analysis species identity results for kit fox, Option 3B, 2010.



Legend

- Option A Study Area Boundary
- Excluded Area
- Typical PV Array
- Alt 3B Proposed Fences
- Proposed Roads
- ★ Red Fox

Map Symbol	Sex	SJKF Individual	Number of Detections
	Male	2	8
	Male	3	14
	Male	7	6
	Male	8	4
	Male	9	6
	Male	13	4
	Male	14	8
	Male	15	1
	Male	17	7
	Male	19	13
	Female	1	4
	Female	4	3
	Female	5	6
	Female	6	2
	Female	10	4
	Female	11	5
	Female	12	7
	Female	16	8
	Female	18	10

Scat collection locations from Smith 2010 (2009 data)
Genetic results from Maldonado 2010

N W E S

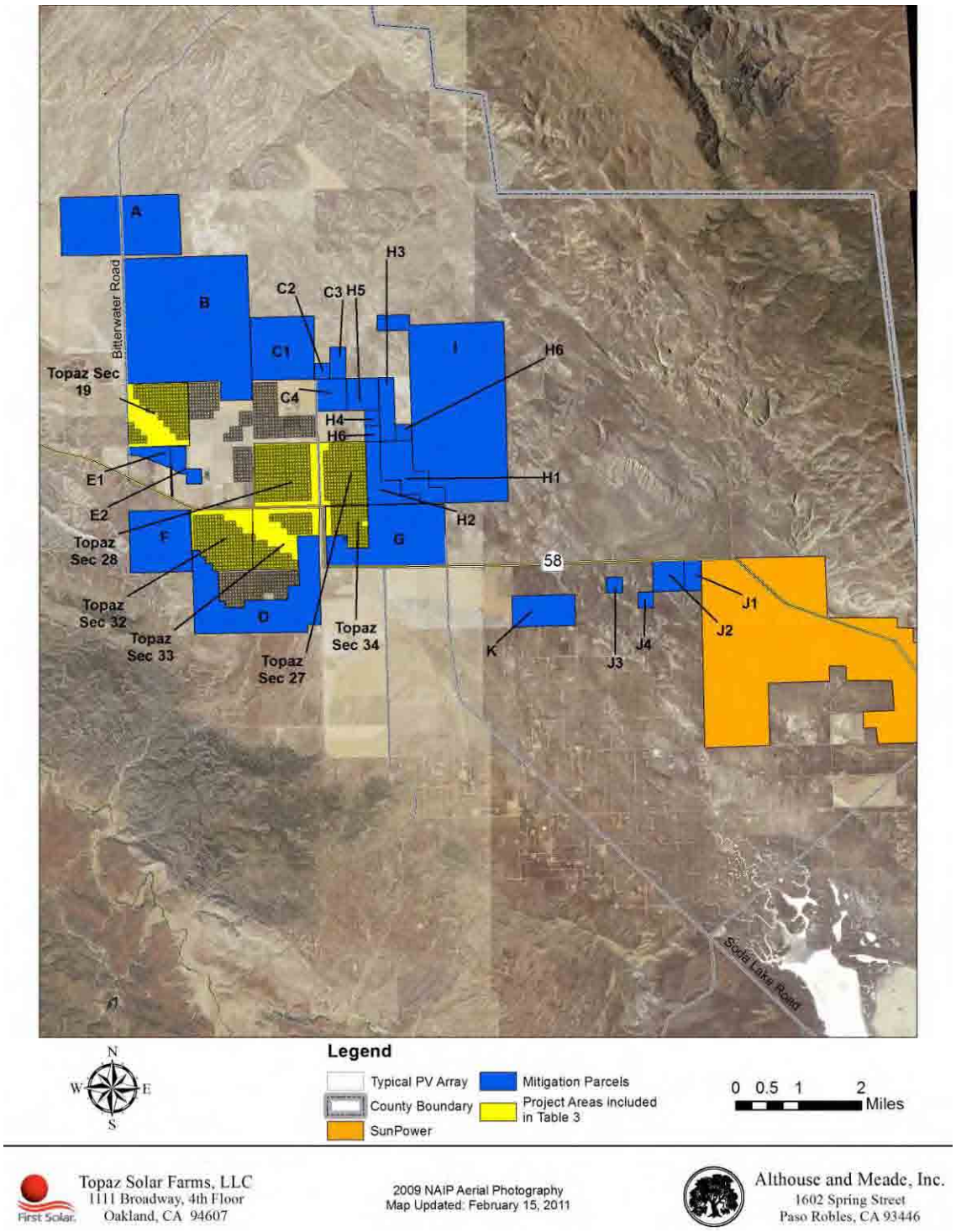
0 0.25 0.5 1 Mile

Topaz Solar Farms, LLC
1111 Broadway, 4th Floor
Oakland, CA 94607

2009 San Luis Obispo County
NAIP Aerial Photography
Map Updated: February 15, 2011

Althouse and Meade, Inc.
1602 Spring Street
Paso Robles, CA 93446

Figure 4. Genetic analysis identity results for kit fox, Alternative 3B, 2009.



Topaz Solar Farms, LLC
1111 Broadway, 4th Floor
Oakland, CA 94607

2009 NAIP Aerial Photography
Map Updated: February 15, 2011

Althouse and Meade, Inc.
1602 Spring Street
Paso Robles, CA 93446

Figure 5. SJKF Potential Conservation Lands. Conservation measures would include parcels shown in blue in the conservation program. Refer to Table 3 for parcel information. PV arrays indicated are from Alternative 3B. Note, up to 2,800 acres of cropland included within the conservation land package may be placed in agricultural conservation easements and may retain the potential to be planted with crops, in order to meet County requirements for mitigating impacts to agricultural resources.

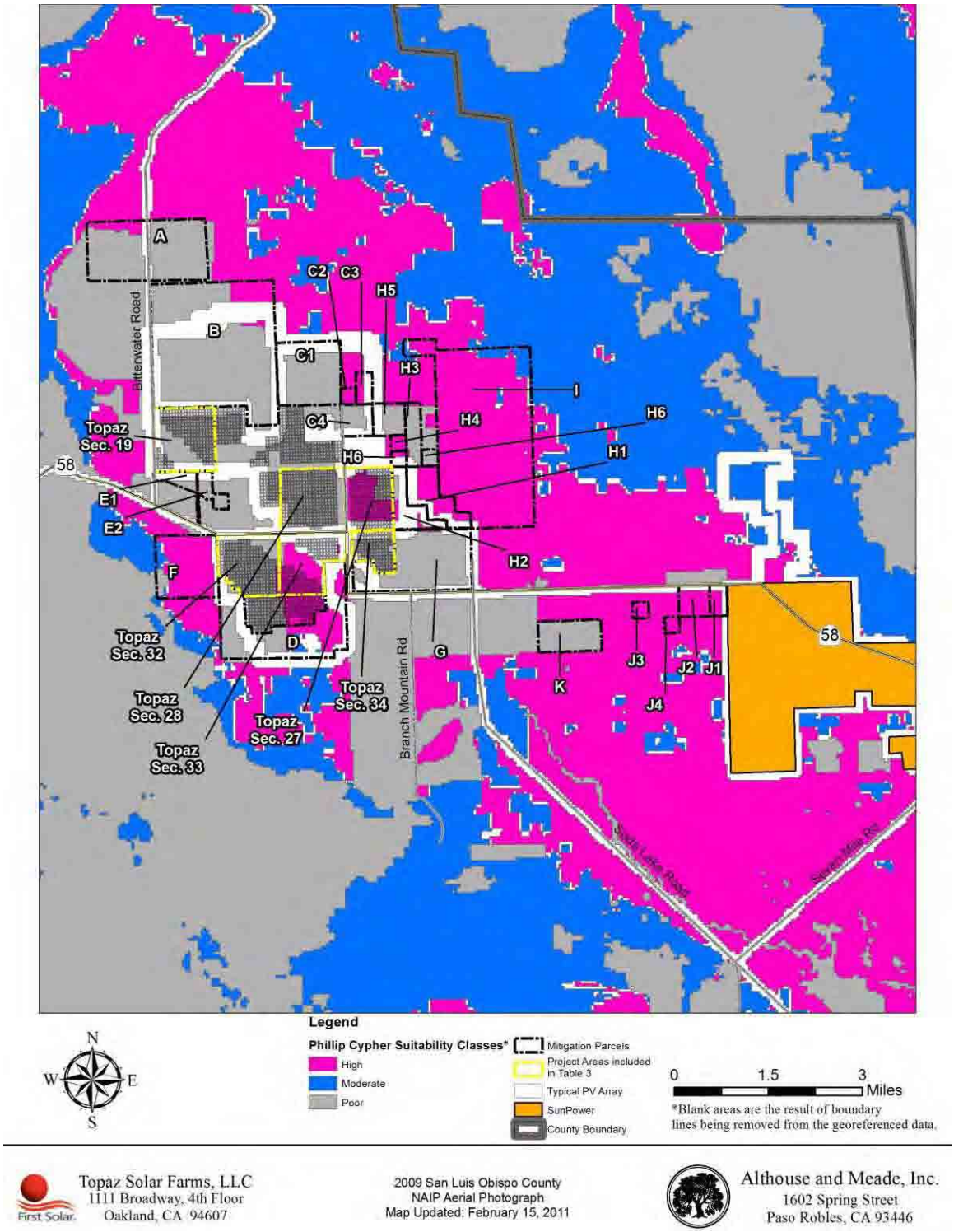
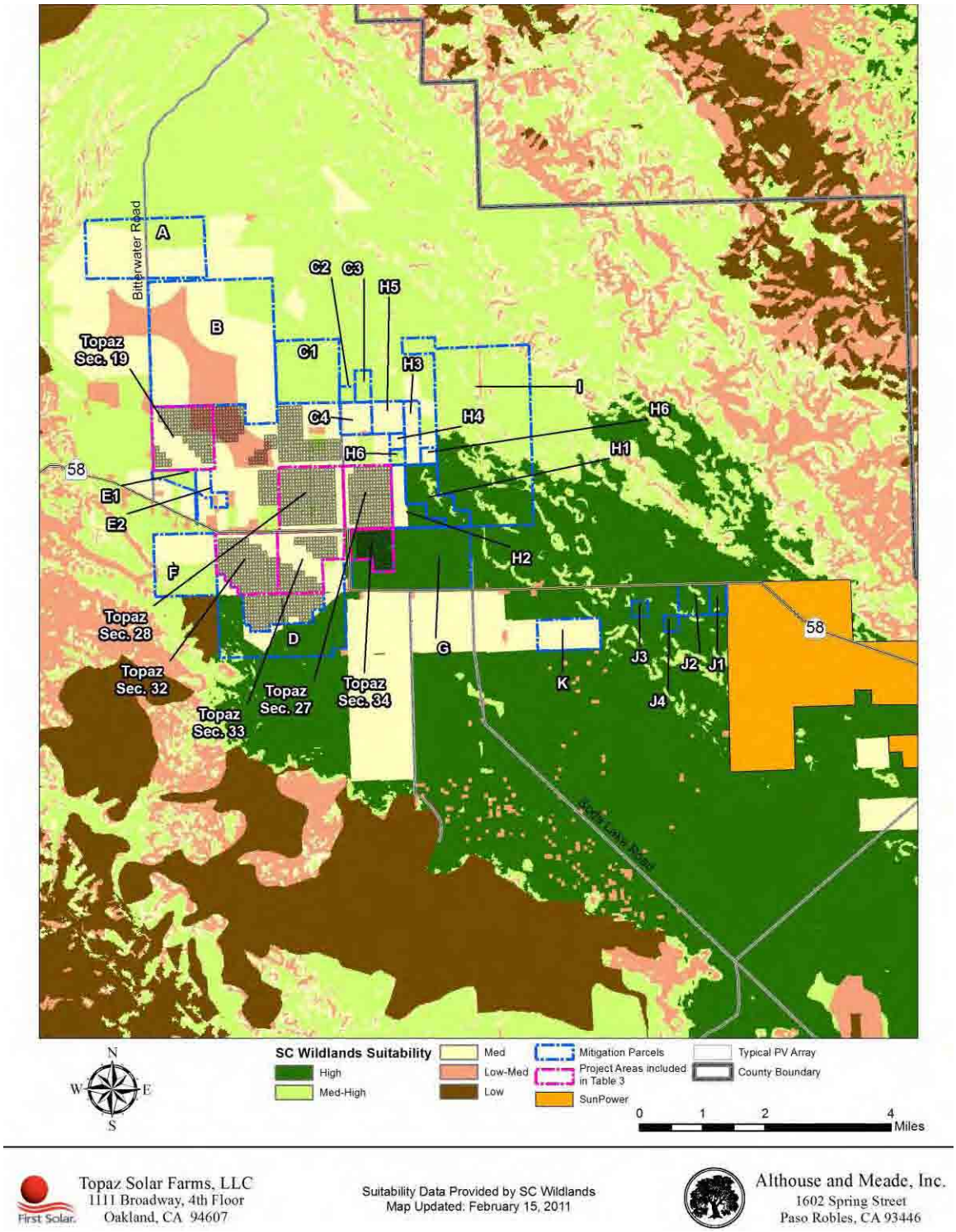


Figure 6. The Project area and conservation lands are indicated with the Philips-Cypher habitat suitability model data. Letters designating parcels are described in Table 3. PV arrays indicated are from Alternative 3B.



Topaz Solar Farms, LLC
1111 Broadway, 4th Floor
Oakland, CA 94607

Suitability Data Provided by SC Wildlands
Map Updated: February 15, 2011

Althouse and Meade, Inc.
1602 Spring Street
Paso Robles, CA 93446

Figure 7. The Project area and conservation lands are indicated with the SC Wildlands habitat suitability model data. Letters designating parcels are described in Table 3. PV arrays indicated are from Alternative 3B.

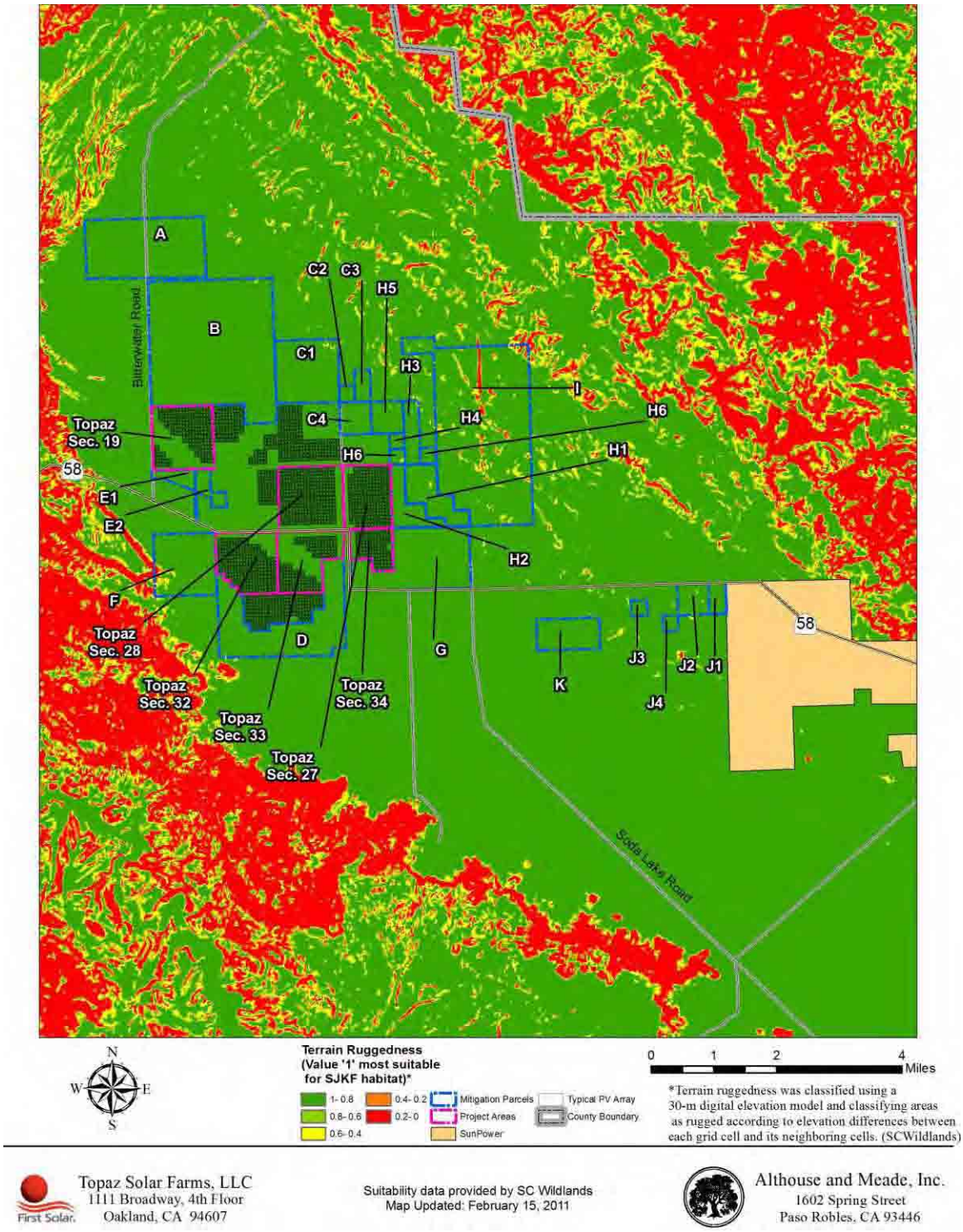


Figure 8. The Project area and conservation lands are indicated with the SC Wildlands terrain data. Letters designating parcels are described in Table 3. PV arrays indicated are from Alternative 3B.

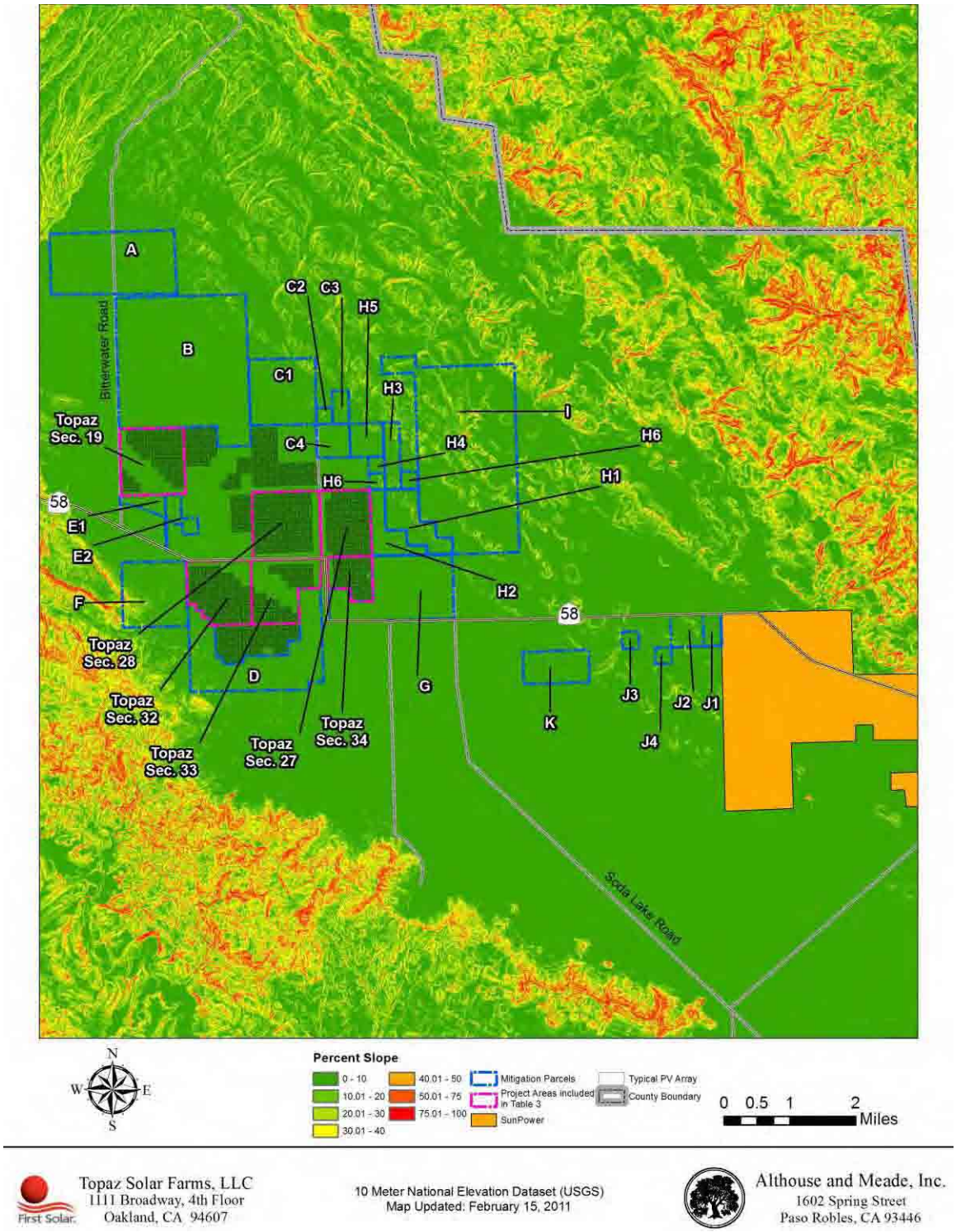


Figure 9. The Project area and conservation lands are indicated with slope data. Letters designating parcels are described in Table 3. PV arrays indicated are from Alternative 3B.

8.0 References

Althouse and Meade, Inc. 2009. Biological Report for the Topaz Solar Farm, California Valley, San Luis Obispo County. Prepared for Topaz Solar Farms LLC. October 2009.

Althouse and Meade, Inc. 2010a. Final Biological Report for the Topaz Solar Farm, California Valley, San Luis Obispo County, California. July.

Althouse and Meade, Inc. 2010b. Biological Report Technical Appendix, Volumes 1, 2, and 3. June.

Aspen Environmental Group. 2010. Topaz Solar Farm Project Draft Environmental Impact Report. County of San Luis Obispo.

Berry, William H., and William G. Standley, 1992. Population trends of San Joaquin kit fox (*Vulpes velox macrotis*) at Camp Roberts Army National Guard Training Site, California. U. S. Dept. of Energy Topical Report, EG&G/EM Santa Barbara Operations Report No. EGG 10617-2155. 16 pp. Reprints are available from the National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161.

Brown, N.L., C.D. Johnson, P.A. Kelly, and D.F. Williams. Endangered Species Recovery Program. Species account. Online at: http://esrp.csustan.edu/

Bjurlin, C.D. 2004. Effects of roads on San Joaquin kit foxes: a review and synthesis of existing data. IN: Proceedings of the 2003 International Conference on Ecology and Transportation, Eds. Irwing CL, Carrett P, McDermott KP, Center for Transportation and the Environment, North Carolina State University, Raleigh, NC: pp. 397-406.

Collins, Paul W. 2009. Results of Small Mammal Trapping at the Topaz Solar Farm, California Valley, San Luis Obispo County, California. October 20.

Collins, Paul W. 2010. Results of Small Mammal Trapping on portions of the Topaz Solar Farm Project Site in California Valley, Sections 4, 5, 15, 26, 28, 32-35, San Luis Obispo County, California. April 26.

Conover, A. 2001. The little foxes. Smithsonian Magazine. 32(5):42.

Cypher, Brian L. 2010a. Personal communications by phone and email with Dan Meade.

Cypher, Brian L. 2010b. Kit Foxes (*Vulpes macrotis*), Chapter 5 in: Urban Carnivores, Ecology, Conflict, and Conservation. Edited by Stanley D. Gehrt, Seth P.E. Riley and Brian L. Cypher, Johns Hopkins University Press, Baltimore, MD.

Cypher, Brian L. 2009. Personal communications by phone and email with Dan Meade.

Cypher, Brian L., Curtis D. Bjurlin, and Julia L. Nelson. 2009. Effects of Roads on Endangered San Joaquin Kit Foxes. Journal of Wildlife Management 73(6):885-893.

Cypher, Brian L. and Patrick A. Kelly, Daniel L. Williams, Howard O. Clark, Alexander D. Brown, Scott E. Phillips. 2005. Foxes in Farmland: Recovery of the

Endangered San Joaquin Kit Fox on Private Lands in California. CSU Stanislaus. 19pp. ESRP, Fresno.

Cypher, Brian L., Curtis D. Bjurlin, and Julia L. Nelson. 2005. Effects of Two-land Roads on Endangered San Joaquin Kit Foxes. California State University, Stanislaus, Endangered Species Recovery Program, Fresno, CA.

Cypher, Brian L. 2000. Effects of roads on San Joaquin kit foxes: a review and synthesis of existing data. California State University-Stanislaus, Endangered Species Recovery Program, Fresno, California.

Cypher, B.L. and Gregory D. Warrick, Mark R. M. Otten, Thomas P. O'Farrell, William H. Berry, Charles E. Harris, Thomas T. Kato, Patrick M. McCue, Jerry H. Scrivner, and Bruce W. Zoellick. 2000. Population Dynamics of San Joaquin Kit Foxes at the Naval Petroleum Reserves in California. Wildlife Monographs, No. 145, The Wildlife Society.

Cypher, B. L., and N. Frost. 1999. Condition of kit foxes in urban and exurban habitats. J. Wildlife Management 63:930-939.

Cypher, B. L., and G. D. Warrick. 1994. Use of human-derived food items by urban kit foxes. Trans. Western Section Wildlife Society 29:34-37.

Cypher, Brian L. and Jerry H. Scrivner. 1992. Coyote Control to Protect Endangered San Juan Kit Foxes at the Naval Petroleum Reserves, California. Vertebrate Pest Conference Proceedings Collection, Proceedings of the Fifteenth Vertebrate Pest Conference 1992, University of Nebraska, Lincoln.

Cypher, Brian L. 2009. Personal communications by phone and email with Dan Meade.

Cypher, Brian L., Patrick A. Kelly, Daniel F. Williams, Howard O. Clark, Jr., Alexander D. Brown, and Scott E. Phillips. 2005. Foxes in Farmland: Recovery of the Endangered San Joaquin Kit Fox on Private Lands in California. National Fish and Wildlife Foundation, Project Number 2000-129-012. California State University, Stanislaus, Endangered Species Recovery Program, Fresno, CA.

Egoscue, H. J. 1975. Population dynamics of the kit fox in western Utah. Bulletin Southern California Academy of Sciences. 74:122-127.

Frost, Nancy. 2005. San Joaquin Kit Fox Home Range, Habitat Use, and Movements in Urban Bakersfield. Master's Thesis (M.S.), Humboldt State University.

Harrison, R.L., D.J. Barr, and J.W Dragoo. 2002. A Comparison of Population Survey Techniques for Swift Foxes (*Vulpes velox*) in New Mexico. The American Midland Naturalist 148(2): 320-337.

Henry, Tammy and Jesus Maldonado. 2010. Unpublished letter. Center for Conservation and Evolutionary Genetics, National Zoological Park, National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Kohn, M. H., York, E. C., Kamradt, D. A., Haught, G. Sauvajot, R. M., & Wayne, R. K. (1999). Estimating population size by genotyping faeces. *Proceedings of the Royal Society of London*, *266***,** 657-663.

Koopman, M.E., et al. 2000. Dispersal patterns of San Joaquin kit foxes. Journal of Mammalogy. 81(1):213-222.

Maldonado, Jesus E. 2010. Final Report to Althouse and Meade Inc., Friday, July 30, 2010, Using non-invasive fecal DNA analysis to estimate the presence, distribution and abundance of endangered San Joaquin Kit foxes in the Topaz Solar Farm project study area. July.

McGee, Brady K., Warren B. Ballard, Kerry L. Nicholson, Briand L. Cypher, Patrick R Lemons II, Jan F. Kamler. 2006. Effects of Artificial Escape Dens on Swift Fox Populations in Northwest Texas. Wildlife Society Bulletin, 34(3): 821-827.

Nelson, Julia L., Brian L. Cypher, Curtis D. Bjurlin, and Scott Creel. 2007. Effects of Habitat on Competition Between Kit Foxes and Coyotes. Journal of Wildlife Management, Volume 71, Issue 5 (July 2007) pp. 1467-1475.

Ralls, K., & Smith, D.A. (2004). Latrine use by San Joaquin kit foxes (*Vulpes macrotis mutica*) and coyotes (*Canis latrans*). *Western North American Naturalist, 64*, 544-547.

Smith, Deborah A. and Alice Whitelaw. 2010. Scat Detection Dog Surveys for the Endangered San Joaquin Kit Fox (*Vulpes macrotis mutica*) on Topaz Solar Farm Properties in San Luis Obispo County, California. Unpublished report, Working Dogs for Conservation Foundation, Three Forks, MT. 18 pages.

Smith, D. A., Ralls, K., Hurt, A., Adams, B., Parker, M., Davenport, B., Smith M. C., Maldonado, & J. E. (2003). Detection and accuracy rates of dogs trained to find scats of San Joaquin kit foxes (*Vulpes macrotis mutica*). *Animal Conservation, 6*, 339-346.

Smith D. A., Ralls K., Cypher B. L., & Maldonado, J. E. (2005). Assessment of scat-detection dog surveys to determine kit fox distribution. *Wildlife Society Bulletin, 33*, 897-904.

Smith, D. A., & Whitelaw, A. 2010. Scat Detection Dog Surveys for the Endangered San Joaquin Kit Fox (*Vulpes macrotis mutica*) on Topaz Solar Farm Properties in San Luis Obispo County, California. January.

Smith, D.A. 2010. Personal communication.

Standley, William G., William H. Berry, Thomas P. O'Farrell, and Thomas T. Kato. 1992. Mortality of San Joaquin Kit Fox (*Vulpes velox macrotis*) at Camp Roberts Army National Guard Training Site, California. EG&G Energy Measurements, for, U.S. Departments of the Army and Air Force National Guard Bureau.

Thelander, C. ed. 1994. Life on the edge: a guide to California's endangered natural resources. BioSystem Books. Santa Cruz, California. p 86-89.

URS Corporation.2008. Carrizo Energy Solar Farm (07-AFC-8), 2008 Biological Surveys Letter Report, URS Project No. 27658060, October 10, 2008.

United States Fish and Wildlife Service. 1967. Native Fish and Wildlife, Endangered Species. Washington, D.C.

United States Fish and Wildlife Service. 1998. Recovery Plan for Upland Species of the San Joaquin Valley, California. Region 1, Portland, OR. Fed. Register Notice, U.S. Fish and Wildlife Service.

United States Fish and Wildlife Service. 1999. Standardized Recommendations for Protection of the San Joaquin Kit Fox prior to or During Ground Disturbance. Prepared by the Sacramento Fish and Wildlife Office, June 1999.

United States Fish and Wildlife Service. 2010. San Joaquin Kit Fox (*Vulpes macrotis mutica*) 5-Year Review: Summary and Evaluation. Sacramento Fish and Wildlife Office, Sacramento, California.

Vanherweg, Bill. 2008. Topaz Solar Energy Project Nocturnal Small Mammal Trapping Survey. Prepared for OptiSolar Inc.

White, P.J., Katherine Ralls, and Donald B. Siniff. 2000. Nocturnal Encounters Between Kit Foxes. Journal of Mammalogy, 81(2): 456-461.

White, P.J. and Robert A. Garrott. 1999. Population Dynamics of Kit Foxes. Can. J. Zool. 77(3): 486–493 (1999).

Exhibit A - USFWS Kit Fox Protection Recommendations

U.S. FISH AND WILDLIFE SERVICE
STANDARDIZED RECOMMENDATIONS
FOR PROTECTION OF THE SAN JOAQUIN KIT FOX
PRIOR TO OR DURING GROUND DISTURBANCE

Prepared by the Sacramento Fish and Wildlife Office
June 1999

INTRODUCTION

The following document includes many of the San Joaquin kit fox (*Vulpes macrotis mutica*) protection measures typically recommended by the U. S. Fish and Wildlife Service (Service), prior to and during ground disturbance activities. However, incorporating relevant sections of these guidelines into the proposed project is not the only action required under the Endangered Species Act of 1973, as amended (Act). Project applicants should contact the Service in Sacramento to determine the full range of requirements that apply to your project; the address and telephone number are given at the end of this document. Formal authorization for the project may be required under either section 7 or section 10 of the Act. Implementation of the measures presented in this document may be necessary to avoid violating the provisions of the Act, including the prohibition against "take" (defined as killing, harming, or harassing a listed species, including actions that damage or destroy its habitat). Such protection measures may also be required under the terms of a biological opinion pursuant to section 7 of the Act resulting in incidental take authorization (authorization), or an incidental take permit (permit) pursuant to section 10 of the Act. The specific measures implemented to protect kit fox for any given project shall be determined by the Service based upon the applicant's consultation with the Service.

The purpose of this document is to make information on kit fox protection strategies readily available and to help standardize the methods and definitions currently employed to achieve kit fox protection. The measures outlined in this document are subject to modification or revision at the discretion of the Service.

All surveys, den destructions, and monitoring described in this document must be conducted by a qualified biologist. A qualified biologist (biologist) means any person who has completed at least four years of university training in wildlife biology or a related science and/or has demonstrated field experience in the identification and life history of the San Joaquin kit fox. In addition, biologist(s) must be able to identify coyote, red fox, gray fox, and kit fox tracks, and to have seen a kit fox in the wild, at a zoo, or as a museum mount.

SMALL PROJECTS

Small projects are considered to be those projects with small foot prints such as an individual in-fill oil well, communication tower, or bridge repair. These projects must stand alone and not be part of, or in any way connected to larger projects (i.e., bridge repair or improvement to serve a

future urban development). The Service recommends that on these small projects, the biologist survey the proposed project boundary and a 200-foot area outside of the project footprint to identify habitat features, and make recommendations on situating the project to minimize or avoid impacts. If habitat features cannot be completely avoided, then preconstruction surveys should be conducted.

Preconstruction/preactivity surveys shall be conducted no less than 14 days and no more than 30 days prior to the beginning of ground disturbance and/or construction activities or any project activity likely to impact the San Joaquin kit fox. Surveys should identify kit fox habitat features on the project site and evaluate use by kit fox and, if possible, and assess the potential impacts to the kit fox by the proposed activity. The status of all dens should be determined and mapped (see Survey Protocol).

Written results of preconstruction/preactivity surveys must be received by the Service within five days after survey completion and prior to the start of ground disturbance and/or construction activities. If a natal/pupping den is discovered within the project area or within 200-feet of the project boundary, the Service shall be immediately notified. If the preconstruction/preactivity survey reveals an active natal pupping or new information, the project applicant should contact the Service immediately to obtain the necessary take authorization/permit.

If take authorization/permit has already been issued, then the biologist may proceed with den destruction within the project boundary, except natal/pupping dens (active or inactive). Protective exclusion zones can be placed around all known and potential dens which occur outside the project footprint (conversely, the project boundary can be demarcated, see den destruction section).

OTHER PROJECTS

It is likely that all other projects occurring within kit fox habitat will require a take authorization/permit from the Service. This determination would be made by the Service during the early evaluation process (see Survey Protocol). These other projects would include, but are not limited to: linear projects; projects with large footprints such as urban development; and projects which in themselves may be small but have far reaching impacts (i.e., water storage or conveyance facilities that promote urban growth or agriculture, etc.).

The take authorization/permit issued by the Service may incorporate some or all of the protection measures presented in this document. The take authorization/permit may include measures specific to the needs of the project, and those requirements supersede any requirements found in this document.

EXCLUSION ZONES

The configuration of exclusion zones around the kit fox dens should have a radius measured outward from the entrance or cluster of entrances. The following radii are minimums, and if they cannot be followed the Service must be contacted:

Potential den	50 feet
Known den	100 feet
Natal/pupping den (occupied and unoccupied)	Service must be contacted
Atypical den	50 feet

Known den: To ensure protection, the exclusion zone should be demarcated by fencing that encircles each den at the appropriate distance and does not prevent access to the den by kit foxes. Exclusion zone fencing should be maintained until all construction related or operational disturbances have been terminated. At that time, all fencing shall be removed to avoid attracting subsequent attention to the dens.

Potential and Atypical dens: Placement of 4-5 flagged stakes 50 feet from the den entrance(s) will suffice to identify the den location; fencing will not be required, but the exclusion zone must be observed.

Construction and other project activities should be prohibited or greatly restricted within these exclusion zones. Only essential vehicle operation on existing roads and foot traffic should be permitted. Otherwise, all construction, vehicle operation, material storage, or any other type of surface-disturbing activity should be prohibited within the exclusion zones.

DESTRUCTION OF DENS

Disturbance to all San Joaquin kit fox dens should be avoided to the maximum extent possible. Protection provided by kit fox dens for use as shelter, escape, cover, and reproduction is vital to the survival of the species. Limited destruction of kit fox dens may be allowed, if avoidance is not a reasonable alternative, provided the following procedures are observed. The value to kit foxes of potential, known, and natal/pupping dens differ and therefore, each den type needs a different level of protection. **Destruction of any known or natal/pupping kit fox den requires take authorization/permit from the Service**.

Natal/pupping dens: Natal or pupping dens which are occupied will not be destroyed until the pups and adults have vacated and then only after consultation with the Service. Therefore, project activities at some den sites may have to be postponed.

Known Dens: Known dens occurring within the footprint of the activity must be monitored for three days with tracking medium or an infra-red beam camera to determine the current use. If no kit fox activity is observed during this period, the den should be destroyed immediately to preclude subsequent use. If kit fox activity is observed at the den during this period, the den should be monitored for at least five consecutive days from the time of the observation to allow any resident animal to move to another den during its normal activity. Use of the den can be discouraged during this period by partially plugging its entrances(s) with soil in such a manner that any resident animal can escape easily. Only when the den is determined to be unoccupied may the den be excavated under the direction of the biologist. If the animal is still present after five or more consecutive days of plugging and monitoring, the den may have to be excavated when, in the judgment of a biologist, it is temporarily vacant, for example during the animal's normal foraging activities. The Service encourages hand excavation, but realizes that soil conditions may necessitate the use of excavating equipment. However, extreme caution must be exercised.

Destruction of the den should be accomplished by careful excavation until it is certain that no kit foxes are inside. The den should be fully excavated, filled with dirt and compacted to ensure that kit foxes cannot reenter or use the den during the construction period. If at any point during excavation a kit fox is discovered inside the den, the excavation activity shall cease immediately and monitoring of the den as described above should be resumed. Destruction of the den may be completed when in the judgement of the biologist, the animal has escaped from the partially destroyed den.

Potential Dens: If a take authorization/permit has been obtained from the Service, den destruction may proceed without monitoring, unless other restrictions were issued with the take authorization/permit. If no take authorization/permit has been issued, then potential dens should be monitored as if they were known dens. If any den was considered to be a potential den, but is later determined during monitoring or destruction to be currently, or previously used by kit fox (e.g., if kit fox sign is found inside), then destruction shall cease and the Service shall be notified immediately.

CONSTRUCTION AND OPERATIONAL REQUIREMENTS

Habitat subject to permanent and temporary construction disturbances and other types of project-related disturbance should be minimized. Project designs should limit or cluster permanent project features to the smallest area possible while still permitting project goals to be achieved. To minimize temporary disturbances, all project-related vehicle traffic should be restricted to established roads, construction areas, and other designated areas. These areas should also be

included in preconstruction surveys and, to the extent possible, should be established in locations disturbed by previous activities to prevent further impacts.

1. Project-related vehicles should observe a 20-mph speed limit in all project areas, except on county roads and State and Federal highways; this is particularly important at night when kit foxes are most active. To the extent possible, night-time construction should be minimized. Off-road traffic outside of designated project areas should be prohibited.

2. To prevent inadvertent entrapment of kit foxes or other animals during the construction phase of a project, all excavated, steep-walled holes or trenches more than 2 feet deep should be covered at the close of each working day by plywood or similar materials, or provided with one or more escape ramps constructed of earth fill or wooden planks. Before such holes or trenches are filled, they should be thoroughly inspected for trapped animals. If at any time a trapped or injured kit fox is discovered, the procedures under number 13 of this section must be followed.

3. Kit foxes are attracted to den-like structures such as pipes and may enter stored pipe becoming trapped or injured. All construction pipes, culverts, or similar structures with a diameter of 4-inches or greater that are stored at a construction site for one or more overnight periods should be thoroughly inspected for kit foxes before the pipe is subsequently buried, capped, or otherwise used or moved in any way. If a kit fox is discovered inside a pipe, that section of pipe should not be moved until the Service has been consulted. If necessary, and under the direct supervision of the biologist, the pipe may be moved once to remove it from the path of construction activity, until the fox has escaped.

4. All food-related trash items such as wrappers, cans, bottles, and food scraps should be disposed of in closed containers and removed at least once a week from a construction or project site.

5. No firearms shall be allowed on the project site.

6. To prevent harassment, mortality of kit foxes or destruction of dens by dogs or cats, no pets should be permitted on project sites.

7. Use of rodenticides and herbicides in project areas should be restricted. This is necessary to prevent primary or secondary poisoning of kit foxes and the depletion of prey populations on which they depend. All uses of such compounds should observe label and other restrictions mandated by the U.S. Environmental Protection Agency, California Department of Food and Agriculture, and other State and Federal legislation, as well as additional project-related restrictions deemed necessary by the Service. If rodent control

must be conducted, zinc phosphide should be used because of proven lower risk to kit fox.

8. A representative shall be appointed by the project proponent who will be the contact source for any employee or contractor who might inadvertently kill or injure a kit fox or who finds a dead, injured or entrapped individual. The representative will be identified during the employee education program. The representative's name and telephone number shall be provided to the Service.

9. An employee education program should be conducted for any project that has expected impacts to kit fox or other endangered species. The program should consist of a brief presentation by persons knowledgeable in kit fox biology and legislative protection to explain endangered species concerns to contractors, their employees, and military and agency personnel involved in the project. The program should include the following: a description of the San Joaquin kit fox and its habitat needs; a report of the occurrence of kit fox in the project area; an explanation of the status of the species and its protection under the Endangered Species Act; and a list of measures being taken to reduce impacts to the species during project construction and implementation. A fact sheet conveying this information should be prepared for distribution to the above-mentioned people and anyone else who may enter the project site.

10. Upon completion of the project, all areas subject to temporary ground disturbances, including storage and staging areas, temporary roads, pipeline corridors, etc. should be re-contoured if necessary, and revegetated to promote restoration of the area to pre-project conditions. An area subject to "temporary" disturbance means any area that is disturbed during the project, but that after project completion will not be subject to further disturbance and has the potential to be revegetated. Appropriate methods and plant species used to revegetate such areas should be determined on a site-specific basis in consultation with the Service, California Department of Fish and Game (CDFG), and revegetation experts.

11. In the case of trapped animals, escape ramps or structures should be installed immediately to allow the animal(s) to escape, or the Service should be contacted for advice.

12. Any contractor, employee, or military or agency personnel who inadvertently kills or injures a San Joaquin kit fox shall immediately report the incident to their representative. This representative shall contact the CDFG immediately in the case of a dead, injured or entrapped kit fox. The CDFG contact for immediate assistance is State Dispatch at (916) 445-0045. They will contact the local warden or biologist.

13. The Sacramento Fish and Wildlife Office and CDFG will be notified in writing within three working days of the accidental death or injury to a San Joaquin kit fox during

project related activities. Notification must include the date, time, and location of the incident or of the finding of a dead or injured animal and any other pertinent information. The Service contact is the Chief of the Division of Endangered Species, at the addresses and telephone numbers given below. The CDFG contact is Mr. Ron Schlorff at 1416 9th Street, Sacramento, California 95814, (916) 654-4262.

Any project-related information required by the Service or questions concerning the above conditions or their implementation may be directed in writing to the U.S. Fish and Wildlife Service at:

Endangered Species Division
2800 Cottage Way, Suite W2605
Sacramento, California 95825-1846
(916) 414-6620

"Take" - Section 9 of the Endangered Species Act of 1973, as amended (Act) prohibits the "take" of any federally listed endangered species by any person (an individual, corporation, partnership, trust, association, etc.) subject to the jurisdiction of the United States. As defined in the Act, take means " . . . to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." Thus, not only is a listed animal protected from activities such as hunting, but also from actions that damage or destroy its habitat.

"Dens" - San Joaquin kit fox dens may be located in areas of low, moderate, or steep topography. Den characteristics are listed below, however, the specific characteristics of individual dens may vary and occupied dens may lack some or all of these features. Therefore, caution must be exercised in determining the status of any den. Typical dens may include the following: (1) one or more entrances that are approximately 5 to 8 inches in diameter; (2) dirt berms adjacent to the entrances; (3) kit fox tracks, scat, or prey remains in the vicinity of the den; (4) matted vegetation adjacent to the den entrances; and (5) manmade features such as culverts, pipes, and canal banks.

"Known den" - Any existing natural den or manmade structure that <u>is used or has been used at any time in the past</u> by a San Joaquin kit fox. Evidence of use may include historical records, past or current radiotelemetry or spotlighting data, kit fox sign such as tracks, scat, and/or prey remains, or other reasonable proof that a given den is being or has been used by a kit fox. The Service discourages use of the terms ”active” and “inactive” when referring to any kit fox den because a great percentage of occupied dens show no evidence of use, and because kit foxes change dens often, with the result that the status of a given den may change frequently and abruptly.

"Potential Den" - Any subterranean hole within the species’ range that has entrances of appropriate dimensions for which available evidence is insufficient to conclude that it is being used or has been used by a kit fox. Potential dens shall include the following: (1) any suitable subterranean hole; or (2) any den or burrow of another species (e.g., coyote, badger, red fox, or ground squirrel) that otherwise has appropriate characteristics for kit fox use.

"Natal or Pupping Den" - Any den used by kit foxes to whelp and/or rear their pups. Natal/pupping dens may be larger with more numerous entrances than dens occupied exclusively by adults. These dens typically have more kit fox tracks, scat, and prey remains in the vicinity of the den, and may have a broader apron of matted dirt and/or vegetation at one or more entrances. A natal den, defined as a den in which kit fox pups are actually whelped but not necessarily reared, is a more restrictive version of the pupping den. In practice, however, it is difficult to distinguish between the two, therefore, for purposes of this definition either term applies.

"Atypical Den" - Any manmade structure which has been or is being occupied by a San Joaquin kit fox. Atypical dens may include pipes, culverts, and diggings beneath concrete slabs and buildings.

Exhibit B: Fence Design for Kit Fox Passage

PERMEABLE FENCE AND WALL DESIGNS THAT FACILITATE PASSAGE BY ENDANGERED SAN JOAQUIN KIT FOXES

Prepared by:

Brian L. Cypher and Christine L. Van Horn Job

California State University, Stanislaus
Endangered Species Recovery Program

March 2009

EXECUTIVE SUMMARY

San Joaquin kit foxes (*Vulpes macrotis mutica*) are listed as federally endangered and California threatened, due largely to past and current habitat loss and degradation. This habitat degradation includes fragmentation of habitat, which sometimes results from barriers that impede movements. Such barriers can include fences and walls that are constructed for various purposes. However, certain fence and wall designs are "permeable" in that they permit passage by kit foxes. Furthermore, even impermeable designs potentially could be modified to facilitate passage by kit foxes. Because of the relatively small size of kit foxes, fences and walls can be easily modified to permit passage by foxes.

We collected images of fence and wall designs in Bakersfield, CA that were known to be permeable to kit foxes, based on direct observations of animals passing through these structures. Kit foxes are able to pass through gaps as small as 3-3.5 inches (7.5-9 cm) in one dimension (width or height). However, smaller openings may slow passage thus making foxes vulnerable to capture when being pursued by a larger predator.

Permeable fence and wall designs help to maintain connectivity between areas thereby making more habitat available for use by kit foxes. Also, it may be possible to design fencing in a manner that impedes passage by larger predators that could potentially kill kit foxes, thus providing a further benefit to foxes. The optimal fence designs and modifications for any given situation will depend upon the primary purpose of the fencing (e.g., human safety, property protection, livestock enclosure, etc.), as well as other factors such as cost.

INTRODUCTION

The San Joaquin kit fox (*Vulpes macrotis mutica*) is a small canid endemic to central California. Although as a species kit foxes occur throughout much of the arid western United States, the San Joaquin kit fox is a distinct subspecies that is restricted to the San Joaquin Valley and select arid valleys in the adjacent Coast Ranges (U.S. Fish and Wildlife Service 1998). The historic range of the San Joaquin kit fox is not well defined. This range likely extended from southern Kern County north to Contra Costa County on the west side of the San Joaquin Valley and Stanislaus County on the east side (Grinnell et al. 1937, U.S. Fish and Wildlife Service 1998). Foxes also were known to occur on the Carrizo Plain and Cuyama Valley in San Luis Obispo County, and in the 1950s were documented in the Salinas Valley in San Luis Obispo and Monterey counties (Balestreri 1981). Foxes also were reported from select valley areas in San Benito and Santa Clara counties (U.S. Fish and Wildlife Service 1998). However, due to an ability to move long distances, it is unclear whether foxes observed in some areas represented extant populations or dispersing individuals.

The current boundaries of the range of the San Joaquin kit fox probably are not significantly different from historic boundaries. However, within those boundaries, extensive areas of habitat have been converted to agricultural, industrial, and urban uses. Consequently, within the range boundaries, the remaining habitat is much diminished and is highly fragmented (Fig. 1). The largest remaining populations occur in the southern and southwestern San Joaquin Valley and on the Carrizo Plain. Optimal habitat for San Joaquin kit foxes consists of arid shrub and shrub-grassland communities with flat to gently rolling topographic relief (U.S. Fish and Wildlife Service 1998).

The San Joaquin kit fox is listed as federally endangered and California threatened, largely due to past and current habitat loss and degradation (U.S. Fish and Wildlife Service 1998). This habitat degradation includes fragmentation of habitat. Most fragmentation results from conversion of habitat on some parcels thereby leaving smaller blocks of habitat separated by lands with uses incompatible to kit foxes. Some fragmentation also results from the construction of barriers that impede fox movements. Such barriers include canals and large roads. On a more local scale, fences and walls constructed for various purposes also can constitute barriers for kit foxes. However, certain fence designs are “permeable” in that they permit passage by kit foxes. Furthermore, even impermeable designs potentially could be modified to facilitate passage by kit foxes. Because of the relatively small size of kit foxes, fences and walls can be easily modified to permit passage by foxes. Permeable fence and wall designs help to maintain connectivity between areas thereby making more habitat available for use by kit foxes. Also, it may be possible to design fencing in a manner that impedes passage by larger predators that could potentially kill kit foxes, thus providing a further benefit to foxes. The optimal fence designs and modifications for any given situation will depend upon the primary purpose of the fencing (e.g., security from human access, livestock enclosure, etc.).

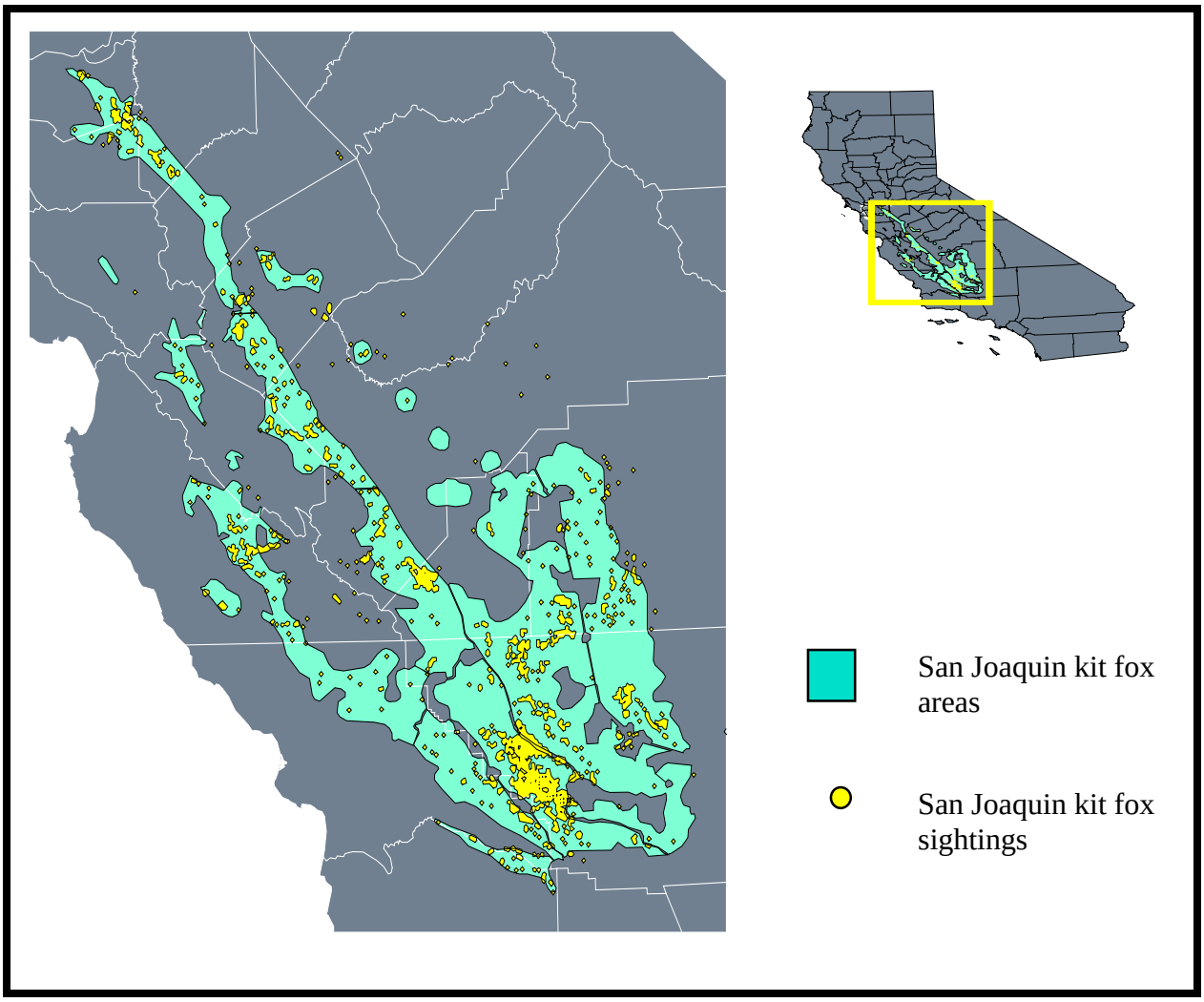


Figure 1. San Joaquin kit fox occurrences and estimated occupied areas based on these occurrences (CSUS Endangered Species Recovery Program unpublished data).

The objectives of this report are to:

1. Identify fence designs and potential modifications for fences and walls that facilitate passage by kit foxes.

2. Discuss designs and modifications that might allow passage by kit foxes but impede or prevent passage by larger predators.

METHODS

For this effort, we collected information on fence designs and modification strategies in the city of Bakersfield, California. A sizeable kit fox population is present in Bakersfield and appears to be thriving (Bjurlin and Cypher 2005, Bjurlin et al. 2005). In this urban environment, most kit foxes encounter fences and walls on a daily basis.

Since 1997, research has been conducted on kit foxes in Bakersfield to assess their demographic and ecological patterns, and to develop conservation strategies (Cypher in press). During the course of this research, hundreds of kit foxes have been live-captured, and radio collars have been placed on many to assess survival, reproduction, den use patterns, and movements. This trapping (and subsequent release) and tracking of collared animals, along with numerous opportunistic sightings of foxes, have provided numerous observations of how foxes negotiate barriers such as fences and walls. In particular and most relevant, these observations have provided excellent insights on which fence designs permit passage by kit foxes and also on how fences and even walls might be modified to facilitate such passage.

Images of fence designs and potential modifications have been collected and compiled in this report. Along with the images, we try to provide discussion on the potential advantages and any disadvantages of each design.

RESULTS AND DISCUSSION

Permeable Fence Designs

Based on our observations, kit foxes are able to negotiate many fence designs by either passing directly through spaces in the fence or passing under it. This capability is greatly enhanced by the relatively small size of kit foxes. Kit foxes are sufficiently small and flexible that they are able to get though gaps measuring 3-3.5 inches (7.5-9 cm) in width. However, when a gap is this small in height or width, it usually needs to larger in the other dimension (probably at least double) to permit passage by kit foxes.

Fencing that is generally used for livestock usually is quite permeable to kit foxes. Kit foxes have no problem passing under or through fences consisting primarily of strands of barbed wire. Such fences commonly are used to contain cattle. “Hog-wire” fencing is commonly used within the range of the San Joaquin kit fox to contain sheep. Such fencing can be variable in mesh size, but usually has mesh openings sufficiently large to permit passage by kit foxes (Fig. 2).

Chain-link fencing usually is not permeable to kit foxes. The mesh size, particularly on standard chain-link fencing, is too small to permit passage by kit foxes (Fig. 3). Larger chain-link mesh sizes exist that potentially could permit passage by kit foxes, but these

larger mesh sizes are still sufficiently small that passage by foxes likely would be difficult (Fig. 3).

Figure 2. “Hog-wire” style fencing with openings measuring 6 inches (15 cm) on each side. These openings are sufficiently large to permit passage by kit foxes.

Figure 3. Chain-link fencing. The upper left image depicts standard chain-link in which the openings are too small to permit passage by kit foxes. In the upper right image, a kit fox pup has gotten its head caught in the fence and died. The lower images depict chain-link fencing with larger openings; passage by kit foxes might be possible but would be difficult.

Use of decorative security fencing is becoming more common. Many of these fence designs have gaps that permit relatively easy passage by kit foxes as well as other animals (Fig. 4). In Bakersfield, foxes frequently have been observed passing through such fences.

Figure 4. Decorative fencing designs that are permeable to kit foxes.

Even fences with inherent designs that do not permit passage by kit foxes can be made permeable simply by raising the bottom of the fence off of the ground a few inches. Kit foxes in Bakersfield commonly are observed easily slipping under such fences (Fig. 5). Furthermore, even in situations where the fences extend down to ground level, kit foxes have created their own “modifications” that render these fences permeable. We have observed a number of instances where kit foxes have excavated a shallow scrape thereby effectively lowering the ground level and facilitating passage under the fence (Fig. 6).

Figure 5. Metal fencing design with openings too small for passage by kit foxes, but the bottom of which has been raised 4-5 inches (10-12.5 cm) off the ground thereby permitting easy under-passage by foxes.

Figure 6. Chain-link fencing installed such that the bottom of the fence is suspended off the ground. Kit foxes are able to pass under this fence, particular in locations where the ground has low spots. In the lower images, kit foxes have dug a shallow passage way under the fence so that they can access dens under the portable buildings.

Fence gates sometimes present opportunities for passage by kit foxes. Because of their construction design, gates frequently have sizeable gaps that kit foxes are able to pass through (Fig. 7). In Bakersfield, kit foxes frequently are observed entering or exiting fenced areas by way of gaps associated with gates. Gaps that foxes passed through were at least 3 inches (7.5 cm) wide. Similarly, kit foxes will readily use gaps created in fences, either by accident or on purpose (Fig. 7).

Figure 7. Gaps in fence gating that permit passage by kit foxes. In the lower right image, a kit fox is passing through a gap in chain-link fencing.

Some fences are constructed with a cement curb or foundation (Fig. 8). Such fences effectively prevent kit foxes from simply excavating a shallow passage way to pass under the fence. In some instances, foxes have excavated larger, deeper passages underneath the cement foundations (Fig. 8). This entails considerable effort and the size of these excavations increase the probability that property owners will backfill, particularly if there is concern that the excavation will compromise the fence.

Figure 8. Images of cement foundations under fences that inhibit passage by kit foxes. In the lower images, kit foxes have excavated passage ways underneath cement foundations.

Wall Permeability

Walls tend to present a significant challege to kit foxes. Foundations for walls typically extend well into the ground making it difficult for foxes to excavate passage ways under these structures. Wall designs rarely have openings sufficient to permit passage by kit foxes, although there are occasional exceptions (Fig. 9).

Figure 9. Openings in a wall designed to permit water drainage, but that also permits passage by kit foxes.

On one occasion, a new wall being constructed in Bakersfield was modified specifically to allow passage by kit foxes (Fig. 10). Two tunnels were incorporated into the wall and these served as simple yet highly effective passage ways for kit foxes. The cost and additional effort to incorporate these structures was negligible, and did not compromise the primary purpose of the wall, which was to protect human safety by excluding access to a canal. Designs and modifications that pass through a wall versus under it may be preferable because foxes are more likely to use passages if they can see through to the other side.

Figure 10. Images of a wall that was constructed along a canal where it bordered a golf course. In the upper left image, a kit fox den is visible at the lower right; this fox family group also used dens over in the canal. Passage ways that were 12 inches (30 cm) in diameter) were incorporated into the wall to permit passage by kit foxes. In the lower right image, a kit fox is using one of the new passage ways.

Exclusion of Larger Predators

Several larger predators are known to kill kit foxes, primarily as a mechanism to reduce competition for resources (Cypher et al. 2001). These predators include coyotes (*Canis latrans*), bobcats (*Lynx rufus*), non-native red foxes (*Vulpes vulpes*), and badgers (*Taxidea taxus*). Coyotes and bobcats in particular are a significant threat to kit foxes, both because they are relatively abundant and they are more likely to pursue a kit fox specifically to kill it. Red foxes are relatively uncommon in natural habitats within the range of the kit fox, and badgers probably rarely pursue foxes.

In the process of rendering fences and walls more permeable to kit foxes, at times it may be desireable to exclude passage by larger predators. This raises two issues that warrant consideration in designing fences and walls that are permeable to kit foxes. First, when passage ways are incorporated into fence and wall designs, these structures should be sufficiently frequent and of dimensions that facilitate rapid passage by kit foxes in the event that they are being pursued by a larger predator. To that end, fence designs such as the larger chain-link size depicted in Figure 3 probably are not optimal designs for use in building permeable fences for kit foxes. A kit fox will not be able to rapidly negotiate such passage ways thereby increasing the probability of capture by a pursuing predator.

A second consideration is that passage ways potentially can be designed or modified to reduce or restrict use by larger predators. For example, passage ways that are narrow in width (4-6 inches; 10-15 cm) but sufficiently tall (at least 12 inches; 30 cm) should allow kit foxes to rapidly pass through, but structures with these dimensions should significantly impede if not completely prevent passage by a larger predator. Openings of 6 inches or less are considered impassable to coyotes (Wade 1982, Huot and Bergman 2007). Furthermore, larger passage ways with larger dimensions can be modified to constrict the opening down to dimensions that allow use by kit foxes, but that inhibit or prevent use by larger predators. As an example, the Endangered Species Recovery Program has installed numerous artificial dens for kit foxes, and routinely uses pieces of rebar in front of the entrances as a strategy to discourage entry by larger predators (Fig. 11).

One final note, to exclude coyotes from an area, fences or walls need to be at least 6 feet (2 m) high, due to the excellent jumping and climbing ability of this species. Also, to prevent coyotes from digging under fences, a buried “apron” of fencing material extending up to 3 feet (1 m) out from the fence may be advisable (Timm et al.2007).

Figure 11. Rebar installed at the entrance to an artificial kit fox den to discourage entry by larger predators.

SUMMARY

Because of their relatively small size, flexibility, and adaptability, kit foxes are able to pass through relatively small openings. This has significant consequences for conservation because barriers such as new fences and walls can easily be designed and existing structures can easily be modified to render them permeable for kit foxes. Furthermore, incorporating passage ways for kit foxes should be achievable through relatively inexpensive means and in a manner that does not compromise the primary purpose for constructing barriers (e.g., human safety, protection of property).

LITERATURE CITED

Balestreri, A.N. 1981. Status of the San Joaquin kit fox at Camp Roberts, California, 1981. Unpublished Report, U.S. Department of the Army, Engineering, Environmental, and Natural Resources Office. California Polytechnic State Univ., San Luis Obispo.

Bjurlin, C. D., and B. L. Cypher. 2005. Encounter frequency with the urbanized San Joaquin kit fox correlates with public beliefs and attitudes toward the species. Endangered Species Update 22:107-115.

Bjurlin, C. D., B. L. Cypher, C. M. Wingert, and C. L. Van Horn Job. 2005. Urban roads and the endangered San Joaquin kit fox. California State University-Stanislaus, Endangered Species Recovery Program, Fresno, California.

Cypher, B. L. In press. Kit foxes. Chapter in Gehrt, S. D., S. P. D. Riley, and B. L. Cypher. Urban carnivores: ecology, conflict, and conservation. Johns Hopkins University Press, Baltimore, Maryland.

Cypher, B. L., H. O. Clark, Jr., P. A. Kelly, C. Van Horn Job, G. D. Warrick, and D. F. Williams. 2001. Interspecific interactions among mammalian predators: implications for the conservation of endangered San Joaquin kit foxes. Endangered Species Update 18:171-174.

Huot, A. A., and D. L. Bergman. 2007. Suitable and effective coyote control tools for the urban/suburban setting. Proceedings of the Wildlife Damage Management Conference 12:312-322.

Timm, R. M., C. C. Coolahan, R. O. Baker, and S. F. Beckerman. 2007. Coyotes. Pest Notes, Publication 74135, University of California, Berkeley.

U.S. Fish and Wildlife Service. 1998. Recovery plan for upland species of the San Joaquin Valley, California. Region 1, Portland, OR.

Wade, D. A. 1982. Use of fences for predator damage control. Vertebrate Pest Conference Proceedings 10:24-33.

TOPAZ BIOLOGICAL ASSESSMENT

Biological Assessment

for the

Topaz Solar Farm Project

California Valley
San Luis Obispo County
California

Prepared for

Topaz Solar Farms, LLC
1111 Broadway, 4th Floor
Oakland, California 94607

Presented to

U.S. Department of Energy
Loan Programs Office
Environmental Compliance Division
1000 Independence Avenue, S.W., LP-10
Washington, DC 20585

by

ALTHOUSE AND MEADE, INC.
BIOLOGICAL AND ENVIRONMENTAL SERVICES
1602 Spring Street
Paso Robles, California 93446
(805) 237-9626

February 2011

654.27

Table of Contents

Definitions iii
1.0 Introduction 1
1.1 Purpose Statement 2
1.2 Species Considered in this Document 3
1.3 Summary of Effects Determinations 4
1.3.1 Summary of Applicant Proposed Measures 5
1.4 Informal Consultation History 7
2.0 Project Information 8
2.1 Location of Project 8
2.2 Project Description 8
2.2.1 Preparation, construction and installation of the TSF Project 10
2.1 Proposed Conservation Package 12
3.0 Action Area 12
3.1 Environmental Baseline 13
3.2 Habitat Type Descriptions 14
3.2.1 Cropland 14
3.2.2 California annual grassland 15
3.2.3 Vernal pool 16
3.2.4 Natural non-wetland pool 17
3.2.5 Anthropogenic non-wetland pool 18
3.2.6 Agricultural reservoir 18
3.2.7 Anthropogenic 18
4.0 Federally Listed Species 18
4.1 Federally Listed Species that May Be Affected by the TSF Project 19
5.0 Species Accounts 22
5.1 San Joaquin Kit Fox 22
5.2 Longhorn fairy shrimp 25
5.3 Vernal pool fairy shrimp 26
5.4 Mountain Plover 27
5.5 Golden Eagle 30
5.6 Bald Eagle 31

6.0 Effects Determinations 32
6.1 San Joaquin Kit Fox 33
6.2 Longhorn Fairy Shrimp 35
6.3 Vernal Pool Fairy Shrimp 36
6.4 Mountain Plover 36
6.5 Golden Eagle 37
6.6 Bald Eagle 38
7.0 Conservation Measures 39
7.1 Summary of Project Design and Conservation Elements 39
7.2 San Joaquin Kit Fox 45
7.2.1 Measures to avoid and/or minimize potential direct injury or death to kit fox from TSF Project construction and operation activities 46
7.2.2 Measures to increase the on-site habitat quality of the TSF Project 47
7.2.3 Measures to off-set loss of kit fox habitat 47
7.3 Vernal Pool Fairy Shrimp and Longhorn Fairy Shrimp 48
7.4 Bald Eagle and Golden Eagle 48
8.0 Interrelated Actions 49
9.0 Cumulative Effects 49
10.0 Conclusion 50
11.0 Figures 52
12.0 Biological Resource Maps 59
13.0 References 67
Appendix A: Other Federally-listed Species Reported from the Region ..... A - 1
Appendix B: San Joaquin Kit Fox Conservation and Monitoring Plan ..... B - 1
Appendix C: Biological Assessment for the Carrizo-Midway 230 kV Reconductoring Project ..... C - 1

List of Tables

TABLE 1. SUMMARY OF EFFECTS DETERMINATIONS 4
TABLE 2. FEDERALLY LISTED/PROPOSED SPECIES THAT MAY BE AFFECTED 20
TABLE 3. OTHER FEDERALLY-LISTED SPECIES ..... A - 3

Definitions

TSF:	Topaz Solar Farm; name of the proposed project.
TSF Project or Project:	Topaz Solar Farm Project or Project; used generically to describe the proposed project (as described in Section 2.2 of this document), without distinction between the various proposed project alternatives.
Proposed Action:	The TSF Project.
Project Site:	An approximately 10,000 acre area that encompasses Option A, Option B, and Alternative 3B layouts.
Option A:	The southernmost of the two originally proposed TSF Project options with a final fenced Project area of up to approximately 4,100 acres within Study Area A.
Option B:	The northernmost of the two originally proposed TSF Project options with a final fenced Project area of up to approximately 4,000 acres within Study Area B.
Alternative 3B:	The preferred Project alternative, with a final fenced Project area of approximately 3,500 acres within Study Area A.
Study Area A:	An approximately 7,800 acre area that encompasses the Option A and Alternative 3B layouts.
Study Area B:	An approximately 6,300 acre area that encompasses the Option B layout.
Action Area:	An Action Area includes all areas affected directly or indirectly by the TSF Project (Proposed Action).
Lead Agency:	The lead federal agency, which for the TSF Project is the Department of Energy.
Cooperating Agency:	An agency which is invited by a federal Lead Agency to cooperate in the preparation of an environmental impact statement. For the TSF Project, the U.S. Army Corps of Engineers is a Cooperating Agency.

Regulatory Abbreviations

BA: Biological Assessment
EIR: Environmental Impact Report
CEQA: California Environmental Quality Act
NEPA: National Environmental Policy Act
ESA: Endangered Species Act
Eagle Act: Bald and Golden Eagle Protection Act
MBTA: Migratory Bird Treaty Act
USFWS: United States Fish and Wildlife Service
CDFG: California Department of Fish and Game
CNDDB: California Natural Diversity Database
CNPS: California Native Plant Society
USACE: United States Army Corps of Engineers
NRCS: Natural Resource Conservation Service
BLM: Bureau of Land Management
DOE: U.S. Department of Energy
CRP: Conservation Reserve Program
MDBM: Mount Diablo Base Meridian
APM: Applicant Proposed Measure

Technical Abbreviations

PV: Photovoltaic
MW: Megawatts
kV: Kilovolts; 1000 volts
AC: Alternative Current
PCS: Power Conversion Stations
PVCS: Photovoltaic Combining Switchgear houses
M&M: Maintenance and Monitoring Facility
PV Array: A block of photovoltaic panels
PV Module: An individual solar panel
GIS: Geographic Information Systems
GPS: Global Positioning System

Species Abbreviations

BNLL: Blunt-nosed Leopard Lizard
NEAS: Nelson's Antelope Squirrel
GIKR: Giant Kangaroo Rat

1.0 Introduction

This Biological Assessment (BA) provides information regarding wildlife species that are currently listed, candidate, or are proposed for listing under the federal Endangered Species Act, as amended (ESA), that occur on lands associated with the proposed Topaz Solar Farm (TSF) project (TSF Project or Project). Topaz Solar Farms, LLC (Applicant) conducted comprehensive botanical and wildlife surveys on potential Project lands from March 2008 through November 2010. For information regarding all biological surveys and analyses for the potential Project lands, including common species and species of special concern at the state level, please refer to the *Final Biological Report for the Topaz Solar Farm* (Althouse and Meade, Inc. 2010c) and the *2010 Biological Report Technical Appendix, Volumes 1, 2, 3* (Althouse and Meade, Inc. June 2010b), and *Volume 4* (Althouse and Meade, Inc. September 2010d).

There are two proposed Project Options being evaluated in the Environmental Impact Statement (EIS) (U.S. Department of Energy 2011, in prep.): Option A and Option B. Alternative 3B is a Project alternative that was developed by the Applicant at the request of the County of San Luis Obispo (County) during the Environmental Impact Report (EIR) process in response to input provided by local, state, and federal agencies that requested a smaller alternative footprint be evaluated. Alternative 3B is being evaluated as a Project alternative, along with the other Project alternatives, in the Final Environmental Impact Report (FEIR) for California Environmental Quality Act (CEQA) review and in the Final Environmental Impact Statement (FEIS) for National Environmental Policy Act (NEPA) review (refer to Section 2.2 for a full description of the Topaz Solar Farm Project, and Sections 11.0 and 12.0 for Project figures and maps).

The Project Site, defined in the EIS as an approximately 10,000 acre area, has been divided into two overlapping study areas, Study Area A (totaling approximately 7,800 acres) and Study Area B (totaling approximately 6,300 acres), within which the TSF Project could be developed (refer to Figure 1, Section 11.0). Option A and Alternative 3B layouts are within Study Area A, and the Option B layout is within Study Area B. For each of the three Project layouts, all components of the facility would be fenced. Both the County in its CEQA process, and the U.S. Department of Energy (DOE) in its NEPA process, are evaluating TSF Project footprints of up to 4,100 acres within these two study areas. This BA evaluates Alternative 3B as the preferred alternative, with a reduced Project acreage of approximately 3,500 acres. These proposed Project footprints are as follows:

- **Option A** would involve the development of a fenced area of approximately 4,100 acres within Study Area A.
- **Alternative 3B** would involve the development of a fenced area of approximately 3,500 acres within Study Area A.
- **Option B** would involve the development of a fenced area of approximately 4,000 acres within Study Area B.

This BA is prepared in accordance with the requirements set forth in section 7 of the ESA and its implementing regulations (16 U.S.C. § 1536, 50 CFR §§ 402, *et seq*.), and with the ESA consultation guidance contained in the Endangered Species Act Consultation Handbook (U.S. Fish and Wildlife Service and National Marine Fisheries Service 1998).

1.1 Purpose Statement

This BA is submitted to the U.S. Department of Energy (DOE) as the lead federal agency (Lead Agency) for the TSF Project, pursuant to section 7 of the ESA. The purpose of this BA is to provide the best available scientific and commercial data to facilitate section 7 consultation with the United States Fish and Wildlife Service (USFWS) and subsequent preparation of a Biological Opinion, with requested Incidental Take Statement, for the Topaz Solar Farm Project. This consultation covers listed species that may be affected by the Project, as outlined below in Section 1.2. It also encompasses consultation for other federal agencies, such as the U.S. Army Corps of Engineers (USACE), that may be issuing permits or approvals for the Project.

Under the federal ESA, formal agency consultation is conducted through the section 7 process when a proposed project may affect federally listed species or designated critical habitat. Incidental take can be authorized through the section 7 process for ESA listed species. Additionally, section 7 consultation may be necessary for species proposed for listing under the ESA, such as mountain plover. The lead agency must confer with the USFWS if a project is likely to jeopardize the continued existence of a proposed or candidate species, or its critical habitat (U.S. Fish and Wildlife Service and National Marine Fisheries Service 1998). However, a federal agency may choose to formally confer on effects to proposed or candidate species even if jeopardy is not likely. A formal conference can be converted to a formal consultation and used to authorize incidental take if the species becomes listed under the ESA prior to implementation of the project.

For the TSF Project, the Incidental Take Statement in the Biological Opinion is expected to include three federally-listed, candidate, or proposed species known to occur in the potential Project areas: San Joaquin kit fox, vernal pool fairy shrimp, and longhorn fairy shrimp (refer to Section 1.3 for a summary of effects determinations).

The federal Bald and Golden Eagle Protection Act (16 U.S.C. §§ 688-668d, enacted by 54 Stat. 250) (Eagle Act) was modified in 2009 to include mechanisms for authorizing limited “take” of bald and golden eagles, where “take” (as defined specifically in the Eagle Act, and which includes “disturb”) would occur from otherwise lawful activities (74 FR 46835). Thus, the bald and golden eagle are analyzed in this BA to determine if the TSF Project would “disturb” these species and/or require an Incidental Take Permit under the Eagle Act. As is explained in Sections 1.3, 6.5 and 6.6, it is not expected that the TSF Project would “disturb” the bald eagle or the golden eagle, and the TSF Project is not expected to require a “take” permit for these species.

In this document, DOE will be referred to as the Lead Agency for the proposed Topaz Solar Farm Project. The Applicant submitted a Part I application to DOE for a loan guarantee on March 29, 2010, and submitted a Part II application on August 10, 2010. The purpose and need for agency action is to comply with DOE’s mandate under Title

XVII of EPAct 2005 by selecting eligible projects that meet the goals of the Act. DOE is using the NEPA process to assist in determining whether to issue a loan guarantee to the Applicant to support the TSF Project.

The Applicant is applying to the U.S. Army Corps of Engineers (USACE) for a Clean Water Act (CWA) Section 404 permit. The USACE is expected to issue an appropriate permit for the TSF Project and has agreed to be a Cooperating Agency under the NEPA for the TSF Project.

This BA has also been prepared in coordination with the California Department of Fish and Game (CDFG) because the Applicant intends to seek incidental take authorization from CDFG for the San Joaquin Kit Fox, a species which is listed as threatened under the California Endangered Species Act. This incidental "take" authorization is expected to be obtained through the California Fish and Game Code Section 2081 incidental "take" permit process.

1.2 Species Considered in this Document

The Project (described and defined in Section 2.0) may affect four species listed, candidate, or proposed for listing under the ESA, as well as two species of raptor that are protected by the Eagle Act:

- San Joaquin kit fox (*Vulpes macrotis mutica*): ESA Endangered
- Longhorn fairy shrimp (*Branchinecta longiantenna*): ESA Endangered
- Vernal pool fairy shrimp (*Branchinecta lynchi*): ESA Threatened
- Mountain plover (*Charadrius montanus*): ESA Proposed Threatened
- Bald eagle (*Haliaeetus leucocephalus*): ESA De-listed, Eagle Act
- Golden eagle (*Aquila chrysaetos*): Eagle Act

This BA analyzes direct and indirect effects of the TSF Project to these species. Section 5.0 provides detailed discussions of the six species listed above. We discuss general species biology, survey methods and survey results for the Action Area (as defined in Section 3.0). Section 6.0 provides an individual effects analysis for each species, with supporting documentation. Conservation measures designed to avoid or minimize potential adverse effects of the Project, and which could potentially result in beneficial effects, are considered in Section 7.0, as is required for the section 7 ESA consultation process.

Three years of comprehensive botanical surveys were conducted on the TSF Project lands, from March 2008 through July 2010. No ESA-listed, candidate or proposed plant species were detected, and none are expected to be present.

Appendix A provides a summary of the surveys and other scientific information developed regarding eight other federally-listed species reported from the region that were not detected within or near the Action Area and for which the TSF Project would have "No Effect" for ESA purposes. Appendix B contains the San Joaquin Kit Fox Conservation and Monitoring Plan (Althouse and Meade, Inc. February 2011) prepared for the TSF Project.

The Action Area does not include any designated or proposed critical habitat for federally listed species. Therefore this BA does not include specific analyses regarding federally-designated critical habitat.

1.3 Summary of Effects Determinations

Based on the analysis contained in this BA, the TSF Project may adversely affect San Joaquin kit fox through direct and/or indirect effects to individuals, populations and habitat, despite the probability that the TSF Project would result in a long-term beneficial effect on local kit fox populations.

The vernal pool fairy shrimp and longhorn fairy shrimp are large vernal pool branchiopods that are listed under the federal ESA and occur within the Action Area. Although unlikely, the TSF Project could adversely affect these species during construction or operation of the facility.

The TSF Project may affect the bald and golden eagle. However, the potential adverse effect would be discountable (i.e., extremely unlikely to occur and essentially not expected to occur) and insignificant (i.e., will not reach a scale where "disturbance" or "take" occurs) due to factors outlined in Sections 6.5 and 6.6. Thus, the TSF Project would not "disturb" or "take" bald or golden eagles within the meaning of the Eagle Act.

The TSF Project is not likely to adversely affect mountain plover because of the large amount of remaining habitat in the region. A summary of effects determinations is provided in Table 1.

Conservation measures designed to avoid, minimize, and compensate for these potential effects have been incorporated into the TSF Project to ensure that the Project would not appreciably reduce the numbers or distribution of populations of these species. Further, Applicant Proposed Measures (APMs) to preserve, monitor, and manage habitat and populations of listed and proposed species within the Action Area, and the acquisition and/or conservation in perpetuity of additional lands in eastern San Luis Obispo County, would contribute to the long-term survival and recovery of these species. Conservation measures for each species are described in Section 7.0.

TABLE 1. SUMMARY OF EFFECTS DETERMINATIONS.

Species	Listing Status	Effects Determination
San Joaquin kit fox	ESA Endangered	May Affect Likely to Adversely Affect
Longhorn fairy shrimp	ESA Endangered	May Affect Likely to Adversely Affect
Vernal pool fairy shrimp	ESA Threatened	May Affect Likely to Adversely Affect
Mountain Plover	ESA Proposed Threatened	May Affect Not Likely to Adversely Affect

Species	Listing Status	Effects Determination
Bald eagle	Eagle Act	No Disturbance or Take under Eagle Act
Golden eagle	Eagle Act	No Disturbance or Take under Eagle Act

1.3.1 Summary of Applicant Proposed Measures

The following list of conservation measures have been incorporated into the TSF Project as Applicant Proposed Measures for species that the Project is likely to adversely affect (refer to Table 1, above). The San Joaquin Kit Fox Conservation and Monitoring Plan included in Appendix B of this BA contains the full text of SJKF conservation measures.

A. San Joaquin Kit Fox

- Perimeter fencing around solar arrays would be constructed to provide a 5 to 6 inch gap at the bottom, for the entire length of the fence, for kit fox passage into and through the TSF Project. No interior fences within the perimeter fencing would be present.
- Construction activities would be adjusted to avoid active dens, as determined by pre-construction surveys.
- At least 14 artificial 2-chambered dens (two per square mile) capable of supporting kit fox pairs and pups, and 28 artificial escape dens (four per square mile), would be installed within the solar array fences at appropriate locations.
- Additional artificial escape dens would be installed outside the TSF Project perimeter fence at a rate of one den per 1,000 linear feet.
- Solar arrays would be mounted on steel posts with the lower edge of modules approximately 18 inches above the ground to allow kit foxes to see under the arrays.
- The ground under and between the solar arrays would be vegetated with a dominant cover of grasses and herbs to promote a more natural habitat that supports kit fox prey. Vegetation height would be controlled by pulse grazing or other means not hazardous to kit fox.
- Cross fencing and wildlife wire fencing would be removed from corridors outside of the solar arrays where feasible.
- The TSF Project would reduce cropland production that regularly disturbs the land through plowing, seeding, harvesting, and spraying, and is therefore currently dangerous to kit fox. Kit fox use may increase with this change from cultivated agriculture.

- The TSF Project would implement a managed grazing regime to maintain vegetation height suitable for kit fox use and rodent prey.

B. Longhorn Fairy Shrimp and Vernal Pool Fairy Shrimp

- Known and probable locations of federally-listed fairy shrimp pools would be avoided. A 250-foot radius setback would be established to protect vernal pool hydrologic regimes at such known and probable locations.
- Natural drainage patterns would be preserved.

C. Bald Eagle and Golden Eagle

- The TSF Project perimeter fence would be designed to closely surround the solar arrays and other project components, which leaves the maximum possible amount of preserved habitat surrounding the TSF Project.
- If lands adjacent to the TSF Project are approved as compensatory mitigation land for SJKF by the regulatory agencies, the land would be managed as habitat for SJKF, including the discontinuation of cropping. Conversion of cropland to grassland protected in perpetuity would increase prey abundance and foraging potential for bald and golden eagles.
- On-site collection system lines and towers, if not trenched, would be overhead systems designed to be avian-safe, according to the Avian Power Line Interaction Committee (APLIC 2006) guidelines. These avian-safe features may include:
    - Increasing separations of cables to achieve adequate distance for the species involved;
    - Covering energized parts and/or covering grounded parts with materials appropriate for providing incidental contact protection to birds;
    - Applying perch management techniques; and/or
    - Installing avian flight diverters on power lines.

1.4 Informal Consultation History

April 1, 2009: Topaz Solar Farm team attends a meeting in Sacramento with Susan Jones (USFWS) to discuss Project concept and federally listed species with potential to occur on or near the Project.

April 6, 2010: Topaz Solar Farm team attends a meeting in Fresno with the Department of Fish and Game and Susan Jones of the Service. Meeting topics include project design and regulatory process.

May 26, 2010: Topaz Solar Farm team attends meeting with Susan Jones in Sacramento to discuss biological resources findings and regulatory process.

July 21, 2010: Topaz Solar Farm team attends a meeting with Ken Sanchez (USFWS) in Sacramento to discuss the proposed San Joaquin Kit Fox Mitigation Plan and other listed species.

Sept. 16, 2010: Topaz Solar Farm team has discussion with Ken Sanchez (USFWS) via conference call to discuss proposed options for off-site land mitigation for SJKF and other listed species.

Oct. 18-19, 2010: Topaz Solar Farm team site visit and tour of proposed mitigation land with Ken Sanchez (USFWS), Dave Hacker (CDFG), and Justin Sloan (CDFG).

Dec. 14, 2010: Topaz Solar Farm team has meeting/telephone call with Ken Sanchez (USFWS), Kate Symonds (USFWS), Julie Vance (CDFG) and Dave Hacker (CDFG) regarding a full range of section 7 consultation issues, including potential compensation lands, at USFWS offices in Sacramento.

Dec. 17, 2010: Topaz Solar Farm team site visit with Kate Symonds (USFWS).

Jan. 18, 2011: Topaz Solar Farm team conference call with Ken Sanchez and Kate Symonds (USFWS); Julie Vance (CDFG); Steve McMasters (County of San Luis Obispo); Sandra Alarcon Lopez, Chris Huntley, and Jared Varonin (Aspen Environmental Group); and Angie Colamaria (DOE)

Jan. 26, 2011: Topaz Solar Farm team conference call with Ken Sanchez and Kate Symonds (USFWS); Steve McMasters (County of San Luis Obispo); Sandra Alarcon Lopez, Chris Huntley, and Jared Varonin (Aspen Environmental Group); and Angie Colamaria (DOE)

Feb. 1, 2011: Topaz Solar Farm team meeting with Ken Sanchez, Mike Fris, and Diane Elam of the USFWS.

2.0 Project Information

2.1 Location of Project

The TSF Project is located in the northern Carrizo Plain area of San Luis Obispo County, California. The TSF Project is situated northwest of California Valley, east of Bitterwater Road, straddling State Highway 58 within the La Panza NE and California Valley United States Geological Survey (USGS) 7.5 minute quadrangles. Elevation varies from approximately 2,000 to 2,080 feet above mean sea level. Figures and maps of the Action Area are included in Sections 11.0 and 12.0.

2.2 Project Description

The TSF Project would install arrays of photovoltaic (PV) modules, manufactured by First Solar, with the cumulative capacity to generate 550 megawatts of power at the point of delivery to PG&E, under peak solar conditions. PV modules would be mounted on steel support structures called tables. Tables would be attached at an angle to a bracket on vertical steel posts spaced approximately eight to ten feet center-to-center and driven into the ground to a depth of four to seven feet below grade. Once mounted, the front of each table would be approximately 1.5 feet (18 inches) above grade, while the rear would be approximately 5.5 feet (66 inches) above grade. The distance from the ground to the top of the PV module table may vary depending on the topography. The solar arrays have no moving parts for sunlight tracking and utilize no water during operation.

These PV array components could be configured into arrays in multiple ways within the proposed Project fenced area. One configuration would be arrays consisting of 36 rows, which would produce approximately 1.3 MWac of power. Another configuration would be arrays consisting of 56 rows, which would produce approximately 2.52 MWac of power. The arrays would be sectioned into quadrants by two 20-foot-wide access corridors, one running north to south, the other east to west. Other configurations may be developed prior to obtaining construction permits for the Project. The Project components would be the same for each array configuration, and the site layout would contain approximately the same (or slightly less) impacted area.

The TSF Project is immediately adjacent to existing electrical transmission lines and would ultimately generate approximately 550 megawatts of power for transmission along the existing Morro Bay/Midway 230 kV power line that passes through the Project Site. Vehicular access to the facility would be from Bitterwater Road and Highway 58.

PG&E upgrades to the Morro Bay to Midway line (referred to herein as the PG&E Reconductoring Project) are expected to be necessary for interconnection of the final 150 MW of generated power and are evaluated in this BA as an Interrelated Action. Refer to Section 8.0 for more information on this Interrelated Action.

The Applicant applied to the County of San Luis Obispo for a Conditional Use Permit and related land use approvals for the TSF Project. Because of its responsibility for issuing this permit, the County is the lead agency under the CEQA and is responsible for preparation of the EIR.

The FEIR will analyze Option A and Option B as alternative Project options, and Alternative 3B will be evaluated in the FEIR Alternatives chapter. Only the alternative approved by the County of San Luis Obispo would be developed.

The EIS will thoroughly analyze Study Area A and Study Area B as alternatives. The Alternative 3B project layout will be covered by the EIS as a likely project layout located within Study Area A.

Key components of the Project include:

- Installation of over nine million PV solar modules within approximately 6460 arrays, and associated electrical equipment (e.g. Power Conversion Stations [PCS], PV Combining Switchgear [PVCS] houses);
- Direct conversion of sunlight to electricity without the use of water for power generation;
- PV arrays that are approximately five and a half feet in height (the distance from the ground to the top of the PV module table may vary depending on the topography);
- Each array would be approximately 1.3 $MW_{AC,}$ would occupy approximately seven acres, and would be equipped with a PCS, which includes two inverters and one transformer;
- Electrical substation and switching station;
- Monitoring and Maintenance (M&M) facility (11,250 square feet [sq. ft.]);
- Solar Energy Learning Center (900 sq. ft.);
- Placement of most medium-voltage feeder lines underground;
- Approximately 8 to 15 miles (depending on the option selected) of above-ground medium-voltage (34.5 kV) collector lines;
- Construction of approximately 14 to 23 miles (depending on the Option selected) of on-site access roads utilizing existing agricultural roads to the extent feasible;
- Construction of several at-grade road crossings through on-site federal jurisdictional drainages to provide access to construct and maintain the Topaz Solar Farm;
- Restoration of portions of the main on-site drainage to Soda Lake as compensation for permitted “fill” of Waters of the U.S;
- Minimal demand for water usage during plant operation, with no water necessary for module washing and water use only for sanitary purposes;
- A leach field and septic system located adjacent to the M&M facility to support the domestic sanitary needs of employees and visitors during operation;
- Four temporary construction staging areas of approximately 10 acres each that would accommodate temporary construction offices, parking, material laydown, and storage area; and

- Perimeter fencing around solar arrays would be constructed to provide a 5 to 6 inch gap at the bottom, for the entire length of the fence, for kit fox passage into and through the TSF Project. No interior fences within the perimeter fencing would be present.

The PG&E Reconductoring Project is an interrelated action to the TSF Project for purposes of this Section 7 consultation because the reconductoring is necessary to accommodate the final 150 megawatts of the TSF Project and other projects in the region. PG&E's Biological Assessment for the Reconductoring Project is attached as Appendix C and is incorporated herein by reference.

2.2.1 Preparation, construction and installation of the TSF Project

The TSF Project would be constructed over approximately three years. The construction phases include site preparation and construction and installation of the solar modules and electrical components.

Site preparation: Project site preparation involves improvement of on-site construction access roads with gravel or other road stabilization material, installation of drainage crossings, setup of construction staging areas, storm-water management work, preparation of land areas for array installation, and other activities needed before installation of the solar arrays can begin. This work would involve trimming of vegetation, agricultural rolling of PV array areas, selected compacting and grading, and setup of modular offices and other needed facilities. Site preparation would occur for each 2 to 20 MW area at a time in order to minimize ground disturbance. Equipment used for site preparation activities would include water trucks, graders, paddle scrapers, rollers, and farm rollers. Initial activities include clearing and fencing of the substation location and adjacent switching station area. The four temporary construction staging areas would then be cleared and fenced, and the construction entrances would be improved.

The PV arrays require a relatively level and stable surface for safe and effective installation. Topographic, geotechnical, and hydrologic studies were used to determine the necessary grading and compaction. For the majority of the Project site, the ground under the PV arrays would not require grading, but some portions of the Project site have slopes that are too steep to accommodate the PV arrays. The design criteria for the Project require excessive slopes to be graded and reduced to be no greater than three percent. Preparing the ground beneath PV arrays would begin by allowing existing vegetation to remain and be trimmed as close to the ground as possible by mowing or grazing. Next, an agricultural tool, such as a harrow or cultipacker, would be used to loosen and smooth the top one to three inches of soil. Finally, a smooth steel drum roller, or similar equipment, would be used to bring the top four to six inches of soil to the appropriate compaction value. Beneath the compacted surface of the soil, the soil would remain at the existing level of compaction, allowing small mammal dens and burrows to remain. Depending on the moisture level of the soil at the beginning of construction, some water may need to be added to the soil one to two days before compaction occurs.

In addition to the slope-related grading described above, grading and compacting is proposed for the construction staging areas, the transformer and inverter enclosures, the

substation and switching station, the access roads, the Solar Energy Learning Center, and the Maintenance and Monitoring facility. There would be approximately 14 miles under Option A and 22 miles under Option B of on-site construction access roads utilizing existing agricultural roads to the extent feasible. These roads would be improved and treated with gravel or other road stabilization material. This treatment of dirt roads was selected to reduce the need to use water to control dust on roads during construction.

Construction and Installation: This phase involves installation of the PV solar modules and all the necessary electrical equipment to make the Project operational. In addition, preparation of the ground under the arrays and improvement of the construction access roads would continue throughout the majority of the construction process. For array installation, first, vertical support posts are driven into the ground with a truck-mounted pile driver. These would hold the support structures (tables) on which PV modules would be mounted. Equipment used for system installation would include 4x4 forklift, ATV vehicles, tuck-mounted pile drivers, and pick-up trucks. Trenches are dug for the underground AC (alternating current) and DC (direct current) cabling, and the foundations for the inverter enclosures and transformers are prepared. While cables are being laid and combiner boxes are being installed, the PV tables are erected. Prefabricated tilt brackets attach steel structure tables to the vertical posts. Brackets attach the PV modules to the tables. Wire harnesses connect the PV modules to the electrical collection system. Underground cables and overhead circuits connect the Power Conversion Stations (PCS's) to the on-site AC electric infrastructure and ultimately to the Project substation. Equipment used for underground work would include small backhoes, small sheepsfoot roller, and 5 cubic yard dump trucks.

It is expected that a separate crew would build the substation and the connection to the existing transmission line in the switching station. The Project would be brought online and connected to the grid as each subsequent block (approximately 2-20 MW each) is completed.

The construction workforce is estimated to be 400 workers on average for the approximately three-year construction period, with a peak of approximately 500 workers. The construction workforce would be working in at least 3-4 areas at one time, needing up to 5 crews working on ground preparation. Shuttle buses would bring the construction workforce to the TSF Project site from the surrounding communities.

Operation and Maintenance: The Topaz Solar Farm facility is expected to be operational in mid 2014 and would require 15 permanent employees. The Project has a minimum expected lifetime of at least 30 years, with an opportunity for subsequent equipment replacement and repowering. The Project would operate continuously, seven days a week, during daylight hours. While the Project would largely be self-sufficient upon completion of construction, periodic monitoring and maintenance activities would be required. Key elements of the maintenance and monitoring plan include monitoring and reporting the performance of the facility, conducting preventative and corrective maintenance, receiving students and other visitors, and maintaining the security of the facility.

After the productive lifetime of the TSF Project, it will be decommissioned in accordance with all local, state, and federal policies. The majority of the facility components can be recycled, and the land will remain as grassland habitat.

2.1 Proposed Conservation Package

The Applicant proposes to implement a conservation package to fully mitigate for impacts to the San Joaquin kit fox. The conservation package is outlined in detail in the San Joaquin Kit Fox Conservation and Monitoring Plan (Althouse and Meade, Inc. February 2011) included in Appendix B of this document, and is based on intensive research and field survey programs conducted on more than 10,000 acres of land that makes up the Project Study Areas. The conservation package is composed of off-site land preservation for kit fox coupled with a variety of cutting-edge on-site enhancements designed to enable the Project to become inhabited by kit fox.

The Applicant has secured more than 11,000 acres of lands in the northern Carrizo Plain to be protected and managed in perpetuity for kit fox and other sensitive biological resources. These lands are composed of annual grasslands and croplands strategically situated around the TSF Project where land preservation would provide certainty in maintaining the movement corridor for kit fox and other animals moving into or out of the northern Carrizo Plain.

Securing the existing annual grasslands for permanent conservation and management according to approved management protocols would enhance vegetative conditions of the lands, where current management practices often prescribe intensive grazing and other activities that reduce suitability for kit fox. Securing existing croplands for permanent conservation and management provides an opportunity to actively pursue significant increases in habitat suitability by eliminating farming activities that are detrimental to current kit fox habitation.

The TSF Project arrays would be surrounded by a perimeter fence designed for kit fox passage. The perimeter fence passages would be five to six inches in height, which would prevent coyotes from entering the Project. Escape dens and artificial natal dens would be installed inside and outside of the perimeter fence for kit fox use. A vegetation management plan and a habitat restoration and revegetation plan will be implemented to enhance and manage vegetation height to create conditions within the TSF Project suitable for kit fox.

The overall goal of the conservation package offered by the Applicant is to provide the USFWS with a scientifically-based approach to endangered species conservation that utilizes a diverse suite of land preservation opportunities, on-going genetic research on local kit fox populations, and an opportunity to study kit fox interactions with solar development that can be used to inform future projects and management issues in kit fox habitat.

3.0 Action Area

The TSF Project is the “Proposed Action” for purposes of this section 7 consultation. In general, an Action Area includes all areas affected directly or indirectly by a proposed action. As specifically requested by the USFWS, this BA focuses on the Alternative 3B

Project Action Area. The Action Area encompasses all on-site TSF Project components, and provides a buffer of at least 100 feet from the edge of any Project component, including fences. The buffer delineates all areas that could potentially be disturbed by construction of the perimeter fence or other activity. Any disturbance in the buffer area would be temporary.

The PG&E Reconductoring Project is considered an Interrelated Action for the reasons described above, and is not included in the Alternative 3B Action Area defined in this BA (refer to Section 8.0 for more information on Interrelated Actions). Instead, it is fully evaluated in a separate Biological Assessment enclosed as Appendix C.

The Action Area includes all or portions of USGS Land Sections 19, 20, 21, 27, 28, 29, 32, 33, and 34 of Township 29 South, Range 18 East, and portions of Sections 4 and 5 of Township 30 South, Range 18 East, of the Mount Diablo Base and Meridian (MDBM). The Action Area is approximately 4,428 acres in size, however not all of the Action Area will be permanently impacted by the Project (Section 11.0, Figures 2 and 3).

The Applicant has secured options to purchase more land than is needed for the Project. Approximately 10,000 acres of land has been secured and surveyed for biological resources. In the NEPA process, this entire 10,000 acres is referred to as the Project Site (refer to Section 11.0, Figure 1). This land was divided into two overlapping study areas within which the TSF Project could be developed: Study Area A (7,800 acres) that includes the Option A and Alternative 3B layouts and Study Area B (6,300 acres) that includes the Option B layout. The CEQA and NEPA documents for the TSF Project include discussion of the entire Study Area for each layout in order to identify the baseline environmental conditions within and around the areas proposed for development, although impact analyses are based only on the area proposed for development. The Alternative 3B Project layout that is the focus of this BA has been designed to avoid biological constraints and maximize movement corridors around the Project.

3.1 Environmental Baseline

The Action Area is generally characterized by tree-less level terrain and low rolling hills and plain with ephemeral swales. The Action Area is primarily used for agricultural production of grain, and as rangeland for cattle. It has been disturbed by dry-land farming and by ranching activities. Farming practices consist of a rotational program where fields are farmed for one year then plowed bare for a year to conserve soil moisture. At any one time some of the land is plowed bare, some is planted to grain, and some is left fallow. Areas that are left un-tilled for several years or more support naturally recruited annual grasslands. The primary crops grown within the Action Area are barley and oats. These grains are dry-farmed crops sown in the fall or winter and harvested for grain or used as cattle feed. Broad-leaf herbicides are sprayed on the crops by crop duster or ground spray rigs to control non-crop plants. Agricultural fields are described as cropland habitat in this report.

Fields that are plowed in the summer or fall and left unplanted through the following spring and summer tend to grow agrestal weeds. Some of these plants are native to the area, but most are naturalized (non-native, naturally recruiting) annual herbs and grasses.

Early in the spring, vegetation is short, which allows establishment of ground squirrel den complexes and easy foraging by predators and grazing ungulates. If rainfall totals are average or above, as was the case in 2007-2008 and 2009-2010, fields left fallow more than one season become densely vegetated with annual grasses and forbs that can reach three feet in height. Tall dense vegetation limits use of these areas by some wildlife. With less than average rainfall, as in the winter of 2008-2009, vegetation in fallow fields and annual grasslands is typically less than two feet in height.

Every other year croplands are plowed in the late winter or early spring to reduce weeds, but are not sown. From mid spring into summer the plowed ground typically hosts an abundant growth of bindweed, an introduced perennial herb with a deep persistent taproot that sprouts green leafy growth year after year. Bindweed provides summer forage for pronghorn antelope. Common reptiles, small mammals, and birds may forage in plowed fields, but the lack of cover increases the likelihood of predation and reduces food supply.

Portions of the Action Area were removed from farming rotation in the 1980's when the landowners voluntarily entered portions of their land into the Conservation Reserve Program (CRP). The CRP is a federal program administered by the U.S. Department of Agriculture Farm Service Agency, which provides landowners with annual rental payments, cost-sharing assistance, and technical assistance to remove land from annual tilling practices in order to minimize water run-off and sedimentation, and increase wildlife habitat value. CRP contracts are signed for periods of 10 to 15 years. The Natural Resources Conservation Service (NRCS) provides landowners with technical assistance regarding conservation planning and practice implementation.

Lands within the Action Area that are in the CRP are managed as rangelands for cattle. Rangelands are described in this report as annual grasslands since species composition is similar to typical annual grassland habitats in the region. Annual grassland habitats within the Action Area are variable with respect to dominant species due to different topography, soils, grazing regimes, and farming history.

Anthropogenic habitat within the Action Area is associated with residential compounds and other facilities. All existing roads are dirt ranch roads, with the exception of gravel-based access roads from Highway 58 to Sections 4 and 27.

3.2 Habitat Type Descriptions

A map of all habitat types occurring within the Action Area is included as BR Map 1 in Section 12.0. Seven habitat types are described within the Action Area. Ephemeral wetland depressions, previously described and mapped within the Project Site, were completely avoided by the Alternative 3B Action Area. Locations of ephemeral wetland depressions can be reviewed in Althouse and Meade, Inc. (2010c).

3.2.1 Cropland

Land in varying stages of dry-farm production constitutes approximately 3,301 acres (75 percent) of the Action Area.. The cropland habitat designation includes fields planted to grain and fields left bare during rotation. Farming on the parcels utilizes a summer fallow program. Summer fallow is the practice of idling farmland and removing weeds for up to 14 months to allow soil moisture to increase. Barley and oats, non-irrigated

grain crops planted in alternate years, are harvested for grain and then the stubble is used for cattle grazing. Herbicides are regularly used to control weeds in planted fields. Cropland habitat supports few native plant species, and is generally low quality wildlife habitat. In addition, the farming methods employed on active grain fields likely result in routine wildlife mortality.

Although wildlife use of the cropland habitat is limited, several species are regular inhabitants. Ferruginous hawk is a sensitive raptor that winters in the region, and was observed roosting on the bare ground croplands within the Action Area. Deer mice (*Peromyscus maniculatus*) occur in fallow grain fields, notably along fence-lines. Mammals such as kit fox and badger may forage for squirrels and other rodents that live in the habitat. San Joaquin kit fox were photographed by motion detecting camera moving regularly along a fence line on bare cropland field adjacent to annual grasslands in Section 21 in spring 2008. Farm fields are used as resting and feeding areas for pronghorn antelope and as late season grazing habitat when bindweed (*Convolvulus arvensis*), a preferred forage plant, becomes common.

3.2.2 California annual grassland

Annual grasslands comprise approximately 1,111 acres (25 percent) of the Action Area. The annual grassland habitat is a dry seasonal habitat consisting of low-lying annual grasses and forbs. It is dominated by non-native and native annual grass species, with varying percentages of native and introduced forbs. This habitat type is ubiquitous throughout the State of California where cultivation and grazing for the past century or more has converted native annual or perennial grasslands to annual grasslands. Throughout its range the California annual grassland habitat type takes on many forms, and the Action Area likewise contains several forms depending upon the land use history. The Conservation Reserve Program (CRP) lands within the Action Area (Sections 4 and 34) have been untilled for at least 20 years and generally show significant recovery in terms of native forb diversity and abundance. Some areas, such as Section 28, was removed from farming more recently. These grasslands are predominantly composed of introduced annual grasses and support a lower diversity of native forbs and grasses.

Early season vegetation in all grasslands within the Action Area is dominated by redstem filaree (*Erodium cicutarium*), an introduced species. CRP lands develop large areas of native annual fescue (*Vulpia microstachys*) with significant patches of soft chess brome (*Bromus hordeaceus*) and introduced annual fescue (*Vulpia myuros*). In addition, native wildflowers such as *Layia platyglossa*, *Lupinus bicolor*, *Castilleja* ssp., and *Lasthenia gracilis* are common to abundant. Other native forbs common in the CRP grasslands are *Microseris* ssp., *Uropappus lindleyi*, *Stebbinsoseris heterocarpa*, *Lotus humistratus* and *Calandrinia ciliata*.

Fallow agricultural fields that have recently reverted to annual grasslands tend to be dominated by introduced annual grasses such as wild oats (*Avena fatua*), soft chess brome, introduced annual fescue, and foxtail barley (*Hordeum murinum*). Common and sometimes abundant native wildflowers include the native Great Valley phacelia (*Phacelia ciliata*) and several species of fiddleneck (*Amsinckia menziesii*, *A. lycopsoides*, and *A. tessellata*).

3.2.3 Vernal pool

Forty vernal pools occur within the Action Area, with a total area of approximately 2.0 acres. An area in the eastern end of Section 4 of the Action Area contains numerous vernal pools. This vernal pool complex was included in the Action Area in order to provide continued evaluation, protection, and monitoring during the construction and operation phases of the Project. Vernal pools within the Action Area occur in topographic depressions that are not in drainages and do not, under normal circumstances, experience flow of water. They occur in shallow loamy soil up to 8 inches deep over an abrupt textural change to clay at 6 to 8 inches depth. A continuous, cemented hardpan was not encountered during pits excavated as part of wetland delineation, although exposed bedrock of marine sedimentary mudstone and sandstone is visible in a streambed adjacent to these vernal pools, at approximately 24 to 36 inches depth. The Carrizo Soil Survey identifies Pinspring, a soil map unit component mapped across the Action Area, as having a sandy loam horizon weakly cemented by silica at 30 to 39 inches depth. A backhoe pit was not excavated to avoid unnecessary damage to sensitive vernal pool habitat and surrounding upland during the wet season, but would be required to determine whether the exposed layer observed in the streambed is bedrock or cemented soil.

Vegetation typically consists of several species from a suite of plant species strongly affiliated with vernal pools in the region, including hair grass (*Deschampsia danthonioides*), water starwort (*Callitriche marginata*), water pygmyweed (*Crassula aquatica*), mousetails (*Myosurus minimus, M. sessilis*), woolly marbles (*Psilocarphus brevissimus, P. chilensis*), inch-high rush (*Juncus uncialis*), pillwort (*Pilularia americana*) and alkali plagiobothrys (*Plagiobothrys leptocladus*). Many of these pools also support another species of woolly marbles (*P. oregonus*), toad rush (*Juncus bufonius*), wandering speedwell (*Veronica peregrina*), loosestrife (*Lythrum hyssopifolia*), and adobe allocarya (*Plagiobothrys acanthocarpus*), but these species also occur in other mesic habitat types in the Action Area and do not have a high fidelity to vernal pool habitat. Not all vernal pools within the Action Area have all species listed here, but vernal pools we mapped had at least two species with high fidelity to vernal pool habitat in the region (meaning they typically occur in vernal pools and not in other habitats).

Vernal pool habitat includes several pools that have not been farmed for 20 years or more in Sections 4 and one in Section 34, as well as a few additional pools that have been regularly disturbed by farming activities in the last two years, in Sections 20 and 32. Pools in Section 20 were planted with barley in 2010; pools in Section 32 were fallow two years then plowed in 2010. Despite plowing and planting activities in 2009-2010, these pools support *Psilocarphus* spp., *Plagiobothrys leptocladus*, *Myosurus* spp., *Crassula aquatic*, and *Callitriche marginata.* Cultivated barley is generally absent from within vernal pools because it does not tolerate long periods of inundation, although it may be present around the upper margins.

Vernal pools within the Action Area also had strong indication of wetland hydrology via biotic crusts, algal mats, and oxidized rhizospheres, as well as clear indication of hydric soils. Many vernal pools within the Action Area support fairy shrimp (*Branchinecta* spp.) and many other aquatic invertebrates including seed shrimp, backswimmers, and *Daphnia*. A few of the larger pools also support breeding Western spadefoot toads.

Adjacent upland habitat surrounding undisturbed vernal pools supports a variety of wildflowers and grasses, including *Vulpia microstachys*, *Bromus madritensis* ssp. *rubens*, *Erodium cicutarium*, *Lasthenia gracilis*, *Microseris douglasii* ssp. *tenellus*, and *Castilleja* ssp. In farmed vernal pools, surrounding vegetation is predominantly cultivated barley and/or oats.

Classification of vernal pools has been addressed through several approaches, at several scales, ranging from a system based solely on landform to a system presented in the Manual of California Vegetation based on geographic region, type of aquatard, and indicator species, to the recently developed vernal pool vegetation classification system, which identifies three orders of plant communities based on studies of how species co-occur (Solomeshch et al, 2007; Solomeshch and Barbour, 2008; Sawyer and Keeler-Wolf, 1995). Sawyer and Keeler-Wolf (1995) initially identified eight vernal pool groups from an ecosystem approach. In the 1995 edition of the Manual of California Vegetation, the authors note the difficulties associated with classifying vernal pools. Vernal pools in the Action Area lack *Downingia*, a common vernal pool plant, and do not fit well with any of the descriptions under the Sawyer Keeler-Wolf scheme. Species composition is most similar to San Diego mesa claypan vernal pools or San Jacinto valley vernal pools. However, geographic location, soil conditions, and species diversity vary. Also, presence of an abrupt increase in clay content and shallow bedrock/weakly cemented hardpan are more similar to Northern claypan vernal pools, but species composition described in the Manual for this alliance is not consistent with our observations within the Action Area, with only one of the described species for this alliance observed.

Using the Solomesch and Barbour key (2008), vernal pools within the Action Area clearly meet diagnostic criteria for vernal pool vegetation, with seven of the listed diagnostic species regularly occurring in vernal pools within the Action Area. Vernal pools occurring within the Action Area best fit the *Lasthenia fremontii-Downingia bicornuta* group of alliances (in spite of the fact that neither species named in the alliance title occur in the Action Area) due to freshwater conditions, absence of spikerush, and presence of *Deschampsia danthonioides* and *Psilocarphus brevissimus*. The association occurring in the Action Area has not been classified and does not key any further than group of alliances in the Solomesch-Barbour key because the appropriate combination of species and substrate are not an option in this key.

Vernal pools observed in the Action Area do not fit any of the described alliances or vernal pool "types" very well, and do not match criteria for vernal pool habitats listed as sensitive natural communities by the California Natural Diversity Database (CNDDB).

3.2.4 Natural non-wetland pool

Six naturally occurring pools that do not meet wetland criteria due to absence of hydric soils and/or non-dominance of hydrophytic vegetation occur within the Action Area, specifically in Sections 4, 20, 32 and 34. The Action Area contains approximately 0.99 acres of natural non-wetland pools. Some hydrophytic plant species such as *Plagiobothrys leptocladus*, *Plagiobothrys acanthocarpus*, and *Psilocarphus oregonus* are present in low quantities but do not form dominant cover. Upland species are present in equal or greater quantities, including such species as *Plagiobothrys canescens*, *Chamomilla suaveolens*, *Erodium cicutarium*, and *Microseris douglasii* ssp. *douglasii*. In

Section 20, cultivated barley, while stunted, continues to grow as one of the dominant species in the non-wetland pools observed, whereas in vernal pools in Section 20, this saturation-intolerant species is absent. Despite lacking dominance of hydrophytic vegetation, in years with above average rainfall, some of these naturally occurring non-wetland pools provide habitat for common aquatic invertebrates, and larger pools provide potential breeding habitat for spadefoot toads.

3.2.5 Anthropogenic non-wetland pool

Use of unpaved roads during the wet season has generated many ruts and depressions within the roadways that, while not meeting criteria for wetlands due to lack of hydric soils and/or non-dominance of hydrophytic vegetation, do provide poor quality habitat for aquatic invertebrates and spadefoot toads in wet years. These pools are separated from naturally occurring non-wetland pools because they are more transitory in nature, with pools being created or enlarged during the wet season and eliminated during regular road maintenance in the dry season. Some hydrophytic species, such *Plagiobothrys acanthocarpus* and *Psilocarphus oregonus*, are present in low quantities but do not form dominant cover and often form less than five percent total cover. Upland species are present in equal or greater quantities, including *Chamomilla suaveolens* and *Lepidium nitidum* var. *nitidum*.

3.2.6 Agricultural reservoir

Two agricultural reservoirs, one in Section 20 and one in Section 28, hold water and are indicated on the habitat map in Section 12.0. The reservoir in Section 20 filled with rainwater to several feet deep in 2010, and was used by Western spadefoot toads as a breeding pool. Insufficient water was present in 2008 and 2009 for spadefoot toad breeding. In Section 28, the westernmost reservoir held a few inches of rainwater in winter 2010 and was filled by a well in April 2010. Pacific chorus frog, Western toad, and Western spadefoot toad larvae were detected during aquatic amphibian dip-net surveys.

3.2.7 Anthropogenic

All portions of the Action Area that are heavily influenced by human development are mapped and described as anthropogenic habitat. Anthropogenic habitat includes abandoned and occupied ranch compounds and other structures within the Action Area, specifically in Sections 22, 27 and 28. Several of the ranch compounds are liberally planted with ornamental trees and shrubs, which create areas of tree canopy and shrub understory that are otherwise entirely lacking in the vicinity. A variety of bird species utilize the vegetated portions of the anthropogenic habitat for nesting, wintering, and general foraging. Migrant species such as warblers, hummingbirds, and orioles find temporary refuge as well.

4.0 Federally Listed Species

We reviewed records of federally listed species reported from the two USGS quadrangles that contain the Action Area, as well as the surrounding ten USGS quadrangles. Records that were reviewed came from the California Natural Diversity Database (CNDDB), the

USFWS, and the California Native Plant Society (CNPS) On-line Inventory of Rare and Endangered Plants of California. The designated search area encompasses approximately 735 square miles (470,400 acres) of land, and is consistent with typical search area requirements by the USFWS and California Department of Fish and Game (CDFG). The search area includes the following twelve USGS 7.5 minute quadrangles: La Panza NE, California Valley, La Panza, La Panza Ranch, Holland Canyon, Packwood Creek, Shale Point, Las Yeguas Ranch, Simmler, Chimineas Ranch, Branch Mountain, and Los Machos Hills. Additional species were added to the list from our knowledge of the area, and from review of museum specimen data and other private consultant survey reports from the region.

Figure 4 in Section 11.0 depicts the current GIS data for federally-listed species and critical habitat mapped in the vicinity of the Action Area by the CNDDB and USFWS. Biological Resource Maps indicating locations of listed species detected within and near the Action Area are provided in Section 12.0.

This BA includes detailed information regarding federally listed species that occur within the Action Area. Potentially suitable habitat was present within the Action Area for several federally listed species that were surveyed for and subsequently found not to be present within the Action Area (Althouse and Meade, Inc. 2010c). Additionally, potentially suitable habitat for several federally listed species reported from the region was determined not to be present within the Action Area. A total of eight federally listed species that do not occur within the Action Area and would not be affected by the TSF Project are addressed in Appendix A, which is incorporated herein by reference.

4.1 Federally Listed Species that May Be Affected by the TSF Project

Four species listed or proposed for listing under the federal ESA were detected within the Action Area: the San Joaquin kit fox (*Vulpes macrotis mutica*), longhorn fairy shrimp (*Branchinecta longiantenna*), vernal pool fairy shrimp (*Branchinecta lynchi*) and mountain plover (*Charadrius montanus*).

Bald eagle (*Haliaeetus leucocephalus*) and golden eagle (*Aquila chrysaetos*) (both non-nesting) were occasionally detected foraging within the Action Area, but were not found to be nesting there. Since bald eagles were delisted from the ESA in 2007, the Eagle Act, as implemented by the USFWS, provides the primary legal protection for this species. The golden eagle, although never listed under the ESA, is also governed by the Eagle Act. These species, therefore, are addressed in this document as species of federal regulatory concern.

In sum, a total of six wildlife species regulated by the ESA and Eagle Act were detected within the Action Area, and therefore the TSF Project may affect these species (Table 2). Species accounts are provided for all six species in Section 5.0, and individual effects determinations are outlined in Section 6.0. Section 7.0 provides detailed discussions of conservation measures and Applicant Proposed Measures to benefit these listed species. No designated critical habitat for listed species is present within the Action Area.

TABLE 2. FEDERALLY LISTED/PROPOSED SPECIES THAT MAY BE AFFECTED Six wildlife species are listed in this table that are governed by the ESA or Eagle Act, and which were detected within the Action Area and may be affected by the TSF Project.

	Common and Scientific Names	Fed/State Status Global/State Rank DFG Rank	Nesting/ Breeding Period	Habitat Preference	Potential Habitat?	Detected Within Action Area?	Critical Habitat Within Action Area?
1.	**San Joaquin Kit Fox** *Vulpes macrotis mutica*	Endangered/ Threatened G4T2T3/S2S3 Special Animal	December – July	Annual grasslands or grassy open stages with scattered shrubby vegetation. Needs loose textured sandy soil and prey base.	Yes. Suitable foraging and denning habitat is present within the Action Area.	Yes	No
2.	**Longhorn Fairy Shrimp** *Branchinecta longiantenna*	Endangered/None G1/S1 Special Animal	Rainy Season	Small clear water depressions in sandstone, and clear to turbid clay/grass bottomed pools in shallow swales.	Yes. Suitable aquatic habitat is present in ephemeral pools within the Action Area.	Yes	No
3.	**Vernal Pool Fairy Shrimp** *Branchinecta lynchi*	Threatened/none G3/S2S3 Special Animal	Rainy Season	Clear water sandstone depression pools, grassed swale, earth slump, or basalt flow depression pools.	Yes. Moderate to poor quality aquatic habitat is present in ephemeral pools in grassy swales within Action Area A.	Yes	No

	Common and Scientific Names	Fed/State Status Global/State Rank DFG Rank	Nesting/ Breeding Period	Habitat Preference	Potential Habitat?	Detected Within Action Area?	Critical Habitat Within Action Area?
4.	**Mountain Plover** *Charadrius montanus*	Proposed Threatened/None G2/S2? SSC	November - February (Wintering)	Short grasslands, plowed fields, etc. Winters locally, does not nest in SLO County.	Yes. Winters in the Carrizo Plain National Monument, and potentially suitable habitat occurs within the Action Area.	Yes	No
5.	**Golden Eagle** *Aquila chrysaetos*	Eagle Act Protected/ none G5/S3 SSC Fully Protected	March 15 through August 15	Nests in large, prominent trees in valley and foothill woodland. Requires adjacent food source.	Yes. Potential nesting on power towers, few perches at abandoned ranch sites, and foraging habitat are present within the Action Area.	Yes No nests on-site	No
6.	**Bald Eagle** *Haliaeetus leucocephalus*	Eagle Act Protected / Endangered G4/S2 Special Animal (Nesting and Wintering)	March 15 through August 15	Nests within 1 mile of water in tall live tree with open branches.	Yes. Migrant or transient bald eagles do occasionally forage on Carrizo Plain. Suitable nesting habitat is not present within the Action Area or near vicinity.	Yes No nests on site Winter Transient Only	No

5.0 Species Accounts

Species accounts for the six species listed in Tables 1 and 2 above are contained herein. Appendix A includes an evaluation of eight other federally listed species that were found not to be present in the Action Area despite the presence of potentially suitable habitat or that, after biological evaluation, did not have potentially suitable habitat in the Action Area.

5.1 San Joaquin Kit Fox

Listing Status: The San Joaquin kit fox (*Vulpes macrotis mutica)* is listed as endangered under the federal Endangered Species Act, and threatened under the California Endangered Species Act.

Species Biology: The San Joaquin kit fox (SJKF) is a small, tan colored fox with large ears that are set close together, slim body with long slender legs, narrow nose, and long, bushy tail tapering slightly toward the tip. San Joaquin kit foxes inhabit grasslands and scrublands, many of which have been extensively modified agricultural mosaics of row crops, irrigated pastures, orchards, vineyards, and grazed annual grasslands. Oak woodland, alkali sink scrubland, and vernal pool and alkali meadow communities also provide habitat for kit foxes. Dens are scarce in areas with shallow soils because of the proximity to bedrock, high water tables, or impenetrable hardpan layers. Kit foxes are active year-round and are primarily nocturnal. Dens are used for housing and protection. One fox may use several dens, particularly during the summer months. Females may change natal and pupping dens one or two times per month. Kit foxes construct their own dens, but they can also enlarge or modify burrows constructed by other animals, such as ground squirrels, badgers, and coyotes. They also den in human-made structures, such as culverts, abandoned pipes, and banks in roadbeds. Most dens, especially natal and pupping dens, have at least two entrances (Brown et al. 2006).

The TSF Project is located near the Carrizo Plain National Monument core SJKF population, which is one of three core populations in California. All three core populations are geographically distinct, and together with about a dozen smaller satellite populations comprise the entire SJKF metapopulation (USFWS 1998).

Survey Methods: Presence of San Joaquin kit fox within and near the Action Area was determined by a scat survey conducted by Dr. Debbie Smith and Alice Whitelaw of Working Dogs for Conservation Foundation (Smith 2010), and DNA analysis of scat collections conducted by Dr. Jesus Maldonado and Tammy Henry at the Center for Conservation and Evolutionary Genetics, Smithsonian Institution (Maldonado 2010). These studies covered the Action Area in entirety, as well as some surrounding lands (refer to BR Map 2 in Section 12.0). A total of 64.19 miles (103.31 kilometers) of transects were surveyed using dogs trained to locate kit fox scat. Survey routes were determined by Dr. Smith to provide complete coverage of the Action Area, and detect scat of every kit fox that utilized the property during the 8 day survey period. Two separate surveys were conducted, one in August and September 2009 and one in November 2009. Scat locations were determined with hand held GPS units. In the 2009 surveys, 414 kit fox scats were detected. One-hundred fifty-three (153) fresh scats (eight

days old or less) were collected and sent to the genetics laboratory at the Smithsonian Institution, National Zoological Park in Washington, D.C. for analysis. Coordinates of each scat sample collected were entered into a GIS map of the area.

A repetition of the kit fox scat survey was conducted in November 2010 to track the baseline kit fox population. The number of fresh scats detected in the November 2010 survey was 69. The 2010 scat survey found less than half the number found in 2009, reflecting the time of the year (November) that the survey was conducted. Genetic analysis to confirm kit fox identity is in process for 2010 scat surveys. Results of the genetic analysis will provide information regarding individual kit fox on the Project Site and their familial relationships.

In addition to scat surveys, daytime visual surveys were conducted concurrently with other biological surveys which primarily consisted of gathering information on recent signs of kit fox activity. Occupied dens or dens showing sign of recent activity were mapped in the field using hand-held Garmin GPS units. Data gathered on areas of kit fox use during other biological surveys were used to direct focused surveys for natal dens. Kit fox dens identified in the field were categorized as either "Known Den" or "Natal Den". Known dens are defined as those where a kit fox was observed at the den, or the kit fox sign at the den was distinct and fresh, suggesting the den was occupied at the time of observation. Natal dens are defined as those dens used specifically for the purpose of raising puppies. In one instance, a natal den was identified, and then the fox family was at another den, which was subsequently labeled a "Post-natal Den". Where observations of the foxes were insufficient to determine natal versus post-natal, it was identified as a natal den. All kit fox known dens and natal dens are indicated on BR Map 3, Section 12.0.

Motion-detecting cameras (Cuddeback® Digital Expert 2006) were installed at various locations within and around the Action Area to identify and document wildlife. Eleven cameras were placed at 33 locations in 2009 and 2010. Cameras were active from April 2 to July 20, 2009. Cameras for the 2010 season were installed on January 15 and were in place through July 8. The primary target was San Joaquin kit fox, which was photographed twenty-three times, with detections at six locations.

Survey Results: There is a high variation in habitat quality for kit fox utilization within the Action Area, ranging from good to poor. Areas in the north and northwest portion of the Action Area, consisting of Sections 19, 20 and 21 are poor quality. These parcels have been in cropland production for about 70 years, and are not situated near grasslands. Sections 27, 29, 32 and 33 are croplands that are poorly suited to kit fox habitation, but are situated near grasslands and therefore kit fox were detected occasionally using dirt roads as movement corridors. Better quality habitat occurs in the east and southeastern portions of the Action Area, consisting of portions of Sections 4 and 34. These areas contain habitat that has not been cropped for up to 25 years. Section 34 had relatively low abundance of small mammals in 2010, possibly due to grazing practices that reduce the naturalized seed crop (Collins 2010). Sections 4 had low small mammal abundance that is partially attributable to a shallow to moderately deep bedrock layer (25 to 100 cm) that causes water to perch and flood burrows. These conditions seem to limit small mammals from being able to establish populations on these sections despite the absence

of tilled agriculture for approximately 25 years. Although prey abundance was low on Section 4, several kit fox dens were detected there (south of the Action Area boundary). Moderate quality kit fox habitat is present in grassland within Section 28. This habitat was farmed 5 or 6 years ago, and therefore much of the acreage contains tall dense patches of weedy forbs that reduces the suitability for kit fox. The location of kit fox sign detected by various studies within the Action Area is consistent with habitat quality, where more kit fox sign was detected in higher quality habitat areas.

The scat detection study, conducted by Dr. Debbie Smith and Alice Whitelaw of Working Dogs for Conservation Foundation (Smith 2010), and DNA analysis by Dr. Jesus Maldonado and Tammy Henry at the Center for Conservation and Evolutionary Genetics, Smithsonian Institution (Maldonado 2010), found evidence of kit fox predominately on eastern and southern areas of the Action Area (refer to BR Map 2 in Section 12.0). Other portions of the Action Area had fewer detections (one or more scats). Kit fox scat was not detected in Sections 7, 17 and 18, which are croplands situated north and northwest of the Action Area that were included in the scat detection study. The 2009 scat surveys were conducted from August 18th through September 1st, and from November 11th to the 21st. The August survey period occurred during a time when annual population numbers tend to be high, and when family groups are still together prior to dispersal (Brian Cypher, pers. com. 2010; Maldonado 2010).

A total of 19 individual kit fox were detected in the kit fox survey area in 2009, although only 14 were detected within the Alternative 3B Action Area. Genetic analysis found that all nineteen foxes were significantly related to other foxes in the study area. The genetic analysis allows potential family groups to be described. A potential family group was found centered near Section 22, outside the Action Area, that consisted of eight individuals (two parents and six offspring). We observed this family during the spring and summer surveys, and observed at least three pups with parents in 2009. Local residents said there were four pups with this family in 2009, although we observed only three. Kit fox can have up to six pups in a litter (Cypher et al., 2000), however, the additional individuals could have been previous year pups, including a helper offspring that is still part of the family group assisting with pups. A second family group was detected in the southern portion of the property. This group has nine related individuals with two different matings by one male fox. Three of these individuals are also strongly related to the first family group. One mother was detected in Section 26, and another mother in Section 5. Offspring are likely from the same father, who was detected in Section 4. Another group of four individuals were related to the second family group through a male fox. The high degree of relatedness suggests that the number of foxes detected in the Action Area includes the previous year's offspring prior to dispersal.

Of the 14 foxes detected within the Alternative 3B Action Area in 2009, one was detected 10 or more times, 5 were detected 5 to 9 times, and 9 were detected one to four times. There were no detections of transient foxes that were not related to the residents. The foxes that were detected only a few times are likely to have most of their home range outside the Action Area.

Genetic analysis to confirm kit fox identity is in process for 2010 scat surveys. In January 2011, Dr. Maldonado determined most of the 69 scats analyzed are from kit fox,

with a few coyote and red fox scats also collected. Results of kit fox individual identity and familial relationships are expected by March 2011.

In 2009 a pair of kit fox raised three pups in Section 22. We mapped the locations of the natal and post-natal dens used by this fox pair. In spring 2010, a natal den was mapped in the northeast corner of Section 35, east of the Action Area. The natal den of a second pair of kit foxes was mapped in spring 2010 in the southwest corner of Section 4, and a post-natal den was mapped in the northeast corner of Section 4. The array layout for Alternative 3B avoids all natal and post-natal kit fox dens. San Joaquin kit fox were documented utilizing grassland habitats within the Action Area for foraging and denning, and walking regular routes along fence lines. Camera locations within the agricultural fields away from grasslands did not detect kit fox.

The survey results demonstrate that kit fox utilize the Action Area, with most activity occurring in the southern and eastern portions. Since the end of the scat detection survey, the remains of two kit fox (cause of mortality unknown) were found within or adjacent to the Action Area. One carcass was found in Section 27, which is part of the Action Area, and one carcass was found in the northeast corner of Section 33 outside the Action Area boundary. Kit fox juvenile survival reported for the Carrizo Plain is 64 percent, ranging from 50 percent to 74 percent for the years 1989 – 1991 (Cypher 2010). In Lokern, a wide range of juvenile survival has been documented ranging between 20 percent and 81 percent (Cypher et al. 2000). Factors contributing to kit fox survival include precipitation amounts and prey availability (Cypher et al. 2000, Cypher 2010).

5.2 Longhorn fairy shrimp

Listing Status: The longhorn fairy shrimp (*Branchinecta longiantenna*) is listed as endangered under the federal Endangered Species Act; it has no state listing status.

Species Biology: "Longhorn fairy shrimp have been observed in few known pools, generally located on the eastern edge of the Central Coast Mountain Region. Specifically, longhorn fairy shrimp have been observed in sandstone depression pools west of Tracy, California, as well as in claypan pools around the borders of Soda Lake in San Luis Obispo County and in alkaline grassland and Valley Saltbush Scrub pools located on The Nature Conservancy's Preserve in the Soda Lake area (USFWS 1994). Longhorn fairy shrimp have appeared in pools from late December to mid-May in basins filled by winter and spring rains, with required water temperatures ranging from 10-18 ^{o}C (sandstone pools) to 10-29 ^{o}C (claypan pools). However, little is known regarding the specific water chemistry (TDS, alkalinity, and/or pH) required for hatching and surviving for extended periods of time. It has been assumed that, like other Central Valley endemics, larvae of longhorn fairy shrimp hatch soon after winter and spring rains fill the pools with water temperatures at approximately 10 ^{o}C, and require temperatures to remain at approximately 15-20 ^{o}C to attain maturity. If conditions are optimal, maturation is reached in 23 days, but more typically requires 43 days. If pools remain for an extended period of time, longhorn fairy shrimp have been observed in pools for up to 147 days (Eriksen and Belk 1999)." (*Excerpted from Advantage Environmental Consultants 2010).*

Survey Methods: Protocol surveys for listed vernal pool branchiopods began in the 2008 dry season (Helm Biological Consulting, LLC 2008). Wet season surveys were conducted during the 2008-2009 wet season by Advantage Environmental Consultants, LLC (AEC 2009). A second dry season survey conducted in 2009 covered additional lands added to the Project since the 2008 survey (Helm Biological Consulting, LLC 2009). An additional wet season survey was conducted in 2009-2010 by Advantage Environmental Consultants, and a 2010 dry season survey was conducted by Helm Biological Consulting, LLC. Detailed methods for each survey are provided in the original reports, which are included in the 2010 Biological Report Technical Appendix, Volume 2 (Althouse and Meade, Inc. 2010b). Fairy shrimp surveys covered all of the 10,000 acre Project Site. All locations of listed fairy shrimp pools are indicated on BR Map 5 in Section 12.0.

Survey Results: The longhorn fairy shrimp was detected in two pools that are included within the Action Area. The pools are both located in the south half of Section 20, a farm field in active cultivation with dry-farmed grain. The pools are not supported by groundwater, but are filled by direct rainfall and surface sheet-flow. Section 20 was included in the 2008-2009 fairy shrimp protocol survey area. Ephemeral pools in the active farm field were not detected in 2008-2009 due to the low rainfall year that resulted in no inundation. Also, the pools were plowed and the ground was left bare through the season which effectively made the pools undetectable. In March 2010 while conducting other biological surveys, Althouse and Meade, Inc. biologists found several pool complexes with standing water in the south half of Section 20. A new barley crop was approximately six inches tall around the margins of the pools. Unidentified fairy shrimp were visually detected in three pools. AEC sampled the pools on March 23, 2010. Two of the pools contained *B. longiantenna* and the third pool was dry. This pool is situated between the two *B. longiantenna* pools and is mapped as potential habitat for listed fairy shrimp. Because two pools in Section 20 and one in Section 19 were found late in the wet season, the protocol was not fully implemented and presence or absence of listed fairy shrimp was not verified. These pools are all mapped as potential habitat.

The 2010 protocol dry season survey conducted by Helm Biological Consulting sampled all 56 pools that were either not sampled or were found not to contain fairy shrimp during the 2010 wet season survey conducted by AEC. *Branchinecta* cysts were detected in 31 pools. Dry season sampling identifies cysts to genus, not to species; therefore it is unknown if the fairy shrimp in the 31 pools identified during the 2010 dry season survey are common or listed species. BR Maps 5 in Section 12.0 indicates the locations of all 31 pools with unidentified fairy shrimp, and provides a 250-foot buffer around each pool that is consistent with USFWS standard listed fairy shrimp pool setbacks.

5.3 Vernal pool fairy shrimp

Listing Status: The vernal pool fairy shrimp (*Branchinecta lynchi*) is listed as a threatened species under the federal Endangered Species Act; it has no state listing status.

Species Biology: "The vernal pool fairy shrimp has been observed in a variety of vernal pools from December to early May in the Central Valley of California, and to the central and southern Coast Ranges from Solano County to Ventura County, California (USFWS 1994). They are also found in disjunct populations in the South Coast Mountains Region

in a wide variety of habitats. Habitats include sandstone outcrops in Contra Costa and Santa Barbara counties, but the more typical habitat is small swales, earth slumps, or basalt-flow depression basins with a grassy or muddy bottom (Eriksen and Belk 1999). Vernal pool fairy shrimp inhabit vernal pools that vary in size from 0.56 m^2 (1.84 ft^2) to over 10 ha (24.71 acres) and have low to moderate total dissolved solids (TDS) and alkalinity, and neutral pH. Vernal pool fairy shrimp mature rapidly and can reach reproductive age in 18 days under optimal conditions, however, 41 days is more common. Vernal pool fairy shrimp are the shortest lived fairy shrimp, with a maximum lifespan of 139 days (mean = 90 days) (Eriksen and Belk 1999)." (*Excerpted from Advantage Environmental Consultants 2010*).

Survey Methods: Protocol surveys for listed vernal pool branchiopods began in the 2008 dry season (Helm Biological Consulting, LLC 2008). Wet season surveys were conducted during the 2008-2009 wet season by Advantage Environmental Consultants, LLC (AEC 2009). A second dry season survey conducted in 2009 covered additional lands added to the project since the 2008 survey (Helm Biological Consulting, LLC 2009). An additional wet season survey was conducted in 2009-2010 by Advantage Environmental Consultants, and a 2010 dry season survey was conducted by Helm Biological Consulting, LLC. Detailed methods for each survey are provided in the original reports, which are included in the 2010 Biological Report Technical Appendix, Volume 2 (Althouse and Meade, Inc. 2010b). Fairy shrimp surveys covered all of the 10,000 acre Project Site. All locations of listed fairy shrimp pools are indicated on BR Map 5 in Section 12.0.

Survey Results: The vernal pool fairy shrimp was detected in 11 pools within the Action Area. It was only found in true vernal pools. All of the 11 *B. lynchi* pools are located in Section 4, in the extreme southeast end of the Action Area. Four of the vernal pools in Section 4 contained both *B. lynchi* and *B. lindahli*, a common species. All of the vernal pools in Section 4 are filled directly by rainwater or by surface sheet-flow; they are not connected or supported by groundwater sources.

The 2010 protocol dry season survey conducted by Helm Biological Consulting sampled all 56 pools that were either not sampled or were found not to contain fairy shrimp during the 2010 wet season survey conducted by Advantage Environmental Consultants, LLC. *Branchinecta* cysts were detected in 31 pools. Dry season sampling identifies cysts to genus, not to species; therefore it is unknown if the fairy shrimp in the 31 pools identified during the 2010 dry season survey are common or listed species. BR Map 5 in Section 12.0 indicates the locations of all 31 pools with unidentified fairy shrimp, and provides a 250-foot buffer around each pool that is consistent with USFWS standard listed fairy shrimp pool setbacks.

5.4 Mountain Plover

Listing Status: The mountain plover (*Charadrius montanus*) is listed under the federal Endangered Species Act as Proposed Threatened. The USFWS will publish a final listing determination for mountain plover in the Federal Register no later than May 1, 2011. It is also designated as a Species of Special Concern by the California Department of Fish and Game, but is not listed under the California Endangered Species Act.

Species Biology: The mountain plover, although fairly well studied on its breeding grounds, continues to be poorly understood during migration and throughout its wintering range. The Mountain Plover Conservation Plan (Andres and Stone 2009) presents a current overview of the species, its ecology and conservation issues. The Carrizo Plain National Monument Approved Resource and Management Plan and Record of Decision (U.S. Department of the Interior, Bureau of Land Management April 2010) provides a good overview of the status of wintering mountain plovers in the Carrizo Plain, and a description of habitat availability. Knopf and Rupert (1995) conducted telemetry studies on the Carrizo Plain and Pixley National Wildlife Refuge, and Knopf (1998) studied the diets of wintering mountain plovers in California.

The mountain plover is a small migratory North American shorebird that utilizes a variety of short-grass habitats on nesting and wintering grounds. They nest in the Midwest, from southern Canada south to New Mexico and the northern tip of Texas. California appears to be the primary wintering area for mountain plovers, although they are known to winter across the southern United States and northern Mexico east into Texas.

The United States Geologic Survey online species account reports that wintering mountain plover populations are not well understood (http://www.mbr-pwrc.usgs.gov/bbs/grass/a2810.htm). The proportion of the species that overwinters in Mexico is not known (AOU 1983). Limited data has not allowed a projection of trends in wintering populations. Declines have been reported for some portions of southern California (Garrett and Dunn 1981), however winter population trends are not currently known. Although the population structure of mountain plovers is poorly studied, Andres and Stone (2009) estimated that about half of the total population of 18,000 plovers winters in California.

In California, mountain plovers are reported to utilize heavily grazed pastures, non-native annual grasslands, burned fields, fallow fields, plowed fields (usually without furrows), alkaline flats (within valley sink scrub communities) and coastal prairies (Andres and Stone 2009; Knopf and Rupert 1995). In the Carrizo Plain they are most often associated with barren alkali flats, non-native annual grasslands, recently burned fields, and agricultural lands. Barren areas created by active kangaroo rat warrens are also important. The Bureau of Land Management (BLM) reports the "maximum theoretical extent" of mountain plover habitat within the Carrizo Plain National Monument is 69,000 acres, of which a variable proportion contains suitable vegetation structure in any particular year (BLM 2010a). Surveys by BLM have noted that the mountain plovers do not occupy all suitable habitat within the Monument (Sharum undated). Knopf and Rupert (1995) reported the potentially suitable habitat in the Carrizo Plain consists of approximately 201 square kilometers (49,670 acres) of land (85.6% grassland, 11.5% agricultural land, and 2% alkali surfaces). Suitability of available habitat varies from year to year, and throughout the season, due to rainfall and climate patterns that promote or inhibit vegetation growth. Mountain plovers preferentially forage and roost in areas with very little vegetation, typically less than one inch in height. Telemetry research by Knopf and Rupert (1995) indicates the Carrizo Plain wintering mountain plovers preferentially use native habitats (grasslands, alkali surfaces) over agricultural land. In addition, the plovers preferentially use burn areas and alkali barrens within grasslands (as

opposed to vegetated areas). Agricultural lands have long been known to harbor mountain plovers in the Central Valley of California. Although the literature is vague, mountain plovers appear to prefer fields that have been recently harvested and grazed (creating a flat surface with little vegetation), while freshly plowed fields are used on occasion. The use of freshly plowed fields by mountain plovers has been correlated with a lack of available native habitat in the San Joaquin Valley (Knopf and Rupert 1995).

The Carrizo Plain regional mountain plover wintering population likely consists of at least a few hundred individual birds each year. Recent BLM annual single-day roadside surveys detected a low count of 57 mountain plovers (2008) to a high count of 591 (2009). They concluded that annual wintering population variability in the Carrizo Plain is likely due to factors other than habitat suitability, such as breeding range, food resources, environmental contamination, and availability of alternate wintering areas (BLM 2010a). Mountain plovers are highly nomadic in winter, but seem to be present somewhat consistently in the vicinity of Panorama Road and San Diego-Simmler Road in the Carrizo Plain National Monument, from October through March. Telemetry research indicates that once the plovers arrive on the Carrizo Plain in late fall, their individual daily movements are highly variable through the winter as they relocate to find new foraging and roosting areas, remain for a number of days, and move again (Knopf and Rupert 1995). In this study most birds moved less than one kilometer per day. However, infrequent long-range movements over the Temblor Range into the southern San Joaquin Valley were detected. These movements were sufficient to conclude that year to year site fidelity is low in mountain plovers, and further that the "Carrizo Plain and San Joaquin populations are biologically sympatric, as may be the entire Central Valley population." (Knopf and Rupert 1995, pg. 749). Low year to year site fidelity is consistent with a species that is dependent upon micro-habitat variables that fluctuate dramatically from year to year due to rainfall and other mechanisms. Movement among the wintering mountain plover population in California suggests that the birds seek out micro-habitat niches over a wide area, and remain where conditions are preferable.

Grassland habitat within the Action Area is poorly suited to use by mountain plovers due to vegetation height. Mountain plovers prefer bare ground or vegetation less than two inches in height. Most of the grasslands within the Action Area are simply too overgrown. The grassland portions of Sections 4 and 34 were, however, observed to have vegetation heights of two inches or less in February 2010, and were at that time moderately suitable for use by mountain plovers. These two Sections contain annual grasslands which have not been farmed in at least 20 years and which are grazed every three years. They are dominated by filaree (*Erodium cicutarium*) in the winter months prior to spring growth of annual grasses and forbs. None of the grassland habitat in the Section 21 or 28 is suitable for use by mountain plovers due to the vegetation structure that is present. Croplands within the Action Area are plowed in the fall or early winter after first rains and left fallow through the winter. They are plowed again just prior to sowing to remove early season weeds. In the winter-plowed condition they have an uneven surface of loose dirt clods, which is not a preferred ground condition for mountain plover. We consider cropland habitat within the Action Area to be poor quality habitat for mountain plovers, particularly in light of the proximity of preferred habitat that is available in the Carrizo Plain National Monument.

Survey Methods: Winter bird surveys conducted from November 2009 through January 2010 throughout the Project Site utilized a focused survey method in which surveyors walked representative habitat types, and also inspected homesteads, power lines, and fence lines. Winter bird surveys conducted in February 2010 utilized a non-random transect survey method in which biologists covered parallel belts of land in north-south orientation across annual grasslands and croplands within the Action Area and elsewhere in the Project Site. For a detailed description of bird survey methods please refer to Sections 7.2.5 and 7.2.6 of the *Final Biological Report for the Topaz Solar Farm* (Althouse and Meade, Inc. 2010c). Locations where mountain plovers were observed are indicated on BR Maps 7 in Section 12.0.

Survey Results: We observed mountain plovers foraging within and adjacent to the Action Area on four occasions between January and March 2010, with a high count of 17 birds observed in the eastern end of Section 35 in March, outside the Action Area. Three of the four observations were from the same approximate location in Section 35 (two from the same day); the fourth observation was from the south end of Section 34 just outside the Action Area boundary. No observations were made of mountain plovers in the Action Area.

5.5 Golden Eagle

Listing Status: The Golden eagle (*Aquila chrysaetos*) is a California Species of Special Concern. It is not listed under the California Endangered Species Act or the federal ESA. Golden eagles are designated a Fully Protected species by the California Department of Fish and Game. The primary federal legislation governing golden eagles is the Bald and Golden Eagle Protection Act. Golden eagles are also protected by the Migratory Bird Treaty Act (MBTA).

Species Biology: Golden eagles occur throughout the western United States, Alaska, and large portions of Canada and Mexico. They occupy nearly all habitats in the western U.S., including deserts, grasslands, woodlands, and all but the densest forests where hunting is impractical (Johnsgard 1990). Highly adaptable, golden eagles readily occupy habitats where basic needs are met. These basic needs include suitable nesting sites (typically large trees or cliffs), dependable food supplies, and large open areas for foraging.

California supports both wintering and nesting golden eagle populations. In winter, regional populations increase with the influx of northern breeders that migrate south. Occupied wintering habitats often contain a mix of adult and sub-adult birds. Golden eagles do not form large wintering congregations in California, as is reported for bald eagles in Alaska and elsewhere, however they can be abundant in some regions. As the nesting season commences, territorial behaviors limit the number of golden eagles in a particular area. Territory size of a breeding pair is highly variable, depending upon the resources available. Average breeding territories reported in Southern California are approximately 36 square miles. In Northern California, territories are approximately 48 square miles (Johnsgard 1990). One of the highest densities reported for the species is from the vicinity of the Altamont Pass Wind Energy Resource Area east of the San Francisco Bay near Livermore, where at least 44 pairs were documented in an area of approximately 317 square miles (Hunt 1998). The eagle density was thus one pair every

7.3 square miles. In less productive environments, or where potential nest sites are scarce, breeding territories of up to 60 square miles are reported (Johnsgard 1990).

The Carrizo Plain region, extending from the southern tip of the Carrizo Plain National Monument to the extreme northern end of the plain north of the Action Area, and including portions of both the Temblor Range and the Caliente Range, is approximately 500,000 acres (781 square miles) in size. Based on estimated average territory sizes for Southern and Northern California, this area could support between 16 and 22 breeding pairs if sufficient nesting sites and prey availability are present.

Survey Methods: A 2010 aerial survey for golden eagle nests in the TSF Project region was conducted by Brian Latta, Executive Director, The Bird Group (Latta 2010). Methods of the survey conform to the newly published Interim Golden Eagle Technical Guidance (Pagel 2010). In one location, the Beartrap Condor critical habitat area, aerial survey is not permitted and nest searches were conducted on foot. The survey area covered approximately 448,647 acres of land in the Carrizo Plain. Detailed methods are provided in the original report, included in the 2010 Biological Report Technical Appendix, Volume 2 (Althouse and Meade, Inc. 2010b). All active and non-active golden eagle nests identified during the aerial surveys are indicated on BR Map 6 in Section 12.0.

Survey Results: Final results from two complete aerial survey passes determined 12 golden eagle territories are located within the approximately 448,647 acres of land in the Carrizo Plain survey area. The aerial survey did not determine how many eagles were present at the time of the survey, however observations of at least one adult on two of the three non-active territories suggest 11 to 12 pairs were present. Twenty-two golden eagle stick nests were located, nine of which were active and contained chicks. Two nests showed signs of recent activity but were not active. The remaining 11 nests are likely alternate nests not used this year. Seven of the 12 golden eagle territories contained nests within ten miles of the Action Area. Only four of these territories contained active golden eagle nests that are located within 10 miles of the Action Area. The closest active golden eagle nest to the Action Area is approximately 7.3 miles southeast, in the foothills of the Caliente Range west of Soda Lake. No golden eagle nests are located within the Action Area.

Golden eagles forage periodically within the Action Area year-round. In winter, we observed adult and sub-adult golden eagles regularly utilizing habitats within the Action Area for hunting, loafing, and occasional night roosting. From late winter and through spring, adult golden eagles were seldom observed. Presumably, they move into mountainous areas where there is better nesting habitat. Un-mated sub-adult golden eagles are present in and near the Action Area through the spring, where they hunt ground squirrels, feed on carrion, and occasionally utilize trees in abandoned ranch compounds as night roosts.

5.6 Bald Eagle

Listing Status: The bald eagle (*Haliaeetus leucocephalus)* is delisted from the federal ESA, and is listed as endangered under the California Endangered Species Act. The bald eagle is designated a Fully Protected species by the California Department of Fish and

Game. The primary federal legislation governing bald eagles is the Bald and Golden Eagle Protection Act. Bald eagles are also protected by the MBTA.

Species Biology: Bald eagles are wide ranging migrants that typically nest within one mile of water. In San Luis Obispo County, there is an increasing nesting population of reintroduced bald eagles at Lake Nacimiento, and recent records of a nest at Santa Margarita Lake and possibly Lopez Lake and Whale Rock Reservoir. Adults and young are wide ranging and often migratory. Preferred prey is fish, although they will occasionally hunt water fowl, small mammals, and will scavenge carrion. Migrating or transient bald eagles will hunt ground squirrels and other prey, or feed on carrion, on the Carrizo Plain during the non-breeding season.

Survey Methods: Winter bird surveys conducted from November 2009 through January 2010 throughout the Project Site utilized a focused survey method in which surveyors walked representative habitat types, and also inspected homesteads, power lines, and fence lines. Winter bird surveys conducted in February 2010 utilized a non-random transect survey method in which biologists covered parallel belts of land in north-south orientation across annual grasslands and croplands within the Action Area and elsewhere in the Project Site. For a detailed description of bird survey methods please refer to Sections 7.2.5 and 7.2.6 of the *Final Biological Report for the Topaz Solar Farm* (Althouse and Meade, Inc. 2010c). Locations where bald eagles were observed are indicated on BR Maps 7 in Section 12.0.

Survey Results: A bald eagle was observed in the vicinity of the Action Area in February 2008 (DFG 2008c). We observed an adult bald eagle along Bitterwater Road at the west edge of Section 18 adjacent to the Action Area in March 2009. A sub-adult bald eagle was observed in Section 32 of the Option A Action Area in February 2010. These and other observations in the region suggest bald eagles occasionally forage on the Carrizo Plain during the non-breeding season; however, no breeding habitat is present. The closest nesting location to the Action Area is most likely at Santa Margarita Lake, approximately 25 miles west.

6.0 Effects Determinations

Potential effects associated with major construction projects on threatened and endangered species include both direct and indirect effects, which can be either adverse or beneficial. Direct effects are results of the TSF Project, including but not limited to such effects as displacement, loss of habitat and mortality of individuals (adverse effects), or increased quantity of suitable habitat (beneficial effect). Indirect effects are those caused by the TSF Project that are reasonably certain to occur and may include but are not limited to effects such as disturbance to individuals and habitat degradation (adverse) or habitat improvement (beneficial). Effects may be temporary (short-term), for example during the construction phases, or permanent (long-term), such as effects arising from operation and maintenance of the facility for the life of the Project.

Cumulative effects, those arising from the total impact of development, management, and use of surrounding lands are discussed separately in Section 9.0.

Based on review of the best scientific and commercial data available, we determined that the TSF Project would not jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat.

6.1 San Joaquin Kit Fox

The Topaz Solar Farm San Joaquin Kit Fox Conservation and Monitoring Plan (Althouse and Meade, Inc. February 2011) was prepared specifically to address potential Project effects and mitigation strategies for this species. This plan is included in Appendix B, and the information contained in the Plan is considered an integral part of this BA..

Direct Effects: The San Joaquin kit fox occurs within the Action Area. The TSF Project may result in direct impacts to San Joaquin kit fox. Potential direct effects of the TSF Project on kit fox include displacement, a change in habitat quantity, and mortality of individuals. Displacement would be a direct adverse effect. Change in habitat quantity would be either a beneficial or adverse effect. The Project intends to convert existing croplands (poor quality and dangerous habitat for SJKF) to annual grassland habitat (increase in higher quality habitat), which would be a potentially beneficial effect if SJKF occupy the facility after construction is complete. Absent conservation land, the TSF Project would have an adverse effect on SJKF habitat quantity if, in spite of converting croplands to grasslands, SJKF do not occupy the completed solar facility. Direct mortality could occur due to construction activities, including vehicle strikes.

Direct effects can also be described in terms of short-term and long-term effects. Potential short-term direct effects are those that may result during the construction phases, but which would cease after completion of the Project. These may include temporary displacement of foxes from portions of the Action Area where they are known to be present, changes in daily movement and hunting patterns of individual foxes, removal of potential denning sites, and potential injury or death to individual kit foxes due to construction equipment. Potential long-term direct effects are those that would persist for the life of the Project, and may include change in habitat quantity in the area which could alternatively result in: 1) a decrease in kit fox numbers utilizing the Action Area, 2) maintenance of kit fox numbers using the Action Area, or 3) an increase in kit fox numbers using the Action Area. A decrease in kit fox numbers would result if rodent populations decrease in the Project's solar array areas or the surrounding grasslands, if active burrows and dens are filled, or if foxes do not den near solar arrays. An increase in kit fox numbers utilizing the Action Area could occur if release from current farming operations creates usable habitat, if foxes adjust to solar arrays and take up residence within the array fences, if vegetative cover in the solar arrays is sufficient to support and increase rodent prey, and if array fencing provides a refuge to kit foxes from predation. The goal of the SJKF Mitigation and Monitoring Plan is to facilitate the latter scenario. Kit foxes have successfully utilized other modified habitats (Cypher 2010).

Potential short-term direct effects of the Project:

- Ground disturbance includes limited grading, smoothing ground surface, driving support rods, assembling arrays, and trenching
- Potential for SJKF harm from construction equipment
- Potential exclusion from work area during project construction

- Potential displacement of denning foxes

Potential long-term direct effects of the Project:

- Could create safe haven for SJKF, resulting in increased population
- Vegetative cover, as managed by the Applicant according to an approved vegetation management plan and habitat restoration and revegetation plan, could increase prey abundance for SJKF
- End of farming within the solar array and several mitigation parcels would open many square miles for SJKF use and increase prey abundance
- Conservation easements on adjacent parcels could result in agricultural uses less disturbing to SJKF, such as grazing instead of dry farming
- SJKF movement would not be blocked
- Project kit fox enhancement measures, such as:
    - Artificial dens – as per Endangered Species Recovery Program (ESRP) guidelines
    - Escape dens, which might also be used by other species, such as burrowing owl
    - Fencing that allows kit fox passage and mostly excludes coyote and red fox

Indirect Effects: The Carrizo Plain supports one of three core populations of San Joaquin kit fox. Potential indirect effects of the Project could include reduction in habitat quality following construction due to infrastructure (buildings, inverter pads, posts), reduction in use of grassland/grazing land due to the presence of the solar arrays, and change in movement patterns across the Project's array areas.

We investigated whether the presence of the Project would significantly alter movement patterns of kit fox as they disperse from the core population area into other areas. The kit fox recovery plan identifies three core areas: Carrizo Plain, Western Kern County, and Ciervo-Panoche area. A recovery action identified in the kit fox recovery plan is to "protect and enhance corridors of movement of kit foxes through the Salinas-Pajaro Region and from the Salinas Valley to the Carrizo Plain and San Joaquin Valley." Although kit fox dispersal paths are not well understood, nor is the dispersal range well documented, we expect that the northern Carrizo Plain movement corridors are important. A few kit foxes have been detected in the Shandon area, San Juan Creek, and north of the Action Area on Pinole Ranch. Kit fox are present along Bitterwater Valley Road and in the Bitterwater Valley, although it is not known how many of these foxes are resident, or whether they more frequently connect with closer fox populations to the east, rather than the Carrizo population to the south.

Movement opportunity around the Project would continue to be present after the Project is built, and open space areas on site would have improvements to enhance kit fox movement and survival. Thousands of acres of land near the Project would be conserved in perpetuity, thereby preserving the movement corridors east and west of the Action Area. On-site improvements would include removal of some existing fencing in open space areas that currently inhibit kit fox movement, and installation of escape dens.

Examples of existing fencing that would be removed from the Project site include approximately 12,000 feet of cyclone fence around the former Arco solar farm site within Section 27. Array perimeter fencing would include a 5 to 6 inch gap at the base for the entire length, allowing kit fox passage. Escape dens would also be provided both outside and inside of the array areas.

Effects Determination: **May Affect, Likely to Adversely Affect**. This is the appropriate effects determination in light of the potential for short-term adverse effects, including a low potential for incidental take during construction, even though the overall long-term effect of the Project on kit fox is expected to be beneficial.

6.2 Longhorn Fairy Shrimp

The TSF Project would avoid all vernal pools within the Action Area that contain or could potentially contain longhorn fairy shrimp. The Project would establish a permanent minimum setback of 250 feet from the edge of all pools containing or potentially containing longhorn fairy shrimp, as depicted on BR Maps 5 in Section 12.0. Protection measures would be implemented as part of the APMs (refer to Section 7.2) to ensure Project construction, operation and subsequent maintenance activities do not result in adverse effects to listed fairy shrimp or their habitat.

Vernal pools in cropland habitats that are included in the final TSF Project layout would no longer be subjected to adverse farming effects and would be protected from TSF Project-related activities by implementing applicant-proposed buffers. The Project could, therefore, result in a beneficial effect to longhorn fairy shrimp.

Direct Effects: We do not anticipate any short-term or long-term direct adverse effects of the Project on longhorn fairy shrimp at known pool locations. Potential short-term direct effects such as vehicles driving over dry vernal pools, would not occur due to implementation of APMs, as outlined in Section 7.2. Direct beneficial effects could occur upon conversion of croplands containing vernal pools to passive solar facilities managed for grassland habitat and associated vernal pools.

Direct adverse effects could potentially occur to longhorn fairy shrimp if they are identified in pools within the Action Area not previously identified as containing listed species. However, extensive protocol level surveys consisting of wet and dry season sampling mapped all potential habitat and completed definitive presence/absence surveys. Therefore, the potential for the TSF Project to adversely affect longhorn fairy shrimp is extremely low.

Indirect Effects: Sheetflow that feeds pools in Section 20 would not be changed by construction of the TSF Project. Applicant proposed 250-foot buffers and elimination of farming would protect and improve habitat in and around the vernal pools. Reduction of farming operations upslope would lessen the potential for sediment transport into the pools. We do not anticipate indirect effects of the TSF Project would reduce the quality of existing pool habitat for longhorn fairy shrimp.

Effects Determination: **May Affect, Likely to Adversely Affect**. This is the appropriate effects determination because, although the likelihood is extremely low, the TSF Project could potentially result in adverse effects to longhorn fairy shrimp.

6.3 Vernal Pool Fairy Shrimp

The Project would avoid all vernal pools within the Action Area that contain or could potentially contain vernal pool fairy shrimp. The Project would establish a permanent minimum setback of 250 feet from the edge of all pools containing or potentially containing vernal pool fairy shrimp, as depicted on BR Maps 5 in Section 12.0. Protection measures would be implemented as part of the APM's (refer to Section 7.2) to ensure Project construction, operation and subsequent maintenance activities do not result in adverse effects to listed fairy shrimp or their habitat.

Vernal pools in cropland habitats that are included in the final Project layout would no longer be subjected to adverse farming effects and would be protected from Project-related activities by implementing applicant-proposed buffers. The Project could, therefore, result in a beneficial effect to vernal pool fairy shrimp.

Direct Effects: We do not anticipate any short-term or long-term direct adverse effects of the Project on vernal pool fairy shrimp at known pool locations. Potential short-term direct effects such as vehicles driving over dry vernal pools, would not occur due to implementation of APM's, as outlined in Section 7.2. Direct beneficial effects could occur upon conversion of croplands containing vernal pools to passive solar facilities managed for grassland habitat and associated vernal pools.

Direct adverse effects could potentially occur to vernal pool fairy shrimp if they are identified in pools within the Action Area not previously identified as containing listed species. However, extensive protocol level surveys consisting of wet and dry season sampling mapped all potential habitat and completed definitive presence/absence surveys. Therefore, the potential for the TSF Project to adversely affect vernal pool fairy shrimp is extremely low.

Indirect Effects: Long-term indirect effects such as permanent modification of the hydrological regime that maintains vernal pools containing listed fairy shrimp are not anticipated because of APM's that would provide vernal pool buffers. Vernal pools in the southern end of the Option A Action Area are rain-filled and are not dependent upon drainage flows or groundwater for inundation. Applicant proposed setbacks allow sufficient room for pools to fill naturally. We do not anticipate indirect effects of the Project would reduce the quality of existing pool habitat for the vernal pool fairy shrimp.

Effects Determination: **May Affect, Likely to Adversely Affect**. This is the appropriate effects determination because, although the likelihood is extremely low, the Project could potentially result in adverse effects to vernal pool fairy shrimp.

6.4 Mountain Plover

The Carrizo Plain mountain plover wintering population, consisting of approximately several hundred individuals, accounts for less than a tenth of the statewide wintering population of approximately 9,000 individuals. The primary wintering habitat in the Carrizo Plain is within the National Monument and is protected in perpetuity. The abundance of mountain plovers in the Carrizo region does not seem to be limited by amount of available wintering habitat.

The TSF Project could result in a loss of some potential winter foraging habitat. Loss of a few hundred acres of potential winter foraging habitat within the Action Area would constitute a discountable and insignificant adverse effect to mountain plover in light of the large area of potentially suitable wintering habitat in the nearby Carrizo Plain National Monument.

Direct Effects: We do not anticipate any short-term or long-term direct adverse effects of the Project on mountain plover that would be above a level of discountable and insignificant.

Indirect Effects: Potential indirect effects of the Project could include disruption of foraging patterns within the Action Area. This type of effect would be considered discountable and insignificant because the birds would reasonably be expected to move to off-site suitable foraging grounds.

Effects Determination: **May Affect, Not Likely To Adversely Affect**. This is the appropriate effects determination because the Project is not expected to reduce the reproduction numbers or distribution of the wintering mountain plover population in the Carrizo Plain region.

6.5 Golden Eagle

Golden eagles forage within the Action Area throughout the year. The Action Area provides moderate quality foraging habitat for golden eagles during the winter season. There are no golden eagle nests, either active or inactive, within the Action Area (Latta 2010). Trees associated with abandoned ranch compounds are very poorly suited for golden eagle nest construction. The PG&E towers that pass through the Action Area could be utilized for nesting purposes by golden eagles; red-tailed hawks and ravens presently nest on the towers within the Action Area. There are no cliff faces or other suitable nesting areas on site.

The Project would result in a loss of approximately 3,500 acres of suitable golden eagle foraging habitat within the Action Area, consisting of annual grassland and cropland habitats within the Project perimeter fencing. Additionally, the Project would have some medium-voltage collection system lines that would be designed to not present a danger for electrocution or collision by raptors. This would be accomplished by utilizing design features recommended by the Avian Power Line Interaction Committee (APLIC 2006) which provides species-specific minimum horizontal and vertical spacing guidelines that would eliminate the potential for electrocution by bridging the gap between conductors. In addition, avian flight diverters are recommended to prevent collisions with power lines. Section 7.4 provides a detailed outline of proposed conservation measures.

Direct Effects: The Project would result in an insignificant loss of moderate quality foraging habitat and would not substantially interfere with normal breeding, foraging or sheltering behavior. The loss of habitat would be insignificant because it represents an extremely small fraction of the suitable golden eagle foraging habitat in the region. Thus, the TSF Project would not result in either “disturbance” or “take” of golden eagles, as defined in the Eagle Act. The potential for construction and operation of the proposed solar facility to result in “take” of golden eagles, as defined by the Eagle Act, is discountable. Construction and operation activities may affect golden eagles, but would

not "disturb" golden eagles to the extent the Project would cause injury, decrease in productivity, or nest abandonment.

Indirect Effects: Construction of the proposed Project could affect golden eagle foraging activities due to operation of equipment and general human presence in the area. However, the level of use of the Action Area by golden eagles is moderately low and large areas of suitable foraging habitat are present in the vicinity. Therefore, any indirect effects of the Project would be insignificant.

Effects Determination: **Discountable and Insignificant, No Take Anticipated**. The Eagle Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." "Disturb" is defined by the Service in regulations at 50 CFR § 22.3 as: "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."

The TSF Project may affect the golden eagle, but would not substantially interfere with its normal breeding, feeding or sheltering behavior. Therefore, the potential adverse effect would be discountable (i.e., extremely unlikely to occur and essentially not expected to occur) and insignificant (i.e. will not reach a scale where "take" occurs) due to factors explained above. The TSF Project would not "take" or "disturb" golden eagles, as defined in the Eagle Act.

6.6 Bald Eagle

The Action Area provides low quality foraging habitat for bald eagles during the winter season; nesting habitat is not present within or near the Action Area. The Project would result in a loss of approximately 3,500 acres of suitable golden eagle foraging habitat within the Action Area, consisting primarily of annual grassland and cropland habitats within the project perimeter fencing. Additionally, the Project would have some medium-voltage collection system lines that would be designed to not present a danger for electrocution or collision by raptors. This would be accomplished by utilizing design features recommended by the Avian Power Line Interaction Committee (APLIC 2006) which provides species-specific minimum horizontal and vertical spacing guidelines that would eliminate the potential for electrocution by bridging the gap between conductors. In addition, avian flight diverters are recommended to prevent collisions with power lines. Section 7.4 provides a detailed outline of proposed conservation measures.

Direct Effects: The Project would not result in direct effects, either adverse (loss of suitable habitat or mortality) or beneficial (increase in habitat quality), to bald eagles. The level of use of the Action Area by bald eagles is very low. The affected habitats are annual grasslands and croplands that are marginally suitable for use as winter foraging habitat. Loss of these habitats within the Action Area would have an insignificant adverse effect on bald eagles. The potential for the Project to result in "take" of bald eagles, as defined under the Eagle Act, is discountable. Construction and operation activities may affect bald eagles, but would not "disturb" bald eagles to the extent the Project would cause injury, decrease in productivity, or nest abandonment.

Indirect Effects: Construction of the proposed Project, if conducted during the winter season, could affect bald eagle foraging activities due to operation of equipment and general human presence in the area. However, the level of use of the Action Area by bald eagles is very low in general, and is temporally restricted to the wet season when construction activities may be less intensive due to muddy conditions. Therefore, any indirect effects of the Project would be discountable.

Effects Determination: **Discountable and Insignificant, No Take Anticipated**. The Eagle Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, or molest or disturb." "Disturb" is defined by the USFWS in regulations at 50 CFR 22.3 as: "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."

The Project may affect the bald eagle, however the potential adverse effect would be discountable (i.e., extremely unlikely to occur and essentially not expected to occur) and insignificant (i.e. will not reach a scale where "take" occurs) due to factors explained above. The Project would not "take" or "disturb" bald eagles, as defined in the Eagle Act.

7.0 Conservation Measures

Sensitive biological resources are present within the Action Area, including three listed species and one species proposed for listing under the federal ESA and two species listed under the Eagle Act. This section provides recommendations to reduce the effect of the Project on federally listed species that may be affected by the Project. Where potentially adverse effects to listed species could occur during construction and operation of the Project, we provide conservation measures designed to offset the effect. Many of the conservation measures outlined in the following subsections are Applicant Proposed Measures that are part of the Project description and would be voluntarily implemented. Off-site land preservation and other conservation measures such as pre-construction surveys are requirements of the regulatory agencies. Potential land to be preserved has been identified and will be reviewed by USFWS and CDFG. Specific on-site measures have been proposed to enhance habitat for kit fox. Plans are proposed that would result in a net conservation benefit to San Joaquin kit fox.

7.1 Summary of Project Design and Conservation Elements

The Topaz Solar Farm Project has been located and designed to avoid and minimize potential adverse effects to the San Joaquin kit fox and two species of fairy shrimp that are present on the Project site (refer to Figure 5, Section 11.0 and Biological Resource Maps in Section 12.0). The Project has been sited primarily on highly disturbed private lands in San Luis Obispo County in an area that provides a unique opportunity to deliver solar energy within PG&E's service territory and which minimizes biological impacts. The Project site contains no federal or state listed plants and only three listed species, and the habitat for two of these species will be completely avoided and protected.

The Applicant is also ready to implement a comprehensive conservation strategy to compensate for potential listed species impacts, including an ambitious conservation land package that involves protection of more than 11,000 acres of land on the Carrizo Plain (refer to Section 2.1, above). Proposed conservation and enhancement of this land would permanently protect and enhance a large portion of an important movement corridor for kit fox moving northward out of the Carrizo Plain east of the Project site. Additionally, the conservation lands would provide permanent protection and enhancement for a smaller movement corridor on the west side of the Project that provides connectivity to the Paso Robles area kit fox population via the San Juan River valley. The Applicant would also enhance thousands of acres of land currently in crop production and convert it to natural grassland, a significant habitat improvement for kit fox.

Project Siting

The Topaz Solar Farm Project is a 550 megawatt solar photovoltaic generating facility that will be situated on approximately 3,500 acres of land in the Carrizo Plain in eastern San Luis Obispo County, California. This renewable energy project will substantially contribute to meeting a variety of federal, state and regional renewable energy policies and goals, thereby reducing our nation's dependence on conventional power sources. After an exhaustive search of potential project locations, the Applicant chose the current location for the following important reasons, among others:

- The Carrizo Plain is in the highest "solar resource" area in PG&E's service territory. It is optimal for solar energy production because of its more southerly latitude when compared to other service territory locations, its high elevation (about 2,000 feet), its relatively dry climate, and its relative lack of fog, haze and dust.
- The site is immediately adjacent to PG&E's Morro Bay to Midway transmission line ("Transmission Line"), which runs through the Project site. As a result, the Project can be interconnected to California's electrical grid without the need to develop a right of way or construct new transmission lines, with associated adverse environmental impacts.
- Since the Transmission Line has available capacity, it can be connected immediately to the power grid as Project array areas are completed without any transmission upgrades. The only transmission line work necessary to accommodate the Project will be eventual reconductoring to accommodate the final 150 megawatts generated by this Project and other projects in the region.
- The lands along the Transmission Line in the Carrizo Plain are available in relatively large parcel sizes and are not in highly productive agricultural use.
- The relatively flat terrain of the Project site is highly suitable for construction and operation of solar arrays.

Baseline Conditions

The Project location consists entirely of lands that were previously and repeatedly disturbed by dry land farming and by ranching activities. The vegetation consists of actively farmed lands, fallow farmed lands and grasslands in various stages of recovery. All grassland habitat areas within the 10,000-acre Project Site have been previously farmed and grazed, and are, because of this history of disturbance, dominated by non-native annual grass species. Active croplands farmed for grain form the dominant habitat type within the Project Site (Figure 5, Section 11.0). Various Project layouts have contained different amounts of grassland and cropland habitats. For Study Area A (7,800 acres), approximately 60 percent of the land consists of croplands and the remaining 40 percent consists of annual grasslands. Within this Study Area the Applicant designed preferred Alternative 3B such that approximately 75 percent of the Project would be on cropland and only 25 percent would affect grassland habitat. Research has shown that far fewer kit foxes utilize areas dominated by crop production than areas in natural grassland. Other baseline conditions that are present include:

- There are approximately 2.1 acres of total federal jurisdictional wetlands in Study Area A (a very small amount given the 7,800 site size), along with certain ephemeral drainages totaling 15.46 acres that are considered to be jurisdictional (a delineation was verified by the U.S. Army Corps of Engineers on January 28, 2011).
- No plant species listed under either the federal Endangered Species Act ("ESA") or the California Endangered Species Act ("CESA") are present on the Project site. There are a few relatively small locations of individuals or groups of rare (CNPS listed) plants within the Project.
- After comprehensive wildlife surveys, the only federal or state listed wildlife species detected on the Project site are the San Joaquin kit fox (ESA and CESA), longhorn fairy shrimp (ESA) and vernal pool fairy shrimp (ESA). One ESA Proposed Threatened species, mountain plover, is present in some portions of the Project. Surveys reflect that no giant kangaroo rats, blunt-nosed leopard lizards, California tiger salamanders, California condors, California red-legged frogs or Kern primrose sphinx moths are present. Since all known or potential locations of the two fairy shrimp species will be entirely avoided (with permanent 250-foot buffers), the only ESA-listed species that will be adversely affected in a substantial manner by the Project is the kit fox.
- Only approximately 1700 acres of Option A and 250 acres of Alternative 3B (Section 34) presently constitute quality habitat for kit fox. Section 28 was farmed as recently as five or six years ago and is generally too overgrown to be high quality kit fox habitat.
- There are currently 12,000 linear feet of chain link fence that dramatically limits passage of kit fox in Section 27. In addition, sown croplands prevent passage by kit fox for several months a year (typically April through harvest in August or September) when grain crops are too tall and dense.

- Current farming practices on the Project site lands are believed to be detrimental to the continued existence of listed fairy shrimp species that occur on the site. Farming over vernal pools, such as occurs in Section 20, degrades and fills these habitats. Constituent vernal pool plant species are removed, hydrology is adversely affected, and suitability for listed species is diminished.

- Current farming practices on the Project site lands also reduce habitat suitability for kit fox by changing the vegetative structure of the landscape, reducing prey availability, increasing predation risk, and by fragmenting adjacent potentially usable habitat areas. Farming activities have long been known to fragment, degrade, and remove kit fox habitat (Grinnell, J. and J.S. Dixon, 1937; Knapp, D.K. 1978; Orloff, S, F. Hall, and L. Spiegel, 1986; U.S. Fish and Wildlife Service, 1998; Cypher, Phillips, and Kelly 2007; Cypher et. al 2005; Warrick et al., 2007). Poor habitat suitability of croplands negatively affects the suitability of surrounding grasslands, thereby adversely affecting more land area than just what is farmed. The proposed action would restore thousands of acres of cropland outside of the array fences and 2,718 acres within the fences (Alternative 3B) to natural grassland, a significant increase in quality kit fox habitat. At certain times of year, cropland areas allow for kit fox movement and dispersal, however cropland areas do not support the number of rodents found in natural grassland areas. In plowed conditions, croplands offer little in the way of prey or cover for kit fox. The scarcity of dens in cropland relative to non-agricultural areas makes kit fox more susceptible to predation (Cypher et al. 2007).

- Farming practices in the Carrizo Plain have utilized rodenticides extensively in the past, which is known to kill kit fox (U.S. Fish and Wildlife Service, 1998). Heavy equipment utilized for plowing and harvesting likely results in direct mortality through entombment or plow implement strikes of kit foxes.

Project Conservation Measures

The Applicant has agreed to incorporate a variety of conservation measures into the Project to protect the three ESA-listed species, some of which it originally proposed and some of which it has agreed to at the request of public agencies or third parties. These measures generally fall into three categories – avoidance, minimization and conservation – which will be discussed separately below.

Avoidance Measures

The Applicant designed the original Project with important avoidance measures targeted to the three species listed under the ESA and it has agreed to implement further avoidance measures for these species as the Project approval process has proceeded. The key (but not the only) avoidance measures for these species include:

- All known and probable locations of the two listed fairy shrimp species will be avoided, and a permanent 250-foot radius setback will be implemented to protect this habitat.

- Project construction activities will occur before dusk, and employee presence and truck deliveries will only occur during daylight hours, unless otherwise authorized, to avoid sensitive times when kit fox have a greater likelihood of being present.
- The Project was designed to minimize the impact of the Project on potential kit fox movement corridors on both the east and west sides of the Project.
- At the request of the County and the wildlife agencies, the Applicant has designed Project Alternative 3B, to incorporate the following additional avoidance measures requested by the County, the Service and the California Department of Fish and Game ("DFG"):
- It has compacted the total PV array areas substantially by eliminating access-ways, spaces and interstitial areas with less valuable habitat between arrays, thereby reducing the total size of the fenced areas by 15% from approximately 4,100 acres to 3,500 acres.
- It has dramatically reduced the amount of grassland (considered by the wildlife agencies to be the most valuable habitat for kit fox on Project lands) utilized by the Project by 56 percent from approximately 1,700 acres to approximately only 775 acres.
- By moving and compacting PV arrays, it has freed up an additional 1.3 miles of breadth on flat land in the eastern kit fox movement corridor, which runs in a southeast to northwest direction along the eastern side of the Project. Among other things, it has removed all arrays from Section 35 and removed arrays from the eastern quarter of Sections 27 and 34.
- In the northeast corner of the Project, adjacent to the main movement corridor, it has completely eliminated all arrays in Section 22, thereby preserving a large movement corridor in this area.
- In the western and southern areas of the Project, it has taken several steps to promote the western movement corridor. Among other things, it eliminated all arrays in the southern half of Sections 4 and 5 and designed a notched area in Section 32 that frees up a wider diagonal corridor for wildlife movement. Moreover, in Sections 4 and 5, it has completely avoided hundreds of acres of potential fairy shrimp habitat and most rare plant habitats.

Minimization Measures

- The Applicant has designed an effective suite of minimization measures designed to minimize potential adverse effects to kit fox during the construction and operation of the Project. Although it is beyond the scope of this document to summarize all of these measures, some of the key measures are as follows:

- A robust suite of pre-construction survey, monitoring, worker education, construction restriction and similar measures will be implemented to ensure that kit fox individuals and kit fox dens are avoided and protected throughout the construction period.

- The Applicant has designed the interior of the fenced arrays to be used as habitat by kit foxes throughout the operation of the Project. Accordingly, it will be installing kit fox passages at regular intervals in the perimeter fencing, will be installing kit fox escape dens both inside and outside the Project fences, and will be installing artificial dens capable of being used as natal dens in an appropriate spatial design throughout the site.

- The interior of the fenced areas will be managed to promote kit fox behavior. Thus, arrays will be mounted so that the bottoms are approximately 18 inches above the ground to allow kit foxes to see underneath and vegetation will be planted among the arrays, and maintained by appropriate means, both to provide protection and to allow kit fox to see prey species. There will be no perimeter lighting or lighting within the array areas. Exterior lighting that is installed for security at the substation, switching station, and operations and maintenance facility will be minimized and shielded to prevent any affect on kit fox.

- All fences around PV arrays will include a 5 to 6 inch gap at the base of the fence to allow movement of kit fox through the fenced areas. This gap will also prevent kit foxes from being trapped against the fence by a predator. This measure has been adopted in response to wildlife agency requests and provides full permeability and opportunity for movement by kit fox through the project site.

Conservation Measures

After consultation with the Service and DFG, the Applicant has put together a conservation package to address the loss of potential kit fox habitat caused by the Project. In addition to the kit fox enhancement measures that are being installed on the Project lands, this package consists of the fee purchase or dedication of a conservation easement on more than 11,000 acres of land around the Project and the adjacent movement corridors. The package has the following key features:

- The total amount of proposed conservation land is over 11,000 acres, which is more than three times the total amount of land that will be utilized for the Project.

- The conservation lands provide a range of habitat quality that is better suited to kit fox than the lands that would be utilized for the Project. A comparison of the potential conservation lands to the Project lands demonstrates the following:

    1. The original Option A Project is composed of approximately 42 percent grassland and 57 percent cropland, while the conservation lands are composed of approximately 60 percent grassland and 40 percent cropland.

    2. Project Alternative 3B layout contains approximately 788 acres of grassland, only 250 acres of which is high quality grassland (not farmed in over 20 years), as compared with over 6,500 acres of grassland in the conservation lands. This is approximately an 8:1 ratio of conservation grassland to Project grassland. The remainder of the Project will be returned to an appropriate habitat condition for primary prey animals for

kit fox. Additional conservation land offsite will restore natural grassland and dramatically improve habitat for kit fox in the northwestern Carrizo Plain.

3. An analysis of the overall quality of the conservation lands, based on presence, habitat quality, movement corridor value, slope and other factors demonstrates that the conservation lands contain a significantly higher percentage of very good quality kit fox habitat than the Project lands.

- As requested by the Service and DFG, the conservation lands are comprised of thousands of acres of land concentrated in the movement corridor between the Project and the proposed SunPower California Valley Solar Ranch (CVSR) project. When combined with the revised Project layout, these lands substantially protect thousands of acres of land within the eastern movement corridor that are not otherwise generally accessible to or protected for kit fox. These include parcels south of and adjacent to Highway 58, thus protecting locations for road crossings and conserving areas near the highway that might be more susceptible to development risk.
- The conservation package also contains thousands of acres of relatively flat land just north of the Project that connect with the eastern corridor lands that are high quality habitat for kit fox.
- The mitigation package further has 1,040 acres contiguous with the southwest portion of the Project and 640 acres immediately west of the Project that will protect and expand the movement corridor on the western side of the Project.

The Topaz conservation package ensures the protection of high quality San Joaquin Kit Fox habitat and movement corridors in the northern Carrizo Plain in perpetuity.

7.2 San Joaquin Kit Fox

The Topaz Solar Farm San Joaquin Kit Fox Conservation and Monitoring Plan (Althouse and Meade, Inc. February 2011) includes detailed avoidance, minimization, protection, conservation and compensation measures for kit fox, and is included as Appendix B in this report. A primary goal of Project design and construction methodology is to avoid "take" of kit fox. Protection of off-site lands would compensate for the acreage removed from use, contributing to full mitigation. Enhancement of existing habitat on-site will provide increased protection and potential denning habitat for the foxes. Installation of artificial dens, visitor and worker education programs, kit fox friendly management practices, monitoring on-site, and large areas of open space would fully mitigate for modification of approximately 3,500 acres of kit fox habitat due to the Project. The combined on-site and off-site mitigation measures proposed are intended to fully conserve and compensate for the potential effects of the TSF Project on San Joaquin kit fox.

7.2.1 Measures to avoid and/or minimize potential direct injury or death to kit fox from TSF Project construction and operation activities

- Pre-construction surveys for SJKF would consist of three phases: den location surveys, work area clearance surveys, and daily work area surveys. This approach would be utilized to prevent injury or death of kit fox during Project construction.
- Worker education programs regarding SJKF identification, life history and habits, population status, and protection measures, and penalties for unauthorized take of SJKF would be provided for all construction and operational employees.
- During construction, pre-construction survey and monitoring measures would be conducted specific to the Project that meet the standard San Joaquin kit fox CEQA mitigation measures approved by the County of San Luis Obispo, the USFWS, and the Department of Fish and Game for projects in San Luis Obispo County.
- During the construction phase, any disturbance activities after dusk shall be prohibited unless coordinated through the County, during which additional kit fox mitigation measures may be required. Workers and worker shuttles would be instructed to arrive at the construction site no earlier than one-half hour before sunrise and depart from the site no later than one-half hour after sunset. Delivery of materials by truck would be restricted to daylight hours between sunrise and sunset.
- Speed signs of 25 mph (or lower) would be posted for all on-site construction traffic to minimize the probability of road mortality of the San Joaquin kit fox.
- All excavations, steep-walled holes and trenches in excess of two feet in depth would be covered at the close of each working day by plywood or similar materials, or provided with one or more escape ramps constructed of earth fill or wooden planks. Trenches would also be inspected for entrapped kit fox each morning prior to onset of field activities and immediately prior to covering with plywood at the end of each working day. Any kit fox found shall be allowed to escape before field activities resume, or be removed from the trench or hole by a qualified biologist and allowed to escape unimpeded.
- During Project construction phases, any pipes, culverts, or similar structures with a diameter of four inches or greater, stored overnight at the Project would be thoroughly inspected for trapped San Joaquin kit foxes before the subject pipe is subsequently buried, capped, or otherwise used or moved in any way.
- During the construction phases, all food-related trash items such as wrappers, cans, bottles, and food scraps would be disposed of only in closed containers. These containers would be regularly removed from the Project site.
- Construction activities would be adjusted to avoid active kit fox dens.
- Management practices would avoid the use of rodenticides.

- Pets would not be allowed on the Project site.

7.2.2 Measures to increase the on-site habitat quality of the TSF Project

- Perimeter fencing around solar arrays would be constructed to provide a 5 to 6 inch gap at the bottom, for the entire length of the fence, for kit fox passage into and through the TSF Project. No interior fences within the perimeter fencing would be present.
- Escape dens would be located both inside and outside the Project fences. Artificial den placement would be more than 25 feet from any Project components to avoid potential conflicts.
- Artificial dens capable of supporting kit fox pairs and pups would be installed at a rate of one two-chambered pupping den and at least four escape dens in every section (or square mile) of the Project.
- Solar arrays would be mounted on steel posts with lower edge of modules approximately 18 inches above the ground to allow kit foxes to see under the arrays.
- The ground under and between the solar arrays would be vegetated with a dominant cover of grasses and herbs to promote a more natural habitat that supports kit fox prey. Vegetation height would be controlled by pulse grazing sheep or other means not hazardous to kit fox. Invasive weeds would be monitored and controlled according to the Project Vegetation Management Plan.
- Cross fencing and wildlife wire fencing would be removed from corridors outside of the solar arrays, where feasible.
- All exterior lighting would be placed or shielded to avoid lighting open space and solar array areas. No permanent night lighting would be allowed, except for the Project's Solar Energy Learning Center, substation, monitoring and maintenance facility and PG&E switching station.
- The Project would reduce cropland production that regularly disturbs the land by plowing, seeding, harvesting, and spraying; these activities presently endanger kit fox within the Action Area.

7.2.3 Measures to off-set loss of kit fox habitat

- Off-site lands surrounding the Action Area may be restored to annual grassland or maintained as annual grassland and managed to promote kit fox and other native species, if agreed by the regulatory agencies (including USFWS and CDFG) that these lands would be acceptable as conservation and mitigation lands. This would be achieved through a fee purchase or dedication with a conservation easement, along with Enhancement and Endowment Funds.
- Additional off-site kit fox habitat would be purchased and protected in perpetuity. The proposed amount and location of mitigation land that would

be purchased is described in the Topaz Solar Farm San Joaquin Kit Fox Conservation and Monitoring Plan (Althouse and Meade, Inc. February 2011) attached hereto as Appendix B. This conservation plan has been prepared to prescribe actions that would maintain and improve the condition of the kit fox population in the area. Elements of the plan include habitat enhancement and protection, both on-site and off-site that would fully compensate for Project effects to kit fox under both the federal ESA and the California Endangered Species Act. Further details of these measures are set forth in Appendix B, which is specifically incorporated herein.

7.3 Vernal Pool Fairy Shrimp and Longhorn Fairy Shrimp

- Known and probable locations of federally-listed fairy shrimp pools would be avoided and a 250-foot radius setback would be implemented to protect these vernal pool**s**.
- Vernal pools would be protected during construction by installation of orange fencing placed at the setback boundary between the vernal pool and TSF Project areas.
- Natural drainage patterns would be preserved.
- Prior to, during and after the construction phase, use of pesticides or herbicides by the applicant would be in compliance with all local, State, and Federal regulations.

7.4 Bald Eagle and Golden Eagle

- Applicant's conversion of cropland to grassland habitat outside the TSF Project perimeter fence that is protected in perpetuity would increase prey abundance and foraging potential for bald and golden eagles.
- Overhead collection lines and towers would be designed avian-safe by implementing the following measures recommended by the Avian Power Line Interaction Committee (APLIC 2006), as applicable and feasible. These avian-safe features may include:
    - Provide adequate separation between electrified components to protect the species involved;
    - Cover energized parts and/or cover grounded parts with materials appropriate for providing incidental contact protection to birds;
    - Apply perch management techniques, and/or
    - Install avian flight diverters on power lines.

8.0 Interrelated Actions

Network upgrades to the existing PG&E Morro Bay to Midway transmission line may be required to accommodate the interconnection of the final 150 MW of the Project to the grid, as well as to accommodate other generation projects in the region. These PG&E upgrades could include the reconductoring of the 230-kV transmission line between the new PG&E switching station on the Project site and the Midway Substation in the San Joaquin Valley. The PG&E Reconductoring Project is an Interrelated Action to the Proposed Action. PG&E has prepared a separate Biological Assessment for the PG&E Reconductoring Project (ICF International 2010). The PG&E Reconductoring Project should be included in the consultation for the Proposed Action. PG&E is currently expected to obtain all other permits for their project.

9.0 Cumulative Effects

Cumulative effects include the effects of future State, local, or private actions that are reasonably certain to occur in the Action Area considered in this Biological Assessment. Future federal actions that are unrelated to the Project are not considered in determining the cumulative effects because they are subject to separate consultation requirements pursuant to section 7 of the ESA (U.S. Fish and Wildlife Service and National Marine Fisheries Service 1998).

The cumulative effect of the Project and adjacent non-federal activities that are reasonably certain to occur could degrade movement pathways through the northwest portion of the Carrizo Plain, affecting dispersing San Joaquin kit fox. Privately owned properties surrounding the Action Area are expected to continue to be managed as dry farmed cropland or as heavily grazed grassland. Non-federal activities that are "reasonably certain to occur" in the Carrizo Plain area include road and utility right-of-way management, livestock grazing, home building, continued agriculture, recreational activities such as off-road vehicle riding, and hunting. Impacts to listed species habitat from such activities include direct mortality, temporary and permanent habitat loss, habitat degradation, fragmentation, and trampling of host or food plants. Impacts to individual animals include collisions with vehicles or equipment, entombment in burrows, displacement due to human activity, trampling and shooting, increased predation associated with human development, ground squirrel reduction efforts (poisoning), and reduction of food sources.

Non-federal activities that could potentially affect listed vernal pool species in the vicinity of Action Area include, but are not limited to, development, construction, and maintenance activities associated with urban, highway/roadway and utility projects; application of herbicides/insecticides (i.e., chemical contaminants); conversion of vernal pools and/or vernal pool grasslands to agricultural uses; and application of seasonal water to create irrigated pastures. Conversion of rangeland to active agricultural uses in San Luis Obispo County does not require a special use permit, grading permit, or any other type of discretionary decision by the County prior to implementation of the action. Therefore, this type of conversion may go unnoticed by the local and federal agencies and an unknown amount of vernal pool and vernal pool grassland habitat may be affected by agricultural activities.

Grasslands with low, sparse cover and plowed agricultural fields provide foraging habitat for mountain plover that occasionally and irregularly occur in the Action Area during winter. Mountain plovers could be adversely affected by future State, local, and private actions, as described above. However, the effects of these conversions are expected to minimally affect the species given the infrequent occurrence of the species, reduced suitability of most grasslands, and the widespread availability of agricultural lands in and near the Action Area.

Cumulative effects of the Project and adjacent non-federal activities could result from ongoing activities described above including farm and ranch operations, highway or utility projects, and a few building projects for barns and homes. Conservation of lands near the Project could reduce cumulative effects by protecting and preserving land currently not subject to federal action.

10.0 Conclusion

Construction of the proposed Topaz Solar Farm Project may affect federally-listed, candidate, or proposed species. Approximately 3,500 acres of land would be fenced around solar arrays. Installation of the solar panels and connecting lines would temporarily disturb the Project site, as would grading in some areas to smooth slopes. Harrowing and rolling with a smooth roller would prepare the Project site for panel installation and reduce trip hazards for panel installers. Grading for access roadways, lay-down area/staging areas, a substation, and other structures would be minimal. The solar farm would be present for at least 30 years. Development of habitat usable by small mammals and kit fox would occur soon after installation.

Three species listed and one species proposed for listing under the federal Endangered Species Act were detected within the Action Area: San Joaquin kit fox, longhorn fairy shrimp, vernal pool fairy shrimp and mountain plover. Two species protected by the Eagle Act were detected within the Action Area: bald eagle and golden eagle.

The Action Area contain numerous parcels that have been in agricultural production for over 70 years. All habitats within the Action Area are heavily influenced by past farming and ranching operations. Land management practices have removed all shrub vegetation from the Action Area, and converted natural grassland systems to rangeland and farmland dominated by introduced species. Rangeland, described here as California annual grassland, varies in species composition. Areas that have been untilled the longest, some over 20 years as part of the Conservation Reserve Program, typically contain higher diversity and abundance of native plants than areas that have only been untilled for 5 years.

A lack of shrub development limits the amount of shade and cover available to many animal species. Species that are locally common in saltbush scrub habitats in the Carrizo Plain National Monument have not been detected within the Action Area. Species present within the Action Area are those that prefer wide-open habitats and are adaptable to variable habitat conditions, including frequent disturbance. Small mammal and reptile fauna such as mice, kangaroo rats, gophers, lizards and snakes, are present in low abundance. We attribute this condition primarily to detrimental effects of farming

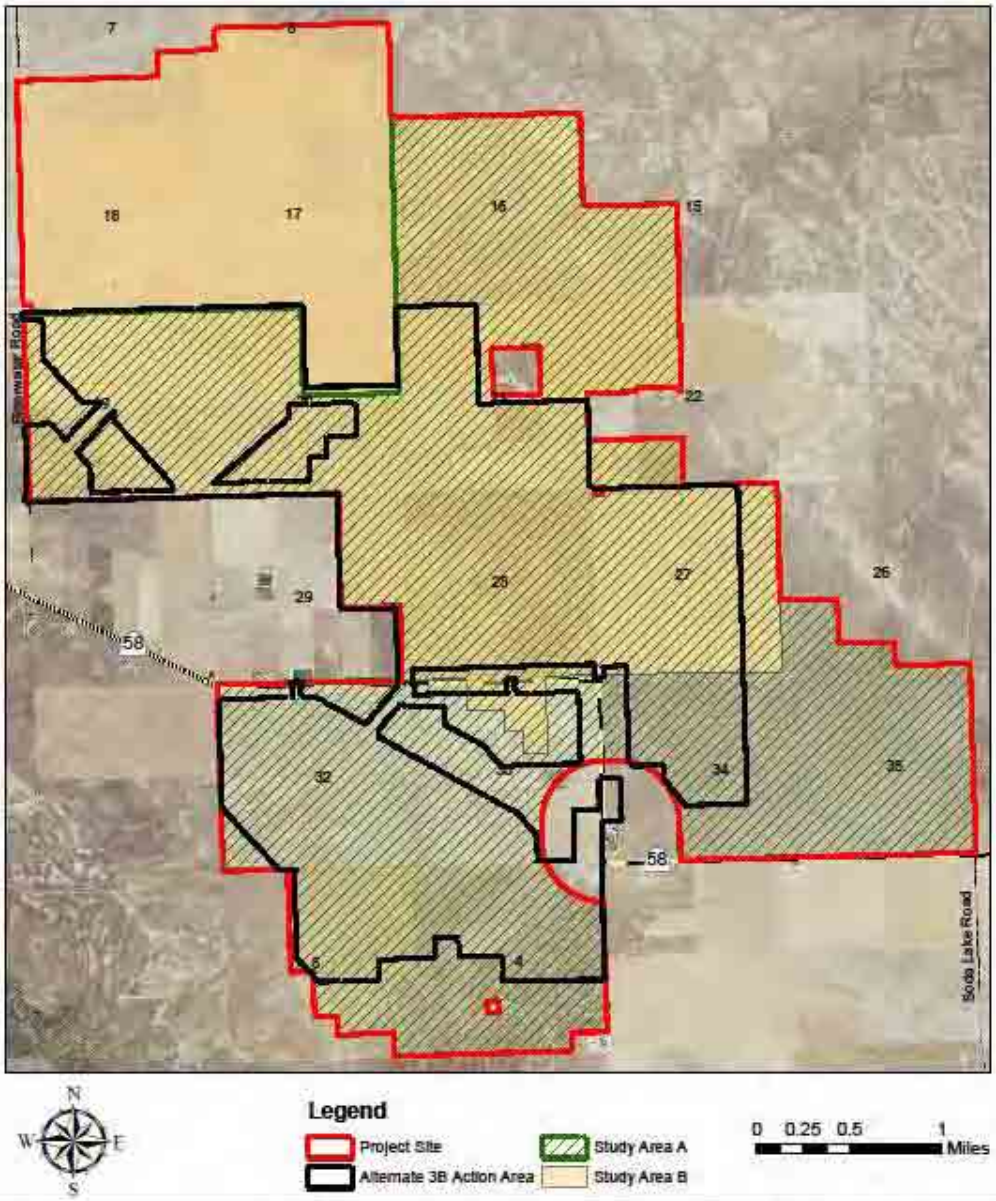
activities. Medium sized mammals such as badger, coyote and kit fox occur within the Action Area and are also affected by farming activities.

The Project would change the habitat type within the solar arrays, but would still provide usable habitat for small mammals, kit fox, reptiles, birds, and invertebrates. For fairy shrimp, avoidance and protection of pools would result in habitat improvement over current conditions, and therefore improved prospects for increasing populations. For areas of the Project currently in cropland, the Project could result in habitat improvements for kit fox. Overall, the Project with proposed conservation measures would not result in any jeopardy to federally listed species, and may result in an increase in the regional populations of vernal pool fairy shrimp, longhorn fairy shrimp, and San Joaquin kit fox.

11.0 Figures

- **Figure 1. Project Site Study Areas**
- **Figure 2. USGS Topographic Map**
- **Figure 3. Aerial Photograph**
- **Figure 4. CNDDB & FWS Critical Habitat Map**
- **Figure 5. Alternative 3B Siting Map**
- **Figure 6. Alternative 3B Components**

Figure 1. Project Site Study Areas

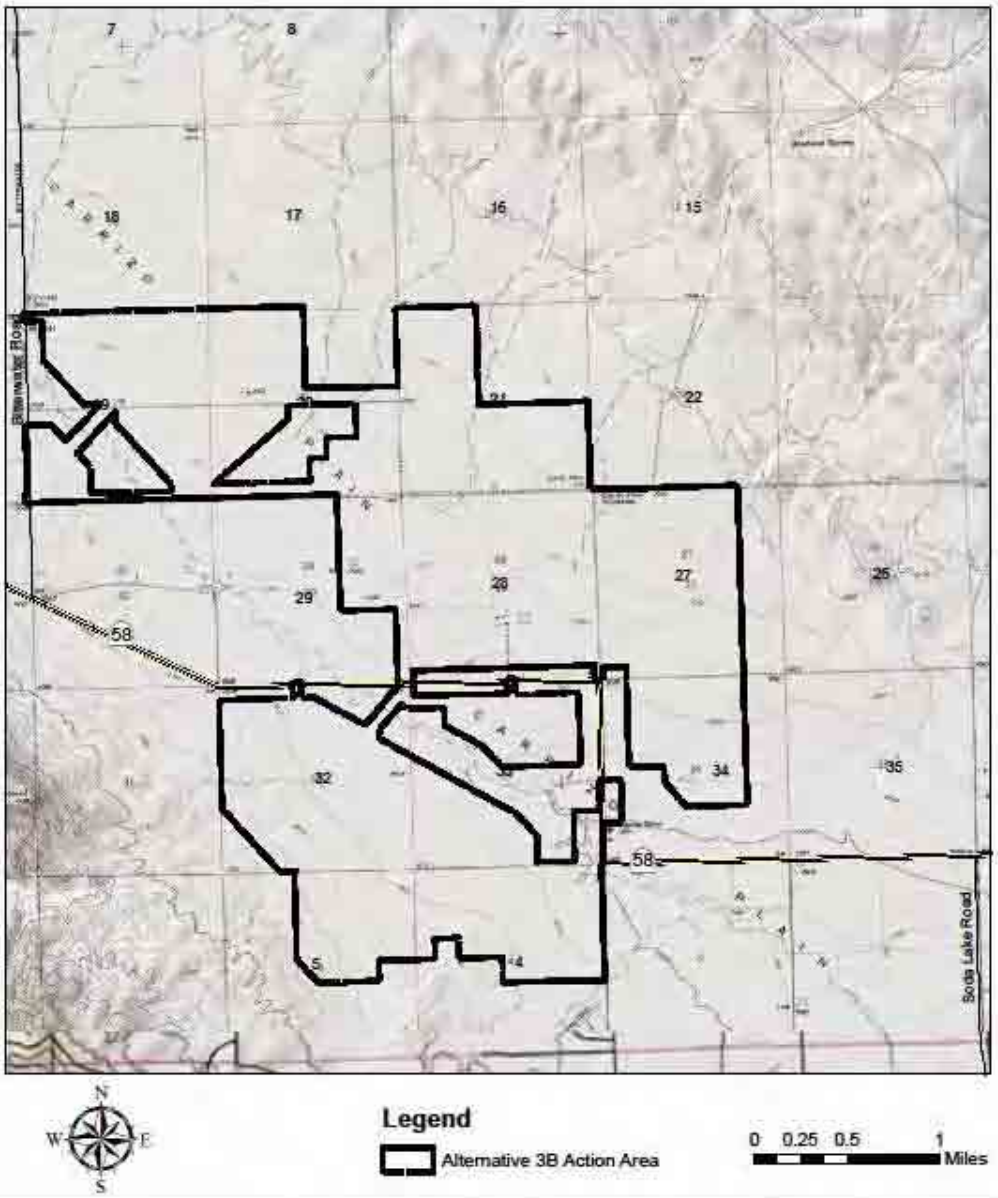


Topaz Solar Farms, LLC
1111 Broadway, 4th Floor
Oakland, CA 94607

2009 San Luis Obispo County
NAIP Aerial Photography
Map Updated: February 11, 2011

Althouse and Meade, Inc.
1602 Spring Street
Paso Robles, CA 93446

Figure 2. USGS Topographic Map

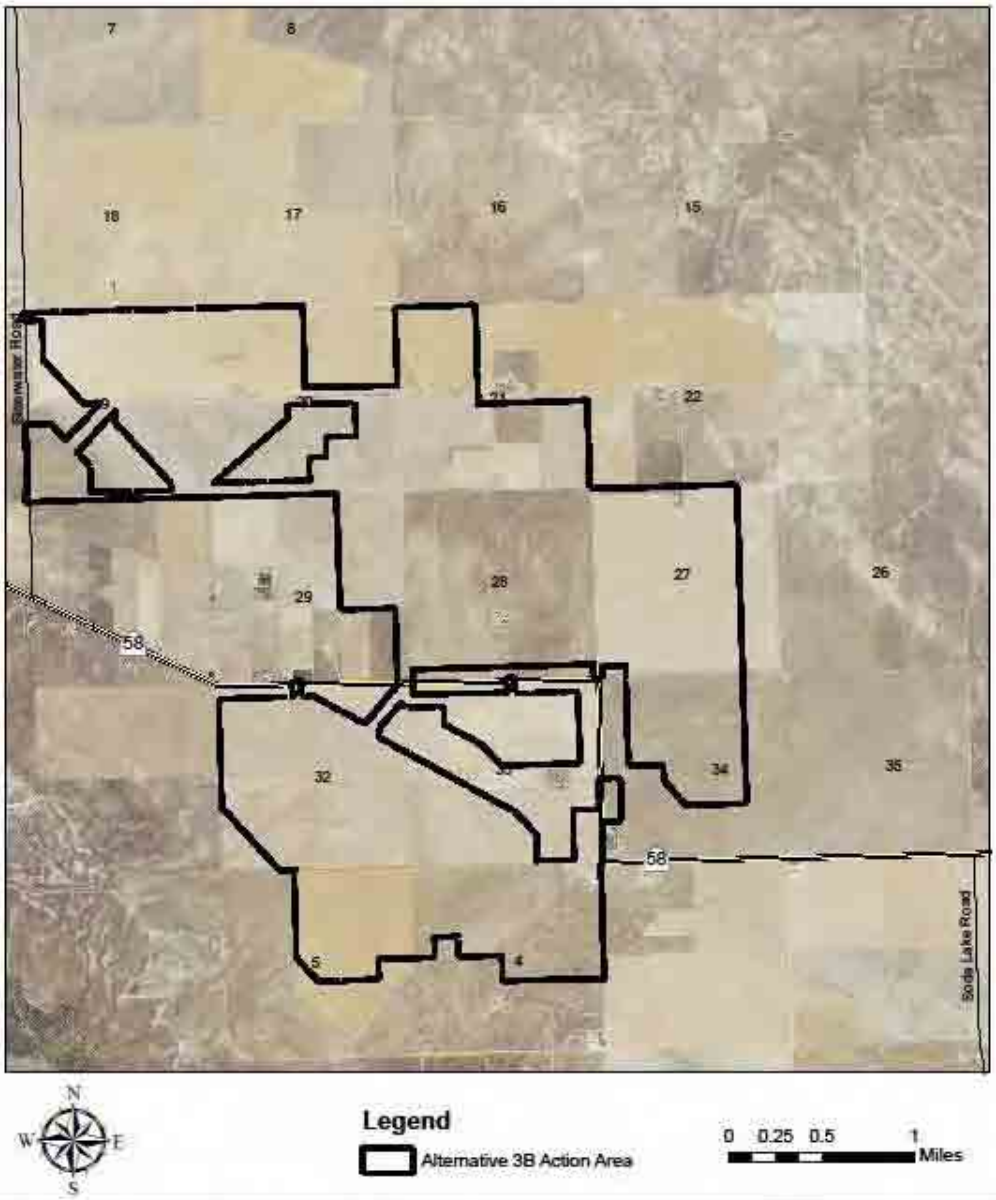


Topaz Solar Farms, LLC
1111 Broadway, 4th Floor
Oakland, CA 94607

USGS Topographic Map
Project site located in La Panza NE & California Valley 7.5' Quadrangles
Map Updated: February 11, 2011

Althouse and Meade, Inc.
1602 Spring Street
Paso Robles, CA 93446

Figure 3. Aerial Photograph

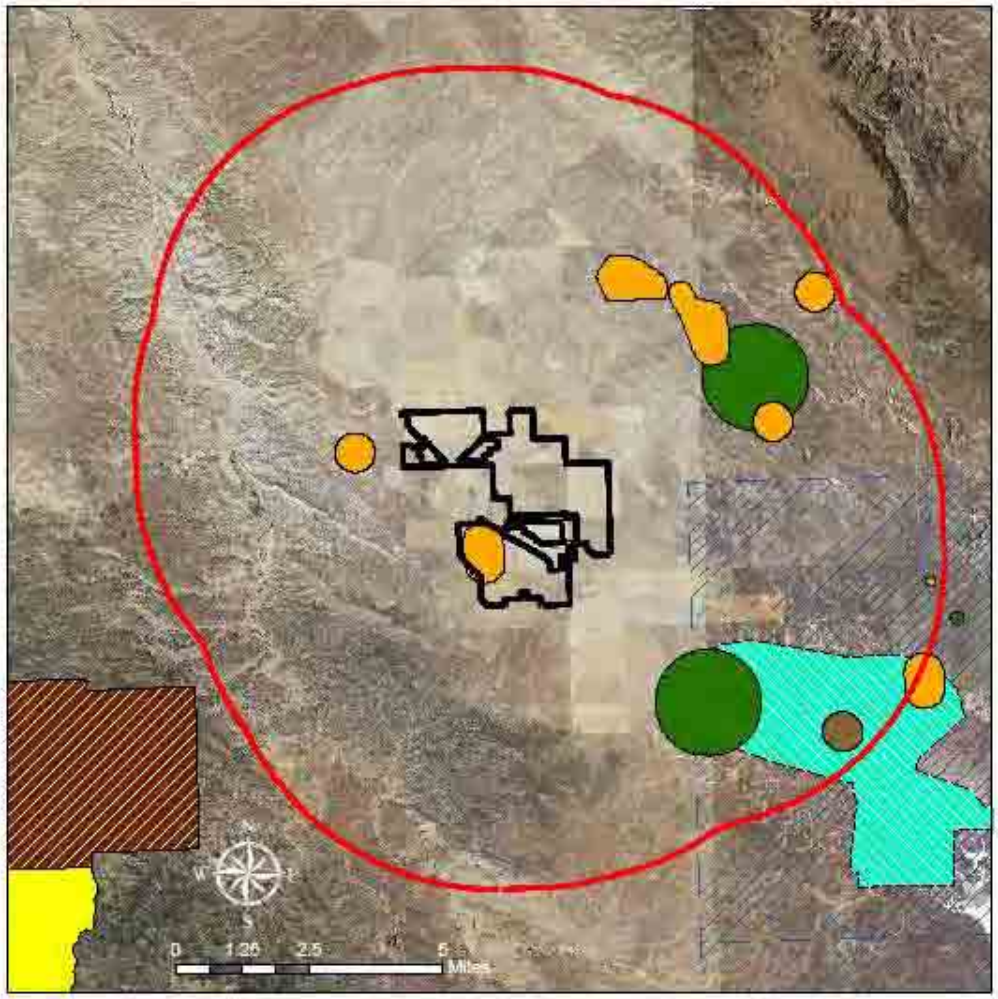


Topaz Solar Farms, LLC
1111 Broadway, 4th Floor
Oakland, CA 94607

2009 San Luis Obispo County
NAIP Aerial Photography
Map Updated: February 11, 2011

Althouse and Meade, Inc.
1602 Spring Street
Paso Robles, CA 93446

Figure 4.
Federal CNDDB Species &
FWS Critical Habitat



Alternative 3B Action Area
5 Mile Radius

CNDDB-Federally Listed Species
Longhorn Fairy Shrimp (Endangered)
San Joaquin Kit Fox (Endangered)
Giant Kangaroo Rat (Endangered)
Vernal Pool Fairy Shrimp (Threatened)

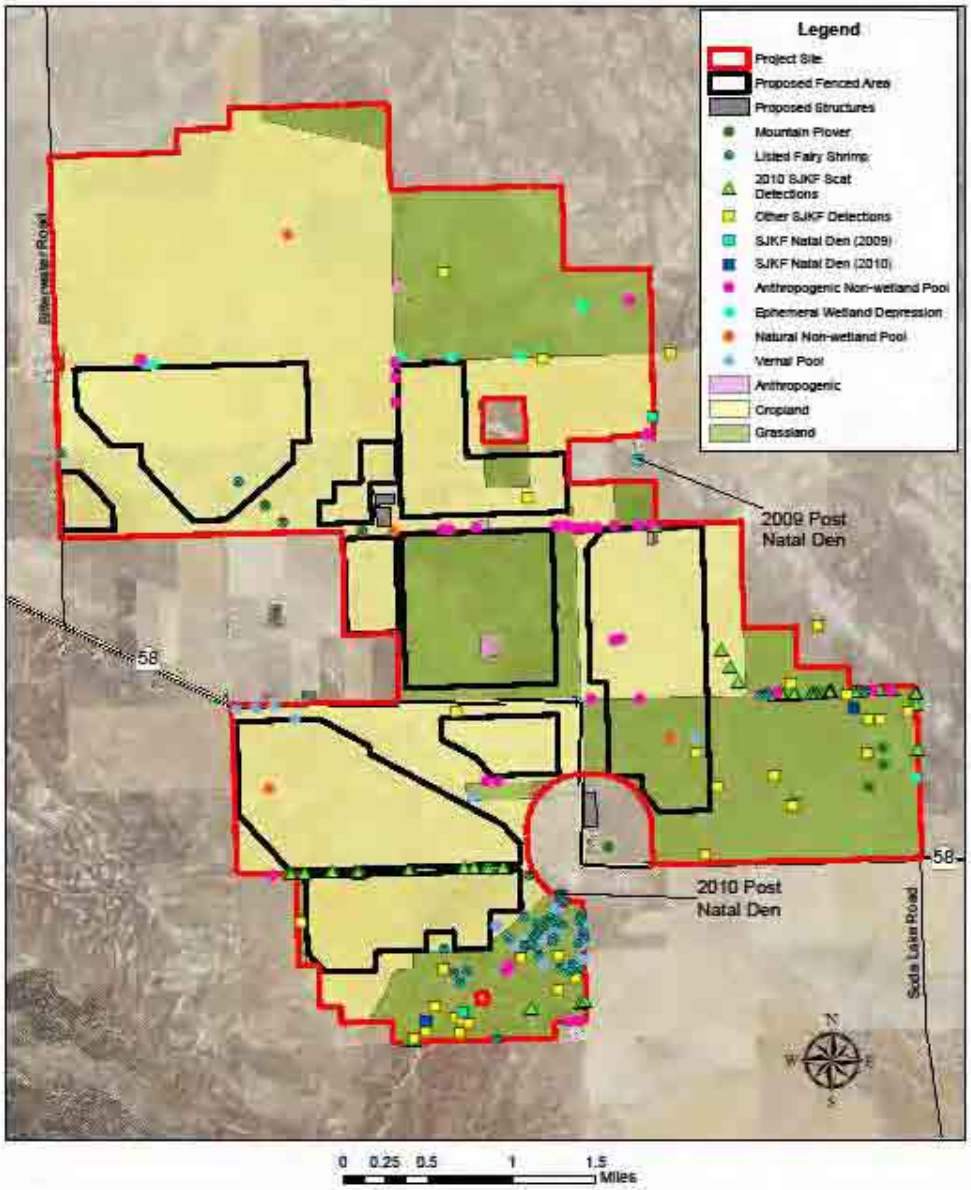
FWS Critical Habitat
California Condor
California Red-legged Frog
Longhorn Fairy Shrimp
Vernal Pool Fairy Shrimp

Topaz Solar Farms, LLC
1111 Broadway, 4th Floor
Oakland, CA 94607

2009 San Luis Obispo County
NAIP Aerial Photography
Project In La Panza NE &
California Valley 7.5' Quads
Map Updated: February 11, 2011

Althouse and Meade, Inc.
1602 Spring Street
Paso Robles, CA 93446

Figure 5. Alternative 3B Siting Map

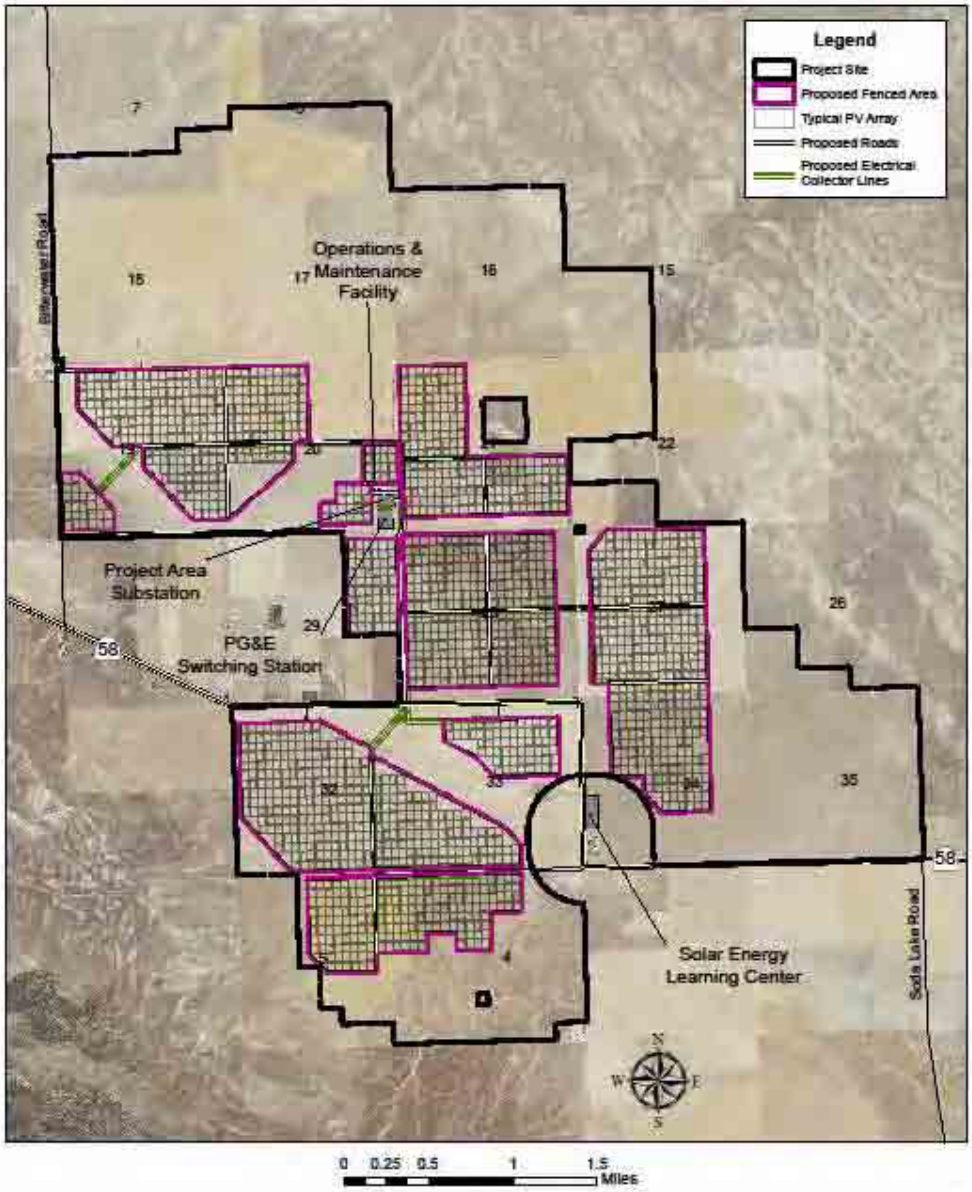


Topaz Solar Farms, LLC
1111 Broadway, 4th Floor
Oakland, CA 94607

2009 San Luis Obispo County
NAIP Aerial Photography
Map Updated: February 11, 2011

Althouse and Meade, Inc.
1602 Spring Street
Paso Robles, CA 93446

Figure 6. Alternative 3B



Topaz Solar Farms, LLC
1111 Broadway, 4th Floor
Oakland, CA 94607

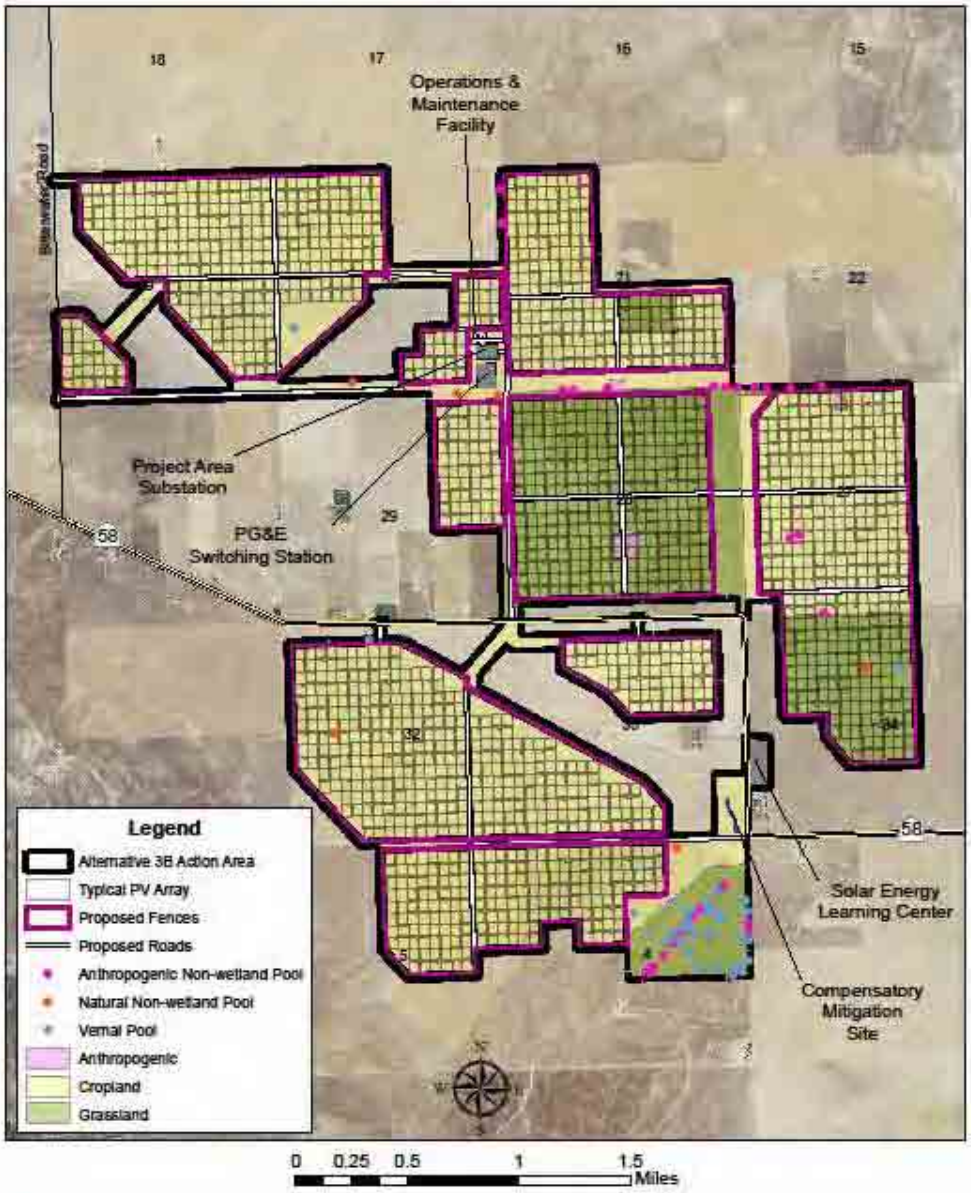
2009 San Luis Obispo County
NAIP Aerial Photography
Map Updated: February 11, 2011

Althouse and Meade, Inc.
1602 Spring Street
Paso Robles, CA 93446

12.0 Biological Resource Maps

- **BR Map 1. Habitat**
- **BR Map 2. San Joaquin Kit Fox Genetic Results**
- **BR Map 3. Kit Fox Active Den Areas**
- **BR Map 4. BNLL Survey Areas 2007-2010**
- **BR Map 5. Listed Vernal Pool Branchiopod Localities**
- **BR Map 6. Golden Eagle Aerial Nest Survey Results**
- **BR Map 7. Mountain Plover and Bald Eagle Observations**

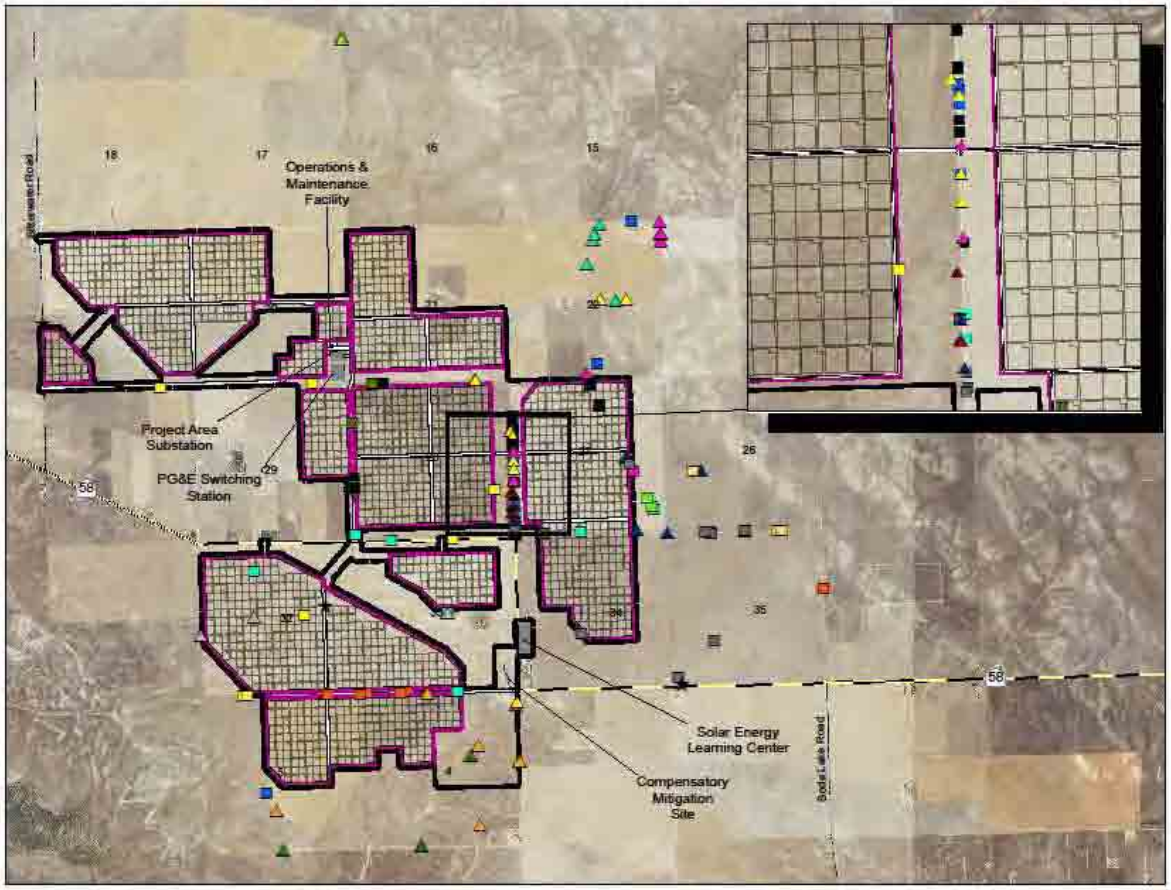
BR Map 1. Habitat



Topaz Solar Farms, LLC
1111 Broadway, 4th Floor
Oakland, CA 94607

2009 San Luis Obispo County
NAIP Aerial Photography
Map Updated: February 11, 2011

Althouse and Meade, Inc.
1602 Spring Street
Paso Robles, CA 93446



Legend

- Alternative 3B Action Area
- Typical PV Array
- Proposed Fences
- Proposed Roads
- ★ Red Fox

Map Symbol	Sex	SJKF Individual	Number of Detections
	Male	2	8
	Male	3	14
	Male	7	6
	Male	8	4
	Male	9	6
	Male	13	4
	Male	14	8
	Male	15	1
	Male	17	7
	Male	19	13
	Female	1	4
	Female	4	3
	Female	5	6
	Female	6	2
	Female	10	4
	Female	11	5
	Female	12	7
	Female	16	8
	Female	18	10

Scat collection locations from Smith 2010 (2009 data)
Genetic results from Maldonado 2010

N W E S

0 0.25 0.5 1 Mile

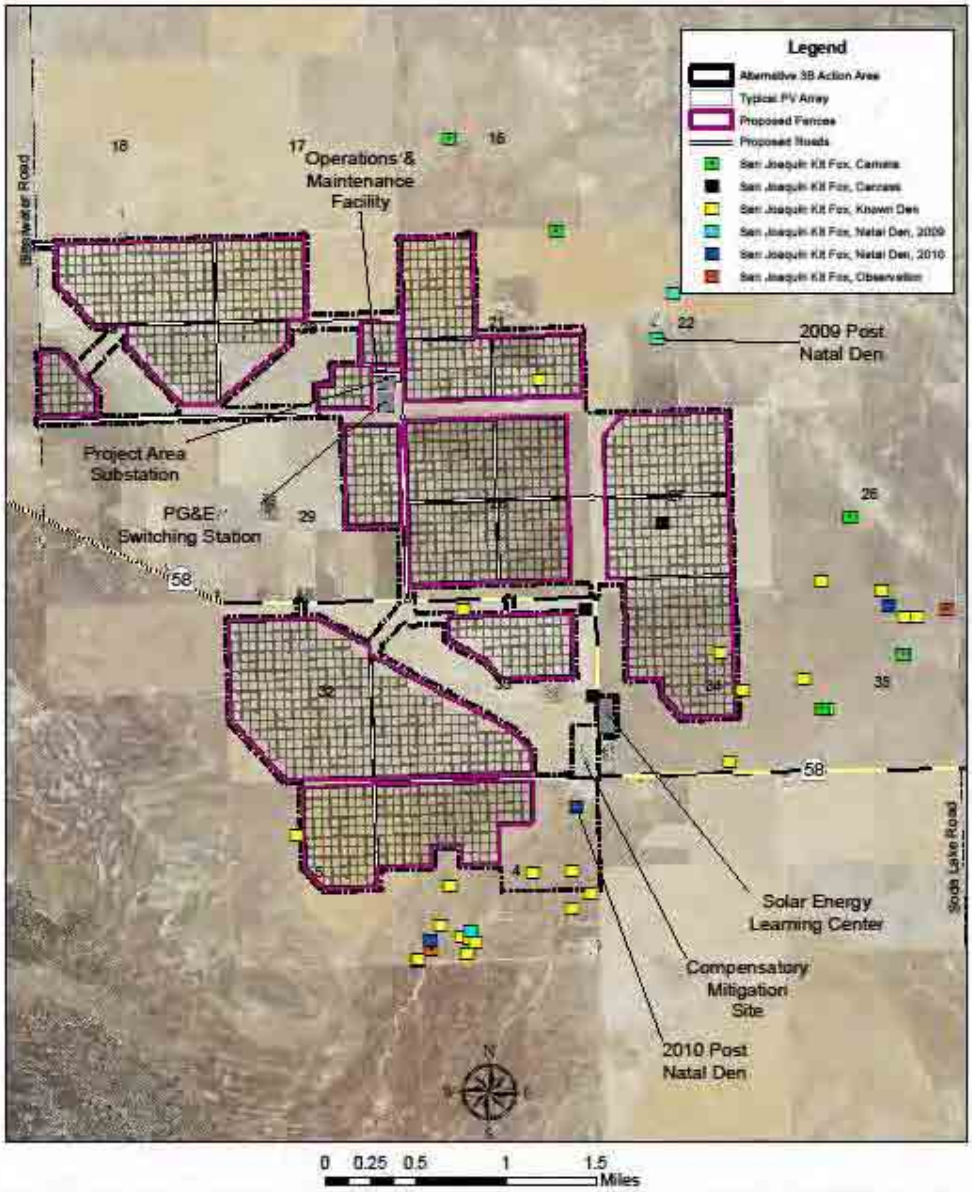
BR Map 2. San Joaquin Kit Fox Genetic Results

Topaz Solar Farms, LLC
1111 Broadway, 4th Floor
Oakland, CA 94607

2009 San Luis Obispo County
NAIP Aerial Photography
Map Updated: February 11, 2011

Althouse and Meade, Inc.
1602 Spring Street
Paso Robles, CA 93446

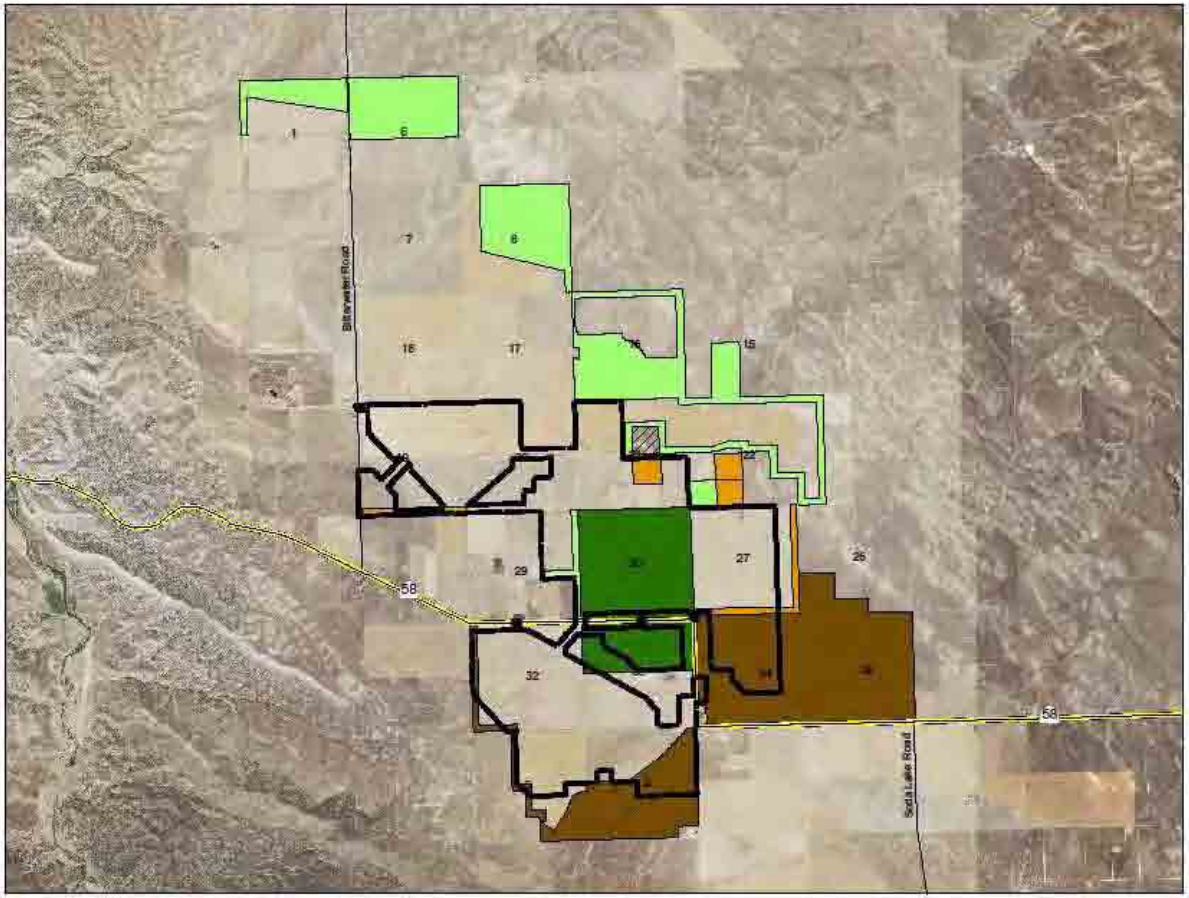
BR Map 3.
Kit Fox Active Den Areas



Topaz Solar Farms, LLC
1111 Broadway, 4th Floor
Oakland, CA 94607

2009 San Luis Obispo County
NAIP Aerial Photography
Map Updated: February 11, 2011

Althouse and Meade, Inc.
1602 Spring Street
Paso Robles, CA 93446



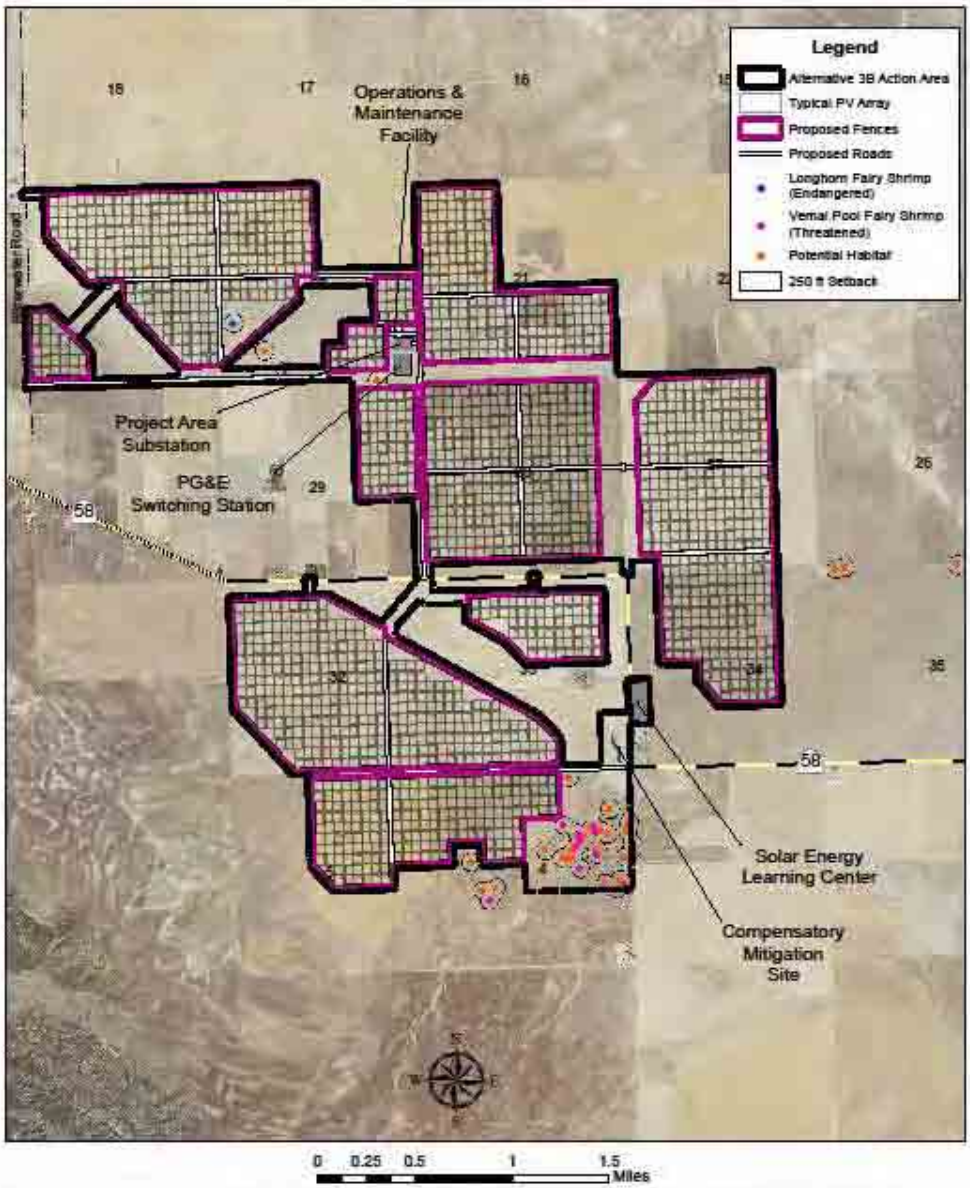
BR Map 4. BNLL Survey Areas, 2007-2010

Topaz Solar Farms, LLC
1111 Broadway, 4th Floor
Oakland, CA 94607

2009 San Luis Obispo County
NAIP Aerial Photography
Map Updated: February 11, 2011

Althouse and Meade, Inc.
1602 Spring Street
Paso Robles, CA 93446

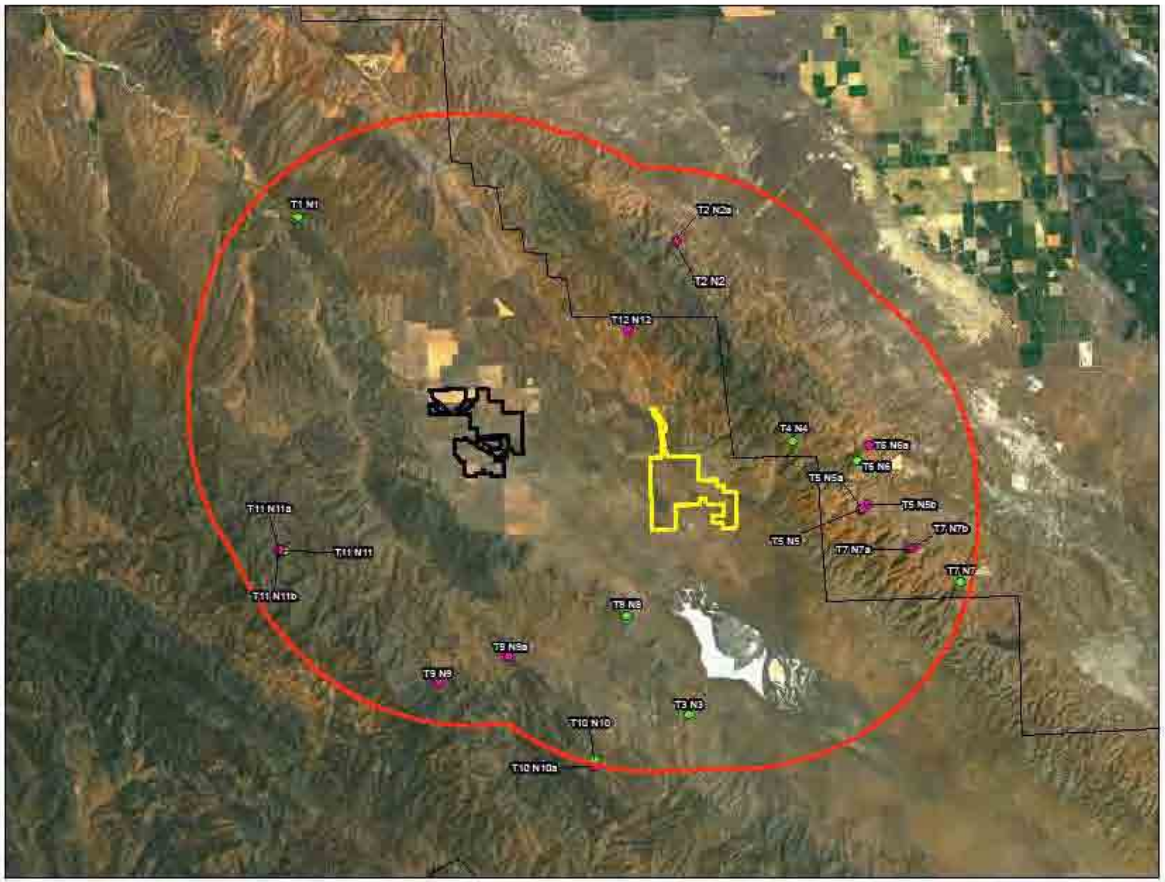
BR Map 5.
Listed Vernal Pool Branchiopod Localities



Topaz Solar Farms, LLC
1111 Broadway, 4th Floor
Oakland, CA 94607

2009 San Luis Obispo County
NAIP Aerial Photography
Map Updated: February 11, 2011

Althouse and Meade, Inc.
1602 Spring Street
Paso Robles, CA 93446



Legend

- Alternative 3B Action Area
- Sun Power Study Area
- Survey Area
- Active Nest
- Inactive Nest

T1= Eagle Territory Number
N1= Eagle Nest Number

N W E S

0 2.5 5 10 Miles

Aerial nest surveys conducted by:
Brian Latta
Senior Raptor Biologist
230 Ross St.
Santa Cruz, CA 95060

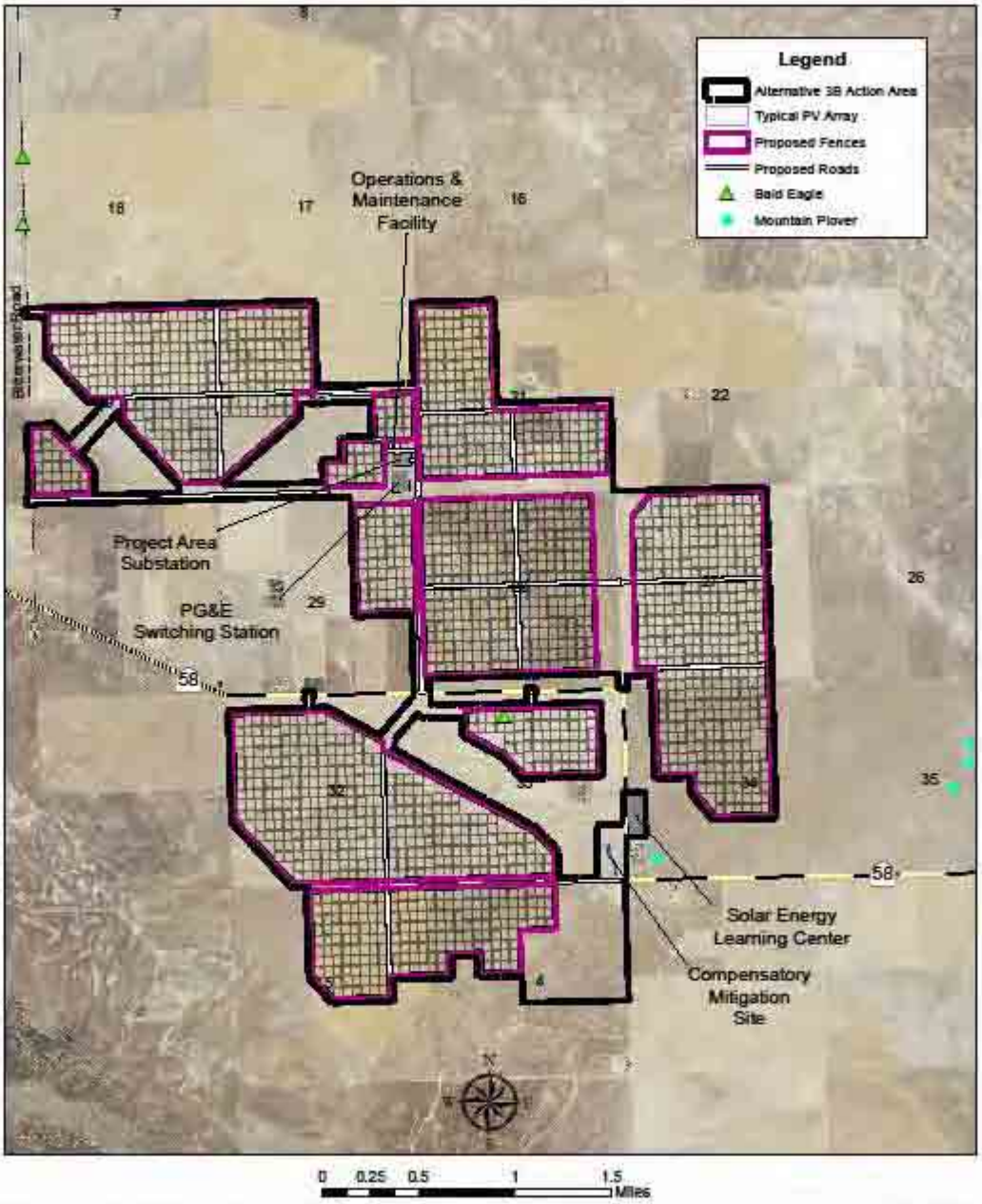
BR Map 6. Golden Eagle Aerial Nest Survey Results

Topaz Solar Farms, LLC
1111 Broadway, 4th Floor
Oakland, CA 94607

2005 NAIP Aerial Photography
Map Updated: February 11, 2011

Althouse and Meade, Inc.
1602 Spring Street
Paso Robles, CA 93446

BR Map 7. Mountain Plover and Bald Eagle Observations



Topaz Solar Farms, LLC
1111 Broadway, 4th Floor
Oakland, CA 94607

2009 San Luis Obispo County
NAIP Aerial Photography
Map Updated: February 11, 2011

Althouse and Meade, Inc.
1602 Spring Street
Paso Robles, CA 93446

13.0 References

Advantage Environmental Consultants, LLC. 2009. 90-Day Protocol Survey Report for U.S. Fish and Wildlife Service Listed Vernal Pool Branchiopods. Proposed Topaz Solar Farm, State Highway 58 & Bitterwater Road, California Valley, San Luis Obispo County, California. AEC Project No. 08-102SD, August 7, 2009.

Advantage Environmental Consultants, LLC. 2010. 90-Day Protocol Survey Report for U.S. Fish and Wildlife Service Listed Vernal Pool Branchiopods. Proposed Topaz Solar Farm, Sections 4, 5, 16, 17, 20, 26, 27, 28, 32, 33, 34, and 35, State Highway 58 & Bitterwater Road, California Valley, San Luis Obispo County, California. USFWS File No. 81420-2009-TA-0208. AEC Project No. 09-075SD, June 16, 2010.

Althouse and Meade, Inc. 2009a. Blunt-nosed Leopard Lizard (*Gambelia sila*) Protocol Survey for the Topaz Solar Farm, California Valley, San Luis Obispo County. January.

Althouse and Meade, Inc. 2009b. Biological Report for the Topaz Solar Farm, California Valley, San Luis Obispo County. Prepared for Topaz Solar Farms LLC. October.

Althouse and Meade, Inc. 2010a Blunt-nosed Leopard Lizard (*Gambelia sila*) Protocol Survey for the Topaz Solar Farm, California Valley, San Luis Obispo County. January.

Althouse and Meade, Inc. 2010b. Biological Report Technical Appendix, Volumes 1, 2, and 3. June.

Althouse and Meade, Inc. 2010c. Final Biological Report for the Topaz Solar Farm, California Valley, San Luis Obispo County, California. July.

Althouse and Meade, Inc. 2010d. Biological Report Technical Appendix, Volume 4. September.

Althouse and Meade, Inc. February 2011. Topaz Solar Farm San Joaquin Kit Fox Conservation and Monitoring Plan.

American Ornithologists Union. 1983. Check-list of North American Birds, 6th ed. Allen Press, Lawrence, KS. 877 pp.

Andres, B. A., and K. L. Stone. 2009. Conservation Plan for the Mountain Plover (*Charadrius montanus*), Version 1.0. Manomet Center for Conservation Sciences, Manomet, Massachusetts.

Arnold, Richard A. Ph.D. April 2010. Habitat Assessment and Limited Presence-Absence Surveys for the Threatened Kern Primrose Sphinx Moth at the Proposed Topaz Solar Farm in San Luis Obispo County, CA.

Avian Power Line Interaction Committee (APLIC). 2006. Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006. Edison Electric Institute, APLIC, and the California Energy Commission. Washington D.C. and Sacramento, CA.

Brown, N.L., C.D. Johnson, P.A. Kelly, and D.F. Williams. 2006. Species Profile: San Joaquin Kit Fox (*Vulpes macrotis mutica*). Endangered Species Recovery Program, California State University Stanislaus. http://esrp.csustan.edu/speciesprofiles/profile.php?sp=vuma

Bureau of Land Management. 2010a. Carrizo Plain National Monument, Approved Resource Management Plan and Record of Decision. Bakersfield Field Office, Bakersfield, CA. April.

Bureau of Land Management. 2010b. Birds of the Carrizo Plain National Monument. http://www.blm.gov/ca/st/en/fo/bakersfield/Programs/carrizo/birds.html Accessed May 7, 2010.

California Department of Fish and Game. May 1994. Approved Survey Methodology for Blunt-Nosed Leopard Lizard. Revised.

California Department of Fish and Game. 2000. Guidelines for Assessing the Effects of Proposed Projects on Rare, Threatened, and Endangered Plants and Natural Communities. Revised May 8, 2000.

California Department of Fish and Game. 2008a. Review of Carrizo Energy Solar Farm Project Application for Certification. Memorandum to Mary Dyas, California Energy Commission, March 26.

California Department of Fish and Game. 2008b. Letter to John McKenzie, County of San Luis Obispo Department of Planning and Building, regarding Notice of Preparation (NOP) for Topaz Solar Farm Conditional Use Permit (SCH No. 2008091026). October 15.

California Department of Fish and Game. April 17, 2008. Meeting with Dave Hacker, CDFG, and Daniel E. Meade, Althouse and Meade, Inc., regarding the Topaz Solar Farm project.

California Department of Fish and Game. 2010. Report to the Fish and Game Commission: A status review of the California tiger salamander (*Ambystoma californiense*). January 11.

California Department of Fish and Game, Natural Diversity Database. July 2009 Special Animals List (901 taxa). State of California, The Resources Agency.

California Department of Fish and Game, Natural Diversity Database. April 2010. Special Vascular Plants, Bryophytes, and Lichens List. Quarterly Publication. 71pp.

California Natural Diversity Database (CNDDB) Rarefind. 2010. The California Department of Fish and Game Natural Diversity Data Base, version 3.1.1 February 28, 2010 data.

California Native Plant Society. December 9, 1983, revised June 2, 2001. CNPS Botanical Survey Guidelines. California Native Plant Society.

California Native Plant Society (CNPS). 2009. Inventory of Rare and Endangered Plants (online edition, v7-09c). California Native Plant Society. Sacramento, CA. http://www.cnps.org/inventory

Consortium of California Herbaria website. 2008. Regents of the University of California. Updated March 22, 2008.

Collins, Paul W. 2009. Results of Small Mammal Trapping at the Topaz Solar Farm, California Valley, San Luis Obispo County, California. October 20.

Collins, Paul W. 2010. Results of Small Mammal Trapping on portions of the Topaz Solar Farm Project Site in California Valley, Sections 4, 5, 15, 26, 28, 32-35, San Luis Obispo County, California. April 26.

Cooper, Daniel S. 2004. Important Bird Areas of California. Audubon California, Pasadena, California.

Cowardin, L. M., V. Carter, F. C. Golet, and E. T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C.

Cypher, Brian L. and Patrick A. Kelly, Daniel L. Williams, Howard O. Clark, Alexander D. Brown, Scott E. Phillips. 2005. Foxes in Farmland: Recovery of the Endangered San Joaquin Kit Fox on Private Lands in California. CSU Stanislaus. 19pp. ESRP, Fresno.

Cypher, B. L., and N. Frost. 1999. Condition of kit foxes in urban and exurban habitats. J. Wildlife Management 63:930-939.

Cypher, B. L., and G. D. Warrick. 1994. Use of human-derived food items by urban kit foxes. Trans. Western Section Wildlife Society 29:34-37.

Cypher, Brian L. and Jerry H. Schrivner. 1992. Coyote Control to Protect Endangered San Juan Kit Foxes at the Naval Petroleum Reserves, California. Vertebrate Pest Conference Proceedings Collection, Proceedings of the Fifteenth Vertebrate Pest Conference 1992, University of Nebraska, Lincoln.

Cypher, B.L., P.A. Kelly, D.F. Williams, H.O. Clark, Jr., A.D. Brown, and S.E. Phillips. 2005. Foxes in Farmland: Recovery of the Endangered San Joaquin Kit Fox on Private Lands in California. Final Report Submitted to the National Fish and Wildlife Foundation, Project Number 2000-0129-012. California State University, Stanislaus, Endangered Species Recovery Program.

Cypher, B.L., S.C. Phillips, and Patrick A. Kelly. 2007. Habitat Suitability and Potential Corridors for San Joaquin Kit Fox in the San Luis Unit Fresno, Kings and Merced Counties, California (34 pp). Prepared for the U.S. Bureau of Reclamation, South-Central California Area Office and The U.S. Fish and Wildlife Service, Endangered Species Program. California State University, Stanislaus, Endangered Species Recovery Program, Fresno, CA (page 1).

Erikson and Belk 1999. Fairy Shrimps of California's Puddles, Pools, and Playas. Mad River Press, Inc., Eureka, CA.

Garrett, K., and J. Dunn. 1981. Birds of Southern California: Status and Distribution. Los Angeles Audubon Soc., Los Angeles, CA. 408 pp.

Grinnell, J. and J.S. Dixon. 1937. Pages 377-420, Fur-bearing Mammals of California. University of California Press, Berkeley, CA. Volume II, 377-777.

Helm Biological Consulting, LLC. 2008. Dry-Season Sampling for Federally listed Large Branchiopods at the Proposed Topaz Solar Farm. December.

Helm Biological Consulting, LLC. 2009. Additional Dry-Season Sampling for Federally listed Large Branchiopods at the Proposed Topaz Solar Farm. August.

Helm Biological Consulting, LLC. 2010. Dry-Season Sampling (2010) for Federally listed Large Branchiopods at the Proposed Topaz Solar Farm. July.

Hickman, James C. 1993. The Jepson Manual. University of California Press, Berkeley and Los Angeles, California.

Hoover, Robert F. 1970. The Vascular Plants of San Luis Obispo County, California. University of California Press. Berkeley, Los Angeles, and London.

Hunt, W.G., R. E. Jackman, T. L. Hunt, D. E. Driscoll, and L Culp. 1998. A Population Study of Golden Eagles in the Altimont Pass Wind Resource Area: Population Trend Analysis 1997. Report to National Renewable Energy Laboratory, Subcontract XAT-6-16459-01. Predatory Bird Research Group, University of California, Santa Cruz.

H.T. Harvey and Associates, Ecological Consultants and URS. 2009. California Valley Solar Ranch Biological Resource Assessment Report. December.

Johnsgard, Paul A. 1990. Hawks, Eagles, and Falcons of North America. Smithsonian Institution Press, Washington and London.

Kays, Roland W. and Don E. Wilson. 2002. Princeton Field Guides, Mammals of North America. Princeton University Press, Princeton and Oxford.

Keeler-Wolf, Todd, Diane R. Elam, Kari Lewis, and Scott A. Flint. 1998. California Vernal Pool Assessment Preliminary Report. State of California, The Resources Agency, Department of Fish and Game. May. Available online at: http://www.dfg.ca.gov/biogeodata/wetlands/pdfs/VernalPoolAssessmentPreliminaryReport.pdf.

Knapp, D.K. 1978. Effects of agricultural development in Kern County, California, on the San Joaquin kit fox in 1977. Calif. Dep. of Fish and Game, Nongame Wildl. Investigations rep., Proj. E-1-1, Job V-1.21. 48pp. + appends.

Knopf, F.L., and J.R. Rupert. 1995. Habits and Habitats of Mountain Plovers in California. Condor 97: 743–751.

Knopf, F.L. 1998. Foods of Mountain Plovers Wintering in California. Condor 100:382-384.

Loredo, I., D. VanVuren, and M. L. Morrison. 1996. Habitat use and migration behavior of the California tiger salamander. Journal of Herpetology 30:282-285.

Maldonado, Jesus E. 2010. Final Report to Althouse and Meade Inc., Friday, July 30, 2010, Using non-invasive fecal DNA analysis to estimate the presence, distribution and abundance of endangered San Joaquin Kit foxes in the Topaz Solar Farm project study area. July.

Murie, Olaus J. 1974. Peterson Field Guides, Animal Tracks. Houghton Mifflin Company, Boston, New York.

Orloff, S, F. Hall, and L. Spiegel. 1986. Distribution and Habitat Requirements of the San Joaquin Kit Fox in the Northern Extreme of their Range. Transactions Western Section The Wildlife Society 22:60-70.

Pagel, J.E., D.M. Whittington, and G.T. Allen. 2010. Interim Golden Eagle technical guidance: inventory and monitoring protocols; and other recommendations in support of eagle management and permit issuance. Division of Migratory Bird Management, U.S. Fish and Wildlife Service.

Peeters, Hans. 2007. California Natural History Guides. Field Guide to Owls of California and the West. University of California Press, Berkeley, Los Angeles, Lindon.

Schlising, Robert A. and Douglas G. Alexander, Department of Biological Sciences, California State University, Chico. 2007. Vernal Pool Landscapes. Studies from the Herbarium, Number 14, California State University, Chico.

Searcy C. and H.B. Shaffer. 2008. Calculating biologically accurate mitigation credits: Insights from the California tiger salamander. Conservation Biology 22(4):997-1005.

Semlitsch, R.D. 2002. Critical elements for biologically based recovery plans of aquatic-breeding amphibians. Conservation Biology 16(3):619-629.

Sharum, Kathy. Undated. A two page report on the results of four years of single-day surveys for mountain plovers in the Carrizo Plain National Monument. Report provided by Tom Edell, compiler of the San Luis Obispo County Breeding Bird Atlas data.

Sibley, David Allen. 2001. The Sibley Guide to Bird Life & Behavior. National Audubon Society. Alfred A. Knopf, New York.

Smith, D. and Alice Whitelaw. 2010. Scat Detection Dog Surveys for the Endangered San Joaquin Kit Fox (*Vulpes macrotis mutica*) on Topaz Solar Farm Properties in San Luis Obispo County, California. January 22.

Smith, D. and Alice Whitelaw. 2011. Scat Detection Dog Surveys for the Endangered San Joaquin Kit Fox (*Vulpes macrotis mutica*) on Topaz Solar Farm Properties in San Luis Obispo County, California (In preparation).

Solomesch, Ayzik, and Michael Barbour. 2008. Key to Vernal Pool Plant Associations. Presented at CNPS Vernal Pool Workshop, March, 2008.

Stafford, Bob. 2008. Personal communication at County pre-application meeting, County of San Luis Obispo,.

Stebbins, Robert C. 2003. Peterson Field Guides Western Reptiles and Amphibians, 3rd edition. Houghton Mifflin Company, Boston, New York.

Trenham, P.C. and H.B. Shaffer. 2005. Amphibian upland habitat use and its consequences for population viability. Ecological Applications 15(4):1158-1168.

Trenham, P.C., W.D. Koenig, and H.B. Shaffer. 2001. Spatially autocorrelated demography and interpond dispersal in the salamander *Ambystoma californiense*. Ecology 82(12):3519-3530.

United States Army Corps of Engineers. 2008a. Regional supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0). Ed. J.S. Wakeley, R.W. Lichvar, and C.V. Noble. ERDC/EL TR-08-28. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

United States Army Corps of Engineers. 2008b. A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States: A Delineation Manual. Ed. R. W. Lichvar and S.M. McColley. ERDC/CRREL TR-08-12. Hanover, NH: U.S. Army Engineer Research and Development Center.

United States Department of Agriculture, National Cooperative Soil Survey. 2003. Soil Survey of San Luis Obispo County, California, Carrizo Plain Area.

United States Department of Energy. 2011, in prep. Environmental Impact Statement for the US Department of Energy Loan Guarantee to Royal Bank of Scotland for Construction of the Topaz Solar Farm, San Luis Obispo County, California

United States Fish and Wildlife Service. 1994. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the Conservancy Fairy Shrimp, Longhorn Fairy Shrimp, and the Vernal Pool Tadpole Shrimp; and Threatened Status for the Vernal Pool Fairy Shrimp. Federal Register 59 (180): 48136-48152.

United States Fish and Wildlife Service. 1996a. Interim Survey Guidelines to Permittees for Recovery Permits under Section 10(a)(1)(A) of the Endangered Species Act for the Listed Vernal Pool Branchiopods. April 19.

United States Fish and Wildlife Service. 1996b. Recovery Plan for the California Condor, Third Revision. Portland, Oregon.

United States Fish and Wildlife Service. 1996c. Programmatic Formal Endangered Species Act Consultation on Issuance of 404 Permits for Projects with Relatively Small Effects on Listed Vernal Pool Crustaceans Within the Jurisdiction of the Sacramento Field Office, California. 1-1-96-F-1. Available online at: http://www.fws.gov/sacramento/es/documents/vp_programatic.pdf

United States Fish and Wildlife Service. 1998. Recovery Plan for Upland Species of the San Joaquin Valley, California. Region 1, Portland, OR. Fed. Register Notice, U.S. Fish and Wildlife Service.

United States Fish and Wildlife Service and National Marine Fisheries Service. 1998. Endangered Species Consultation Handbook. Procedures for Conducting Consultation and Conference Activities Under Section 7 of the Endangered Species Act. March.

United States Fish and Wildlife Service. 1999. Endangered and Threatened Wildlife and Plants: Proposed Threatened Status for the Mountain Plover. Federal Register 64:7587-7601.

United States Fish and Wildlife Service. January 2000. Guidelines for Conducting and Reporting Botanical Inventories for Federally, Proposed, and Candidate Species.

United States Fish and Wildlife Service. 2005a. Designation of critical habitat for the California tiger salamander, Central Population; Final Rule. Federal Register, Vol. 70:49380-49458.

United States Fish and Wildlife Service. 2005b. Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon. Portland, Oregon. xxvi +606 pages. Available online at: http://www.fws.gov/sacramento/es/recovery_plans/vp_recovery_plan_links.htm

United States Fish and Wildlife Service. 2007. National Bald Eagle Management Guidelines. May.

United States Fish and Wildlife Service. 2009. Final Environmental Assessment, Proposal to Permit Take, Provided Under the Bald and Golden Eagle Protection Act. April.

URS Corp. September 24, 2007. Biological Assessment and Wetland Delineation, Carrizo Energy Solar Farm Project. Updated September 10, 2008.

URS Corp. October 10, 2008. Carrizo Energy Solar Farm (07-AFC-8), 2008 Biological Surveys Letter Report, URS Project No. 27658060

Vanherweg, Bill. 2008. Topaz Solar Energy Project Nocturnal Small Mammal Trapping Survey. Prepared for OptiSolar Inc.

Warrick, Gregory D., H. O. Clark Jr., P. A. Kelly, D. F. Williams, B. L. Cypher. 2007. Use of Agricultural lands by San Joaquin kit foxes. Western North American Naturalist, Vol 67, No 2.

Appendix A: Other Federally-listed Species Reported from the Region

Introduction to Appendix A

Appendix A includes information regarding other federally-listed species reported from the region for which the Project would have no effect (refer to Table 3 and following discussions). Extensive field surveys and investigation of habitat suitability and occurrence records have determined that none of these eight federally-listed species occur within or close enough to the Action Area to be affected by the Project. For each species we provide a detailed description of field survey methods and we summarize the resulting determination that they are not present.

TABLE 3. OTHER FEDERALLY-LISTED SPECIES Two federally-listed plants and six federally-listed animals reported from the region are listed that were not found on or near the Project.

	Common and Scientific Names	Fed/State Status Global/State Rank CNPS List/ DFG Rank	Blooming /Nesting/ Breeding Period	Habitat Preference	Potential Habitat?	Detected Within Action Area?	Effect of Project
				Plants–2 species			
	California Jewelflower *Caulanthus californicus*	Endangered/ Endangered G1/S1.1 List 1B.1	February–May	Chenopod scrub, grassland, pinyon-juniper woodland on non-alkaline sandy and rocky soils; 65-900 m.	No. Suitable habitat conditions and soil types are not present within either of the Action Area.	No	No Effect
	San Joaquin Woollythreads *Monolopia congdonii*	Endangered/none G3/S3.2 List 1B.2	February–May	Chenopod scrub, grassland, in alkaline or loamy plains or sandy soils. 60-800 m.	Yes. Suitable habitat and loamy plains or sandy soils are present within portions of Sections 4 and 5 of the Option A Action Area. Suitable soils are not present within the Option B Action Area.	No	No Effect

	Common and Scientific Names	Fed/State Status Global/State Rank CNPS List/ DFG Rank	Blooming /Nesting/ Breeding Period	Habitat Preference	Potential Habitat?	Detected Within Action Area?	Effect of Project
				Animals–6 species			
	California Tiger Salamander *Ambystoma californiense*	Threatened/none G2G3/S2S3 SSC	Rainy season	Need underground refuges, ground squirrel burrows & vernal pools or other seasonal water for breeding.	No. Suitable aquatic habitat with untilled adjacent upland habitat is not present within either of the Action Area. No historic suitable aquatic habitat on the Carrizo Plain. No historic or current specimen records from the Carrizo Plain.	No	No Effect
	Giant Kangaroo Rat *Dipodomys ingens*	Endangered/ Endangered G2/S2 Special Animal	Spring - Summer	Sandy loamy soil on level and gently sloping ground with annual grasses, forbs, and scattered shrubs. sw SnJV	Yes. Potentially suitable habitat may be present within the Action Area. However, intensive burrow transect surveys and a kangaroo rat burrow and scat measurement study determined all kangaroo rat precincts within the Action Area were created and inhabited by the common and widespread Heermann's kangaroo rat (*Dipodomys heermanni*). Giant kangaroo rat does not occur within the Action Area.	No	No Effect

	Common and Scientific Names	Fed/State Status Global/State Rank CNPS List/ DFG Rank	Blooming /Nesting/ Breeding Period	Habitat Preference	Potential Habitat?	Detected Within Action Area?	Effect of Project
	Kern Primrose Sphinx Moth* *Euproserpinus euterpe*	Threatened/None G1/S1 Special Animal	Spring	Host plant is evening primrose (*Camissonia contorta epilobioides*) and potentially other *Camissonia* species.	No. Suitable habitat is not present within the Action Area. Potentially suitable habitat is located in Section 4, outside of the Option A Action Area.	No	No Effect
	Blunt-nosed Leopard Lizard *Gambelia sila*	Endangered/ Endangered G1/S1 Fully Protected	Spring	Semiarid grasslands, alkali flats, and washes; SnJV and adjacent lands. 30-730 m.	Yes. However, most portions of the Action Area are too disturbed. Grasslands are generally too densely vegetated, with no shrub cover. Suitable burrows are present.	No	No Effect
	California Condor *Gymnogyps californianus*	Endangered/ Endangered G1/S1 Special Animal	March 15 through August 15	Wide-ranging over Coast Ranges from Ventura to Big Sur, California.	Yes. Condors likely pass over the area on occasion, and could feed locally on carrion when available. However, Applicant Proposed Measures regarding micro trash clean-up and power line design would be implemented to avoid potential impacts.	No	No Effect
	California Red-legged Frog *Rana draytonii*	Threatened/none G4T2T3/S2S3 SSC	January - March	Lowlands and foothills in or near sources of deep water with dense, shrubby or emergent riparian vegetation.	No. Suitable habitat is not present within either of the Action Area.	No	No Effect

San Joaquin Woollythreads and California Jewelflower

The San Joaquin woollythreads (*Monolopia congdonii*) is a federally listed endangered plant species (also CNPS List 1B.2) that occurs in interior areas of the southern San Joaquin Valley, as well as in the Carrizo Plain region of San Luis Obispo County. The San Joaquin woollythreads is distinguished by disciform heads, minute rays, disk fruits that are two-angled, and disk pappus of 2 to 7 scales. It occurs in grassland and chenopod scrub habitats, typically in sandy or loamy alkaline soils, where it blooms from February to May. The nearest recorded occurrence is a 1954 collection from approximately 14 miles east-northeast of the Action Area, now presumed extirpated (CNDDB 17). This species is also reported from the Carrizo Plain National Monument, with the nearest occurrence approximately 19 miles southeast of the Action Area (CNDDB 31, 45, 46, 79). A reference population in the Monument was visited by Althouse and Meade, Inc. botanists on March 26, 2010 where this species was observed in flower (Althouse and Meade, Inc. 2010c). Moderately suitable habitat is present in the Action Area for this species.

The California jewelflower (*Caulanthus californicus*) is a federally listed endangered plant species (also CNPS List 1B.1) that occurs in the southern San Joaquin Valley, as well as in the Carrizo Plain region of San Luis Obispo County. The California jewelflower occurs in chenopod scrub, valley and foothill grassland, and pinion-juniper woodland habitats, where it blooms from February to May. It is an annual plant in the mustard family that differs from other members of the genus by having stems not inflated and obviously hairy, sepals typically 4 to 8 millimeters, petals 6 to 11 millimeters, and fruits 1 to 6 centimeters. The nearest recorded occurrence is 1991 observation of a single plant on private land approximately 6.3 miles west of the Action Area (CNDDB 73). Suitable habitat is not present within the Action Area for this species.

Botanical surveys conducted in 2010 utilized a transect survey method in which botanists covered parallel belts of land in north-south orientation across annual grasslands and croplands. Each transect belt was 660 feet wide and up to 5,280 feet (one mile) long. Botanists walked meandering lines within each transect, ultimately compiling a complete flora for every Section. Land Sections within the project study area were sampled individually to generate a separate dataset for each Section. Each botanist compiled a list of all plants encountered during their first transect in a new Section; only plant species new for the Section were listed on subsequent transect data sheets. Some plants that could not be positively identified in the field were collected, pressed, and identified in the lab. In addition to compiling plant lists, the botanists recorded notes on dominant species, percent cover, percent bare ground, and vegetation height in all transects. When the botanists identified rare plant populations, they recorded coordinates taken by hand-held GPS, number of plants present, and the approximate size of the occurrence. This data was used to direct focused surveys to completely map rare plant populations. The 2010 transect surveys completed total ground cover once in March, once in April, and once in May. We conducted focused surveys for botanical resources throughout the spring season. Focused surveys were conducted by senior botanists, at times working with Dr. David Keil, Curator of the R.F. Hoover Herbarium at Cal Poly, in order to make determinations on species identity questions raised during transect surveys, collect

voucher specimens, map rare plant populations, and to fully investigate complex habitat types such as vernal pools.

Botanical surveys were timed to coincide with the typical blooming period for rare plant species with potential to occur within the Action Area, including San Joaquin woollythreads and California jewelflower. Botanical surveys conducted through July 2010 determined the San Joaquin woollythreads and California jewelflower do not occur within the Action Area. San Joaquin woollythreads and California jewelflower do not occur in the Action Area, therefore the Project would have No Effect on these species.

Kern Primrose Sphinx Moth

The Kern primrose sphinx moth (*Euproserpinus euterpe*) is a federally listed threatened species known from Ventura, Santa Barbara, Kern, and San Luis Obispo Counties. This sphinx moth species is a medium-sized, day-flying moth that has been found in cropland, hedge rows, grassland, herbaceous areas, shrubland, chaparral, and open weedy areas in desert scrub. The sphinx moth requires the presence of the larval host plant, evening primrose (*Camissonia* ssp.). Grassland and sandy washes provide potentially suitable habitat for the sphinx moth. Potential low quality habitat is present in sandy washes that contain patches of *Camissonia* ssp. in Section 4 outside of the Option A Action Area (Arnold 2010).

A habitat assessment and limited presence-absence survey for the Kern primrose sphinx moth was conducted on April 2, 2010 by Richard A. Arnold, Ph.D. of Entomological Consulting Services, Ltd. (Arnold 2010, included in the Biological Report Technical Addendum, Volume 3). Althouse and Meade, Inc. mapped 45 locations of *Camissonia strigulosa*, a potential larval food plant for the sphinx moth, within the study area (as defined in Althouse and Meade, Inc. 2010c) during botanical transect surveys in April 2010. Dr. Arnold reviewed the *Camissonia strigulosa* locations and Natural Resource Conservation Service (NRCS) soil maps prior to conducting the April 2 site visit to determine which locations were situated on soils potentially suitable to the sphinx moth larval life stage. Dr. Daniel E. Meade from Althouse and Meade, Inc. accompanied Dr. Arnold on the April 2 site visit. Each location was surveyed for larvae and signs of larval feeding damage.

All but one of the previously identified 45 locations of *Camissonia strigulosa* were determined by Dr. Richard Arnold to be situated on clay or loam soils which are not suitable for the pupal stage of the Kern primrose sphinx moth. One location in a sandy wash at the south end of Section 4 (outside the Action Area) was determined to be potentially suitable. No sphinx moth adults or larvae were detected, and no evidence of larval feeding on the *Camissonia strigulosa* plants was observed.

No direct adverse effects to Kern primrose sphinx moth would occur from the Project. Incidental take is not expected as Kern primrose sphinx moths were not detected within the Action Area during field surveys conducted in 2010 and existing Project site conditions provide very poor potential habitat. The Project would have No Effect on the Kern primrose sphinx moth.

California Tiger Salamander

The California tiger salamander (*Ambystoma californiense*) is a federally listed threatened species in San Luis Obispo County, and it is listed as threatened under the California Endangered Species Act. The California tiger salamander (CTS) is endemic to California. California tiger salamanders are restricted to vernal pools and seasonal ponds, in grassland and oak savannah habitats, predominantly from sea level to 2,000 feet, in central California. As an adult, it is a large, stocky, terrestrial salamander with a broad, rounded snout. Larvae are fully aquatic and require standing bodies of fresh water (natural or artificial) that are typically inundated for a minimum of 12 weeks during an average rainfall year. Ponds or agricultural reservoirs with a hydro-period of more than two years can accumulate a diverse array of aquatic predators, including invertebrates, aquatic salamanders, and fishes (Semlitsch 2002). Ponds containing high densities of aquatic predators, especially non-native fishes or bullfrogs (*Rana catesbeiana*), appear to be unsuitable as breeding habitat. Adults migrate to and from breeding ponds during the rainy season beginning in early November, with greatest breeding activity occurring December through March (Stebbins 2003). Newly-metamorphosed CTS leave the pond and spend most of their adult life underground in burrows of California ground squirrels, gophers, and other animals.

In San Luis Obispo County, the current range of the CTS is restricted to seasonal ponds along the northern San Andreas Fault Zone, between Kerr Lake one mile south of the Monterey County line and Grant Lake at Palo Prieto Pass (CNDDB September 2010). The southern known extent of CTS in San Luis Obispo County at Grant Lake is approximately 13 miles northwest of the Action Area. Tiger salamanders in San Luis Obispo County represent the southern extent of the Central Coast Range genetically distinct population, which extends northwest to Monterey Bay (CDFG 2010). The CTS is not known to occur in the Carrizo Plain. Reservoirs located within the Action Area could potentially provide suitable aquatic habitat, however, the intense agricultural production that immediately surrounds these reservoirs does not allow for appropriate upland habitat required by adult CTS. The Project would have no effect on the CTS due to the lack of suitable habitat within the Action Area.

Giant Kangaroo Rat

The giant kangaroo rat (*Dipodomys ingens*) is listed as an endangered species under the Federal and California Endangered Species Acts. The giant kangaroo rat inhabits the arid southwestern edge of central California's San Joaquin Valley and adjacent valleys and plateaus of the Inner Coastal Ranges, including the Carrizo Plain. Giant kangaroo rats are described by the Endangered Species Recovery Program (ESRP) as inveterate diggers that frequently remodel their burrows, closing old entrances and creating new ones. These burrows also provide shelter for the federally listed endangered blunt-nosed leopard lizard (BNLL), state-listed threatened Nelson’s antelope squirrel, and other animals. The nearest reported occurrence in the CNDDB is located approximately three miles east of the Action Area. The occurrence was recorded in 1979 and is located at the north end of the Carrizo Plain, approximately 3.5 air miles north-northeast of Simmler (CNDDB 110).

Small mammal taxa within the Action Area were inventoried during four trapping studies (URS 2008, Vanherweg 2008, Collins 2009, and Collins 2010, in the Biological Report Technical Addendum, Volume 3), three visual detection transect surveys (Althouse and Meade, Inc. 2009a, 2010c), a barn owl pellet analysis (Collins 2009), a kangaroo rat burrow and scat measurement study, and during focused wildlife surveys. The trapping studies each focused on different locations of the Action Area, resulting in a comprehensive sample of small mammals (primarily nocturnal) occurring across the Action Area.

Thirty barn owl pellets were collected and the bone contents were identified to species by Paul Collins, Curator of Vertebrate Zoology at the Santa Barbara Museum of natural History (Collins 2009).

Giant kangaroo rat focused visual detection surveys were conducted in suitable habitats within the Action Area in 2008 and 2009 and in 2010 concurrently with the 17 BNLL full-coverage passes for the adult survey period. These surveys were preceded by visits to known reference sites in the Carrizo Plain National Monument (Panorama Road). Additionally, all 2010 BNLL surveyors attended a giant kangaroo rat field training on May 14, 2010 given by Paul Collins.

Biologists conducting focused surveys for giant kangaroo rat walked transects through suitable habitat looking for kangaroo rat precincts. All precincts identified were mapped and carefully examined for the diagnostic sign of the giant kangaroo rat (vegetation clearing, haystacks, pit caches, etc.). On June 18, 2010, Paul Collins and Tom Olson (Thomas E. Olson Biological Consulting) conducted a kangaroo rat burrow and scat measurement study within the Action Area. Althouse and Meade, Inc. biologist Jason Dart assisted with the survey. Each potential kangaroo rat precinct was surveyed for horizontal and vertical burrows, and other diagnostic sign. Where rodent burrows and sign were positively identified as that of a kangaroo rat, vertical and horizontal measurements were taken of all burrows, and scat was collected where available for later evaluation in the lab. Burrow and scat morphometrics were compared to those presented in the published literature (Williams 1992).

The giant kangaroo rat does not occur within the Action Area. Visual detection surveys conducted during the 2010 BNLL adult survey period identified potential kangaroo rat precincts, which were later evaluated by Paul Collins and Tom Olson.

The kangaroo rat burrow and scat measurement study conducted in June 2010 determined all kangaroo rat precincts were created and inhabited by the common and widespread Heermann's kangaroo rat (*Dipodomys heermanni*). The federally listed endangered giant kangaroo rat does not occur within the Action Area.

No direct adverse effects to giant kangaroo rat would occur from the Project. Incidental take is not expected as no giant kangaroo rats were detected within the Action Area during field surveys conducted in 2008 through 2010. No Effect to giant kangaroo rat is expected to occur from the Project.

Blunt-nosed Leopard Lizard

The blunt-nosed leopard lizard (*Gambelia sila*) is a federal and state-listed endangered species. It is a Fully Protected species by CDFG, meaning no take may be authorized.

Blunt-nosed leopard lizards (BNLL) live in the San Joaquin Valley and Carrizo Plain in expansive, arid areas with scattered vegetation. They inhabit non-native grassland and alkali sink scrub communities of the valley floor marked by poorly drained, alkaline, and saline soils. Insects comprise the major portion of their diet, although other lizards also are eaten. They are opportunistic when foraging for animals, feeding on whatever prey is of appropriate size for capture and consumption. BNLL use small mammal burrows such as those of ground squirrels and kangaroo rats for permanent shelter and dormancy. Seasonal activity above ground depends on weather conditions, especially temperature. The optimum activity period occurs when air temperatures are between 77 and 95 °F and soil temperatures are between 86 and 122 °F. The breeding season begins in April and lasts into or through June. Eggs are laid in June and July, with young emerging in August or September. The nearest recorded occurrence, from July of 1958, is located approximately 7.8 miles south of the Action Area, 8.75 miles northwest of Painted Rock (CNDDB 134).

Protocol surveys for the BNLL were conducted throughout the Action Area (URS 2007, URS 2008, Althouse and Meade, Inc. 2009a, Althouse and Meade, Inc. 2010a, Althouse and Meade, Inc. 2010b). Methods of the BNLL protocol surveys were consistent with published protocol (CDFG 1994). Five protocol surveys were conducted within portions of the Action Area from 2007 to 2010 with negative survey results. The BNLL does not occur within the Action Area.

Protocol surveys did not detect any BNLL within the Action Area. No direct impacts to blunt-nosed leopard lizards would occur from the Project. Indirect impacts may include beneficial effects such as the increase in potential habitat due to the conversion of agricultural lands to grassland. No Effect to BNLL is expected to occur from the Project.

California Condor

The California condor (*Gymnogyps californianus*) is listed as endangered under the federal Endangered Species Act and the California Endangered Species Act. In addition, it is a Fully Protected species by CDFG, meaning no take may be authorized. Condors utilize vast expanses of open savannah, grasslands, and foothill chaparral in mountain ranges of moderate altitude. Deep canyons containing clefts in rocky walls provide nesting sites; large trees are used on occasion. In California, the condor presently ranges over approximately 9,500 square miles of land extending in a wishbone shaped area from Los Angeles northwest through the Coast Ranges to Monterey and San Benito Counties, and northeast through the Tehachapi Mountains east of Bakersfield into southern Fresno County. The California condor may forage up to 100 miles from its nightly roosting site.

From the late 1970's until 1987, wild condors foraged in foothills bordering the San Joaquin Valley, including San Luis Obispo County. The Elkhorn Hills-Cuyama Valley-Carrizo Plain complex and the southern San Joaquin Valley were the primary feeding areas for wild condors after 1982. Between 1982 and 1987 most condor sightings in the Carrizo Plain were at the south end of the National Monument, where sightings were most common in late winter and spring (USFWS 1996b; BLM 2010a). The Carrizo Plain is not presently occupied by condors, and according to the BLM (2010a) condors have not used the National Monument in recent years.

The United States Fish and Wildlife Service has designated nine critical habitat areas for the California Condor, including one area in San Luis Obispo County. Over 600,000 acres of land is designated as critical habitat. The area in San Luis Obispo County is split into the East and West Units of the High Mountain-Beartrap Condor Area. The Action Area are situated approximately 5.5 miles east of the closer 8,320 acre East Unit. The Carrizo Plain is not part of a critical habitat area for the California Condor, although its proximity and potential food sources make it suitable foraging habitat. Each of the Action Area, which are not within a designated critical habitat area, account for less than one tenth of one percent of the total range of the California condor.

Focused bird surveys were conducted within the Action Area during winter and spring months. Bird surveys were designed to detect and identify all species present. Over 221 survey hours were conducted specifically for winter bird surveys, and hundreds of survey hours were conducted for spring wildlife surveys that included intensive birding efforts.

California condors were not detected on or near the Topaz Solar Farm Action Area during our field surveys conducted from March 2008 through July 2010. The Topaz Solar Farm Action Area do not contain adequate roosting or nesting sites for California condors. However, large open areas for foraging are present, and cattle and wild ungulate carcasses in the region may provide feeding opportunities that could attract condors to the Carrizo Plain periodically. The California condor could potentially feed within the Action Area if a large mammal carcass was present.

Construction and subsequent operation of the Project would not adversely affect the California condor. Project construction, operation and maintenance procedures include regular trash clean-up and removal of small metal objects such as nuts and bolts. Clean-up protocols would eliminate small trash items in the extremely unlikely event that a condor would land within the Action Area.

The Project would have some medium-voltage collection system lines that would be designed to not present a danger for electrocution or collision by condors or raptors. This would be accomplished by utilizing design features recommended by the Avian Power Line Interaction Committee (APLIC 2006) which provides species-specific minimum horizontal and vertical spacing guidelines that would eliminate the potential for electrocution by bridging the gap between conductors. In addition, avian flight diverters would be installed to prevent collisions with power lines.

The Carrizo Plain is not presently occupied by condors. The Project is not within a designated critical habitat area for condors. The change of use on approximately 4,100 acres of farming and grazing land would be a discountable effect to California condor, particularly with approximately 250,000 acres of suitable habitat within the Carrizo Plain National Monument and another 12,570 acres of protected critical habitat located in the region. No Effect to California condor is expected to occur from the Project.

California Red-legged Frog

The California red-legged frog (*Rana draytonii*) is a federally listed threatened species with sporadic occurrences documented throughout much of San Luis Obispo County. It does not occur on the Carrizo Plain, but is known from the Caliente Mountains to the west, and from the vicinity of the Cholame Valley to the north. San Luis Obispo County

contains four critical habitat areas officially designated by the USFWS, the closest of which is SLO-4, located approximately 8.6 miles west of the Action Area.

The California red-legged frog generally requires seasonal pools or streams that hold water until late summer for successful breeding. Bullfrogs and introduced fish are detrimental to its breeding success, and have severely reduced many populations in larger watercourses and perennial ponds. The Action Area do not contain suitable aquatic or upland habitat for the California red-legged frog. Aquatic sampling surveys conducted within the Action Area determined the California red-legged frog does not occur within the Action Area. No Effect to the California red-legged frog is expected to occur from the Project.

Appendix B: San Joaquin Kit Fox Conservation and Monitoring Plan

Appendix C: Biological Assessment for the Carrizo-Midway 230 kV Reconductoring Project

BIOLOGICAL ASSESSMENT FOR THE CARRIZO-MIDWAY 230 KV RECONDUCTORING PROJECT

PREPARED FOR:

Pacific Gas and Electric Company
245 Market Street
San Francisco, CA 94105
Contact: Brandon Liddell
(415) 973-4893

PREPARED BY:

ICF International
630 K Street, Suite 400
Sacramento, CA 95814
Contact: Danielle Wilson
(916) 737-3000

December 2010

ICF International. 2010. Biological Assessment for the Carrizo-Midway 230 kV Reconductoring Project. December. (ICF 00097.10.) Sacramento, CA. Prepared for Pacific Gas and Electric Company, San Francisco, CA.

Contents

List of Tables and Figures iv
List of Acronyms and Abbreviations v

Chapter 1 Introduction 1-1
1.1 Purpose of Biological Assessment 1-1
1.2 Legal and Regulatory Background 1-1
1.3 Action Area 1-2
1.4 Federally Threatened or Endangered Species 1-2
1.5 Critical Habitat 1-4
1.5.1 Critical Habitat for the Valley Elderberry Longhorn Beetle 1-4
1.5.2 Critical Habitat for the California Condor 1-4
1.6 Consultation to Date 1-5

Chapter 2 Environmental Baseline 2-1
2.1 Assessment Methodology 2-1
2.1.1 Review of Existing Information 2-1
2.1.2 Vegetation and Habitat Mapping 2-2
2.1.3 Habitat Assessments and Focused Surveys 2-2
2.2 Vegetation Communities and Habitat Types 2-3
2.2.1 Upland Vegetation and Habitat Types 2-3
2.2.2 Other Waters 2-6
2.3 Listed Species 2-7
2.3.1 Kern Mallow 2-7
2.3.2 Valley Elderberry Longhorn Beetle 2-7
2.3.3 Blunt-Nosed Leopard Lizard 2-8
2.3.4 Golden Eagle 2-9
2.3.5 California Condor 2-10
2.3.6 Mountain Plover 2-12
2.3.7 Giant Kangaroo Rat 2-12
2.3.8 Tipton Kangaroo Rat 2-14
2.3.9 San Joaquin Kit Fox 2-15

Chapter 3 Project Description 3-1
3.1 Reconductoring 3-1
3.1.1 Switching Stations 3-2
3.1.2 Microwave Tower and Reflector 3-3

3.2 Land Uses along Transmission Line Right-of-Way 3-3
3.3 Construction Methods 3-4
3.3.1 Reconductoring 3-4
3.3.2 Tower Replacement 3-6
3.3.3 Tower Modifications 3-8
3.3.4 Access Road Modification 3-9
3.3.5 Switching Stations 3-9
3.3.6 Optical Ground Wire 3-9
3.3.7 Ground Disturbance 3-10
3.4 Construction Requirements 3-11
3.4.1 Equipment and Personnel 3-11
3.4.2 Schedule 3-11
Chapter 4 Proposed Conservation Measures 4-1
4.1 General Measures 4-1
4.2 Kern Mallow 4-3
4.3 Valley Elderberry Longhorn Beetle 4-3
4.4 Blunt-Nosed Leopard Lizard 4-4
4.5 California Condor and Golden Eagle 4-5
4.6 Giant Kangaroo Rat and Tipton Kangaroo Rat 4-6
4.7 San Joaquin Kit Fox 4-7
4.8 Compensation 4-8
4.8.1 Compensatory Conservation Strategy 4-8
Chapter 5 Analysis of Effects 5-1
5.1 Kern Mallow 5-1
5.1.1 Direct Effects 5-1
5.1.2 Indirect Effects 5-1
5.2 Valley Elderberry Longhorn Beetle 5-1
5.2.1 Direct Effects 5-1
5.2.2 Indirect Effects 5-2
5.3 Blunt-Nosed Leopard Lizard 5-2
5.3.1 Direct Effects 5-2
5.3.2 Indirect Effects 5-2
5.4 California Condor and Golden Eagle 5-3
5.4.1 Direct Effects 5-3
5.4.2 Indirect Effects 5-3
5.5 Mountain Plover 5-3
5.5.1 Direct Effects 5-3

5.5.2 Indirect Effects 5-3
5.6 Giant Kangaroo Rat and Tipton Kangaroo Rat 5-4
5.6.1 Direct Effects 5-4
5.6.2 Indirect Effects 5-4
5.7 San Joaquin Kit Fox 5-5
5.7.1 Direct Effects 5-5
5.7.2 Indirect Effects 5-5
5.8 Critical Habitat 5-6
5.9 Interrelated Actions 5-6
5.10 Interdependent Actions 5-6
5.11 Cumulative Effects 5-7
Chapter 6 Conclusion and Determination 6-1
6.1 Kern Mallow 6-1
6.2 Valley Elderberry Longhorn Beetle 6-1
6.3 Blunt-Nosed Leopard Lizard 6-1
6.4 California Condor and Golden Eagle 6-2
6.5 Mountain Plover 6-2
6.6 Giant Kangaroo Rat and Tipton Kangaroo Rat 6-2
6.7 San Joaquin Kit Fox 6-2

Appendix A. Species List for the Carrizo-Midway 230kV Power Line Reconductoring Project in Kern and San Luis Obispo Counties, California

Tables and Figures

Table **Page**

2-1 Survey Dates, Botanists, and Areas Surveyed 2-3

3-1 PG&E Reconductoring Project Existing Land Uses in Action Area 3-4

3-2 Preliminary Areas of Disturbance by Work Area 3-10

3-3 Solar-Midway 230 kV Reconductoring Equipment and Intended Use 3-13

Figure **Follows Page**

1a-1f 0-2

Acronyms and Abbreviations

BA	biological assessment
BMPs	best management practices
CAISO	California Independent System Operator
CDFG	California Department of Fish and Game
CFR	Code of Federal Regulations
CNDDB	California Natural Diversity Database
CNPS's	California Native Plant Society's
DOE	Department of Energy
ESA	Endangered Species Act
GPS	Global positioning system
IBEW	International Brotherhood of Electrical Workers
kV	kilovolt
LSTs	lattice steel towers
MP	milepost
msl	mean sea level
NEPA	National Environmental Policy Act
O&M HCP	Operations & Maintenance Habitat Conservation Plan
PG&E	Pacific Gas and Electric Company
ROW	right-of-way
SR	State Route
SWPPP	Storm Water Pollution Prevention Plan
TSP	tubular steel pole
USFWS	U.S. Fish and Wildlife Service
USGS	U.S Geological Survey
VELB	valley elderberry longhorn beetle
WHR	wildlife-habitat relationships classification system

Chapter 1
Introduction

1.1 Purpose of Biological Assessment

The California Independent System Operator (CAISO) has determined that transmission upgrades will be required to deliver the energy generated by proposed the Topaz Solar Farm Project on the Carrizo Plain. Specifically, reconductoring an approximately 34-mile segment of a Pacific Gas and Electric Company (PG&E) 230-kilovolt (kV) transmission line (Proposed Action) would be required. *Reconductoring* is the process of installing new conductor wires on existing towers to increase the capacity of an existing transmission line, although in some cases reconductoring requires the modification or replacement of some towers.

The purpose of this biological assessment (BA) is to provide the information necessary for formal consultation between the Department of Energy (DOE) and U.S. Fish and Wildlife Service (USFWS) regarding the effects of the Proposed Action as required pursuant to Section 7(a)(2) of the Endangered Species Act (ESA). This BA provides all the necessary information for the proposed action. Chapter 2 of the BA describes the specific area that may be affected by the proposed action; the listed, proposed, and candidate species that may be affected by the proposed action; and the environmental baseline against which project-related effects are determined. Chapter 3 describes the action to be considered; Chapter 4 describes the proposed conservation measures; and Chapter 5 describes how the action may affect federally listed, proposed, and candidate species and critical habitat.

As stated in the *Endangered Species Consultation Handbook* (U.S. Fish and Wildlife Service and National Marine Fisheries Service 1998) (referred to in this document as the *Consultation Handbook*), one of the purposes of a Section 7 BA is to help determine whether the proposed action is "likely to adversely affect" listed species and critical habitat, and thus whether formal consultation is necessary. These determinations are provided in Chapter 6 of the BA, along with summaries of project-related effects on the listed species.

1.2 Legal and Regulatory Background

PG&E's reconductoring project is a connected and interrelated action to the First Solar Topaz Solar Farm Project (Topaz Project). This Topaz Project is applying for a federal loan guarantee from DOE for their project, and as a result must comply with the National Environmental Policy Act (NEPA). Also, in accordance with Section 7 of the federal ESA, the DOE is required to consult with the USFWS to ensure that the Topaz Project would not jeopardize the continued existence of any federally listed species or result in the adverse modification or destruction of designated critical habitat. For purposes of this Biological Assessment, Proposed Action shall refer only to the PG&E reconductoring project. The Topaz Project proposed action is covered by the biological assessment for the Topaz Solar Farm.

The Section 7 implementing regulations (50 Code of Federal Regulations [CFR] 402.14[a]) require each federal agency to review its actions in order to determine whether an action "may affect" listed, proposed, and candidate species or critical habitat. If a project "may affect" but is "not likely to adversely affect" a federally-listed species or critical habitat, formal consultation with USFWS is not necessary (50 CFR 402.14[a]). Formal consultation between the DOE and USFWS is necessary only for a DOE action that is "likely to adversely affect" a federally listed species or critical habitat (50 CFR 402.14[a]).

The Section 7 implementing regulations (50 CFR 402.14[c]) require a federal agency to provide the following information to USFWS with any written request to initiate formal consultation:

- A description of the action to be considered;
- A description of the specific area that may be affected by the action;
- A description of any listed species or critical habitat that may be affected by the action;
- A description of the manner in which the action may affect any listed species or critical habitat and an analysis of any cumulative effects;
- Relevant reports, including any environmental impact statement, environmental assessment, or biological assessment prepared; and
- Any other relevant available information on the action, the affected species, or critical habitat.

1.3 Action Area

The *action area* as defined in 50 CFR 402.02 includes all areas in which federally listed species would be directly and indirectly affected by the Proposed Action, which is defined as the PG&E reconductoring project. The *action area* includes all work areas for construction activities associated with the reconductoring work.

1.4 Federally Threatened or Endangered Species

This document addresses potential impacts only for species that are federally listed as threatened or endangered, are proposed under the ESA for such designation, or are designated as a candidate for listing. Species with such designations are under the regulatory authority of USFWS pursuant to Section 7. California state-listed species and other special-status species (California species of special concern and California Native Plant Society listed species) that are not federally listed, proposed, or candidate species are not addressed in this document but are addressed in Appendix 4 of the *Topaz Solar Farm, LLC Draft Environmental Impact Report* (Aspen Environmental Consultants October 2010).

Consistent with Section 7 implementing regulations (50 CFR 402.12[b][2]), a list of endangered, threatened, proposed, and candidate species (USFWS list) was generated on September 28, 2010, for the La Panza NE, Las Yeguas Ranch, Carneros Rocks, Belridge, Lokern, Buttonwillow, and McKittrick Summit 7.5-minute U.S Geological Survey (USGS) quadrangles from the USFWS Sacramento Office website (Appendix A).

The following species that were included in the list are not considered in this BA for the following reasons:

- California jewelflower (*Caulanthus californicus*) (Endangered) – Species was not observed within the project area during botanical surveys conducted in 2010.
- San Joaquin wooly-threads (*Monolopia congdonii*) (Endangered) – Species was not observed within the project area during botanical surveys conducted in 2010.
- Conservancy fairy shrimp (*Branchinecta conservatio*) (Endangered)– Suitable habitat does not occur within the project area or within 250 feet of the project area.
- Longhorn fairy shrimp (*Branchinecta longiantenna*) (Endangered) - Suitable habitat does not occur within the project area or within 250 feet of the project area.
- Vernal pool fairy shrimp (*Branchinecta lynchi*) (Threatened) - Suitable habitat does not occur within the project area or within 250 feet of the project area.
- Kern primrose sphinx moth (*Euproserpinus euterpe*) (Threatened) – Host food plant (*Camissonia campestris*) was not observed within the project area.
- Delta smelt (*Hypomesus transpacificus*) (Threatened) – Project will not affect waters that flow into the Sacramento-San Joaquin Delta where the fish occurs.
- California tiger salamander (*Ambystoma californiense*) (Threatened) – Project does not occur within the range of the species.
- California red legged frog (*Rana draytonii*) (Threatened) – Project does not occur within the range of the species.
- Giant garter snake (*Thamnophis gigas*) (Threatened) – Species has been extirpated from Kern County. Project will not affect any suitable aquatic habitat for the species or affect upland habitats within 200 feet of suitable aquatic habitat.
- Buena Vista Lake shrew (*Sorex ornatus relictus*) (Endangered) – Project does not occur within the range of the species.

Based on these lists, a review of relevant literature, and database searches, ICF International biologists identified the following federally threatened, endangered, proposed, and candidate species that occur or potentially could occur within the action area:

- Kern mallow (*Eremalche kernensis*) (Endangered)
- Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) (Threatened)
- Blunt-nosed leopard lizard (*Gambelia sila*) (Endangered)
- California condor (*Gymnogyps californianus*) (Endangered)
- Golden eagle (*Aquila chrysaetos*) (Protected under the Golden and Bald Eagle Protection Act and Migratory Bird Treaty Act),
- Mountain plover (*Charadrius montanus*) (Proposed for federal listing as threatened),
- Giant kangaroo rat (*Dipodomys ingens*) (Endangered)
- Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*) (Endangered)
- San Joaquin kit fox (*Vulpes macrotis mutica*) (Endangered)

Accordingly, the above-listed species are addressed in this BA.

This BA includes a determination as to whether the proposed action "may affect" each of the species on the USFWS list; the determination is based on the species range and habitat preferences, and the types of impacts that would result from the proposed action. *May affect* is defined as the "appropriate conclusion when a proposed action may pose <u>any</u> effects on listed species or designated critical habitat." The appropriate conclusion when a proposed action would not affect a listed species or designated critical habitat, as stated in the Consultation Handbook, is "no effect". When the federal agency proposing the action determines that a "may affect" situation exists, it must initiate formal consultation or seek written concurrence from USFWS that the action "is not likely to adversely affect" the listed species.

1.5 Critical Habitat

Critical habitat is defined in Section 3(5)(A) of the ESA as "(i) the specific areas within the geographical area occupied by the species on which are found those physical or biological features (I) essential to the conservation of the species, and (II) which may require special management consideration or protection, and (ii) specific areas outside the geographical area occupied by the species upon a determination by the Secretary of Commerce or the Secretary of the Interior that such areas are essential for the conservation of the species." The effects analyses for designated critical habitat in this assessment consider the role of critical habitat in both the continued survival and the eventual recovery of the species in question, consistent with the Ninth Circuit judicial opinion, *Gifford Pinchot Task Force* v. *United States Fish and Wildlife Service*.

Of those species that are covered in this BA, critical habitat has not been designated or proposed for Kern mallow, blunt-nosed leopard lizard, giant kangaroo rat, Tipton kangaroo rat, or San Joaquin kit fox.

Critical habitat for the valley elderberry longhorn beetle (VELB) and California condor have been formally designated. These are discussed below.

1.5.1 Critical Habitat for the Valley Elderberry Longhorn Beetle

USFWS designated critical habitat for the valley elderberry longhorn beetle on August 8, 1980 (*Federal Register* 45-52803). This critical habitat is located along the lower American River in Sacramento. No designated critical habitat for valley elderberry longhorn beetle is located in or near the action area.

1.5.2 Critical Habitat for the California Condor

The USFWS first proposed critical habitat for the California condor on December 16, 1975 (*Federal Register* 40-58308). Final critical habitat was designated on September 22, 1977 (*Federal Register* 42-47840). No designated critical habitat for the California condor is located in or near the project area. The nearest designated critical habitat is the East Unit of the Hi Mountain-Beartrap Condor Area, approximately 7.1 miles west of the western end of the action area, where captive-raised condors were formerly released.

1.6 Consultation to Date

On September 28, 2010, Mr. Will Kohn obtained an official species list from the USFWS Sacramento Office website of all species federally listed as endangered or threatened, and species proposed or candidates for listing that could occur in the action area within Kern County; and from the Ventura Office website of all species federally listed as endangered or threatened, species proposed for such listing, or candidates for listing that could occur in the action area within San Luis Obispo County (Appendix A).

Chapter 2
Environmental Baseline

To assess the effects of an action on listed species, the Section 7 implementing regulations require an analysis of how the proposed action would affect the environmental baseline (50 CFR 402.02). The *environmental baseline* is a current measurement of the status of the listed species or their critical habitat and the status of the present environment in which the species or critical habitat exists (Sullins 2001). The environmental baseline includes the past and present impacts of all federal, state, or private actions and any other human activities, and the anticipated future effects of proposed projects that have already undergone Section 7 consultation, in the action area (50 CFR 402.02).

This chapter characterizes the environmental baseline in the action area. Section 2.1 describes the methods used to assess the present environment and the known or potential occurrences of federally listed species in the action area. Section 2.2 describes the vegetation communities and habitat types found in the action area. Section 2.3 describes the status, habitat requirements, and known or potential presence of each listed species in the action area.

Potential habitat is identified here based on vegetation communities and habitat types occurring in the action area; suitable habitat is then described based on the results of habitat assessment and focused survey efforts.

2.1 Assessment Methodology

2.1.1 Review of Existing Information

Prior to conducting field surveys, existing and readily available information was collected and reviewed to establish lists of special-status plant and wildlife species and other sensitive biological resources likely to be present in the vicinity of the action area. The key sources of data and information accessed during the prefield review are listed below:

- A search of the California Natural Diversity Database (CNDDB) for special-status plant and wildlife occurrences within 10 miles of the action area (California Natural Diversity Database 2010);
- The California Native Plant Society (CNPS) online Inventory of Rare and Endangered Plants of California (CNPS 2010);
- Special species list from the USFWS Sacramento Office website (2010) for the La Panza NE, Las Yeguas Ranch, Carneros Rocks, Belridge, Lokern, Buttonwillow, and McKittrick Summit 7.5-minute USGS quadrangles; and
- Special species list for San Luis Obispo County from the USFWS Sacramento Office website (2010).
- PG&E has an existing Operations & Maintenance Habitat Conservation Plan (O&M HCP) for the San Joaquin Valley that provides take coverage for federally and state listed species that occur

within PG&E's service area in the San Joaquin Valley. Many of these species occur within the portion of the project that occurs within Kern County. The HCP includes avoidance and minimization measures to ensure that PG&Es O&M activities are conducted consistently with state and federal endangered species regulations.

2.1.2 Vegetation and Habitat Mapping

A thorough assessment was conducted within the action area to determine the presence or absence of potential wetlands and/or waters of the United States. Several ephemeral and intermittent streams are present in the action area; however, no wetlands, as defined by the Corps, appear to be present in the action area. A formal wetland delineation that was conducted according to Corps delineation protocols under Section 404 of the Clean Water Act will be submitted to the Corps for verification.

2.1.3 Habitat Assessments and Focused Surveys

General habitat assessment surveys were conducted on February 22 and 23, 2010; March 10, 11, and 18, 2010; June 3, 2010; and August 24, 2010, to characterize wildlife habitat types and evaluate the potential for occurrence of federally listed wildlife species in the action area. The general habitat assessment surveys were conducted by wildlife biologists walking and driving the proposed project work areas (i.e., tension/pull sites, staging areas, and access roads), recording general habitat conditions, and noting habitat features associated with special-status species that could occur in the action area. Focused surveys for federally listed wildlife species were not conducted within the action area for the Proposed Action.

2.1.3.1 Listed Plant Species

The botanical survey area consisted of individual work areas where PG&E is proposing to conduct ground-disturbing activities for the proposed action . Botanical surveys of the work areas were conducted based on current California Department of Fish and Game (CDFG) guidance—*Protocols for Surveying and Evaluating Impacts to Special-Status Native Plant Populations and Natural Communities* (CDFG 2009). Surveys were conducted in all work areas as well as access roads that may be graded or improved as part of the proposed action. The surveys were floristic (i.e., all species encountered were identified to the lowest taxonomic level possible) and were conducted using systematic field techniques (i.e., transects spaced at an appropriate distance to visually survey the entire area).

The work areas are spaced unevenly along an approximately 35-mile alignment that crosses west from the San Joaquin Valley to the Carrizo Plain. In general, most of the work areas are within grassland or saltbush scrub habitats and along an elevation gradient. The work areas are small and therefore were relatively quick to survey; however, the elevation difference between the lowest point (near Buttonwillow) and the highest point (near the Kern/San Luis Obispo county line in the Temblor Range) necessitated multiple visits over an approximately 4-month period to account for the number of potentially occurring species and differences in flowering times. Generally, the lower elevation areas were surveyed in February, March, and April, and the higher elevation areas were surveyed in April and May. Additionally, known reference sites for many of the special-status plant species identified as having a high potential to occur in the area were visited by ICF International botanists to verify the flowering condition of each species at the time of the surveys.

Botanical surveys were conducted by ICF International botanists on 12 individual days between February and June in 2010 (see Table 2-1).

Table 2-1. Survey Dates, Botanists, and Areas Surveyed

Survey Dates	Botanists	General Areas Surveyed*
February 22, 23	Brad Schafer, Cristian Singer	All
March 10, 11	Cristian Singer, Seth Kirby	Low elevation
March 29, 30, 31	Rob Preston, Cristian Singer	All
April 22, 23	Rob Preston, Seth Kirby	All
May 18, 19	Rob Preston, Jessica Hughes	High elevation
June 3,	Brad Schafer	High elevation (new areas added in late May only)

*Several additional work areas were added in late May 2010 and were not surveyed until early June.

Adverse conditions, such as inadequate rainfall, often can affect survey results in the San Joaquin Valley region. Annual species in the region are often small and difficult to observe during drought years, and may sometimes not appear at all during a given year if conditions are not adequate. Rainfall in the region during the 2009–2010 season was approximately 110% of normal[1] at Bakersfield (National Weather Service 2010) and above normal within the Carrizo Plain, at the western end of the Proposed Action. Additionally, temperatures were relatively moderate very late into the spring season. These factors contributed to a large amount of vegetative growth, especially near Buttonwillow; and rare annual species such as Kern mallow (*Eremalche kernensis*) were often abundant within known populations.

2.2 Vegetation Communities and Habitat Types

The following habitats were identified and mapped within the action area: annual grassland, saltbush scrub, oak woodland, California juniper woodland, ephemeral drainage, irrigation canal, irrigated row and field crop, and disturbed. ICF International biologists mapped and described habitat types within a 1,000-foot corridor along the project route based on the California wildlife-habitat relationships classification system (WHR) (Mayer and Laudenslayer 1988).

2.2.1 Upland Vegetation and Habitat Types

2.2.1.1 Annual Grassland

Annual grassland occurs throughout the action area. This vegetation community type often occurs as an integral herbaceous understory component within other vegetation communities, such as saltbush scrub. Herbaceous canopy within stands is generally continuous and dense, to an average height of 0.5 meter. Composition and density of this community type vary widely, depending on fall temperatures and precipitation and a variety of disturbance-related events, including grazing

[1] Normal yearly rainfall at Bakersfield, California is 6.49 inches; rainfall during the 2009–2010 season was 7.18 inches.

intensity and fire frequency. Soil conditions and variations in microtopography also affect the composition of this community type.

Annual grassland within the action area is dominated by ripgut brome (*Bromus diandrus*), barley (*Hordeum murinum*), filaree species (*Erodium cicutarium*, *E. moschatum*, *E. botrys*), fiddleneck species (*Amsinckia menziesii* var. *menziesii*, *A. menziesii* var. *intermedia*), pepper-grass (*Lepidium nitidum*), Sierra tidytips (*Layia pentachaeta* ssp. *albida*), pygmy weed (*Crassula connata*), and goldfield species (*Lasthenia californica*, *L. debilis*). Additional common native plant species include blue dicks (*Dichelostemma capitata*), lupine species (*Lupinus* spp.), California mustard (*Guillenia lasiophylla*), common monolopia (*Monolopia lanceolata*), popcorn flower (*Plagiobothrys* sp.), and bracted alkali goldenbush (*Isocoma acradenia* var. *bracteosa*). Round-leaved filaree (*California macrophylla*), a CNPS List 1B.1 species (rare, threatened, or endangered in California and elsewhere), is known to occur in at least one portion of the action area.

Annual grasslands are used by a large variety of wildlife species. Amphibians in this community include western toad (*Bufo boreas*), Pacific tree frog (*Hyla regilla*), Reptiles that breed in annual grassland habitats include western fence lizard (*Sceloporus occidentalis*), coast horned lizard (*Phrynosoma coronatum frontale*), western skink (*Eumeces skiltonianus*), San Joaquin whipsnake (*Masticophis flagellum ruddocki*), gopher snake (*Pituophis catenifer*), and western rattlesnake (*Crotalus oreganus*). Mammals typically found in this habitat include California vole (*Microtus californicus*), western harvest mouse (*Reithrodontomys megalotis*), California ground squirrel (*Spermophilus beeheyi*), black-tailed jackrabbit (*Lepus californicus*), and coyote (Canis *latrans*). Western meadowlark (*Sturnella neglecta*), and horned lark (*Eremophila alpestris*) are common birds that breed in annual grasslands. Annual grasslands provide foraging habitat for red-tailed hawk (*Buteo jamaicenis*) and turkey vulture (*Cathartes aura*), whereas other species occupy annual grassland only when special habitat features such as cliffs, caves, ponds, or woody plants are available for breeding, resting, or escape cover. In addition, many species that nest or roost in adjacent woodlands may forage in grasslands, including western bluebird, western kingbird, and some species of bats. Federally listed wildlife species that could occur within the annual grassland habitat within the action area include blunt-nosed leopard lizard, giant kangaroo rat, Tipton kangaroo rat, and San Joaquin kit fox. Golden eagles and federally listed California condor also could forage in the annual grasslands in the Temblor Range.

2.2.1.2 Oak Woodland

Oak woodland occurs in a limited portion of the action area within the Temblor Range. Oak woodland in the action area is dominated by Tucker's oak (*Quercus john-tuckeri*). Tucker's oak is an evergreen shrub that reaches an average height of 6 meters. Stands typically occur on steep slopes and ridges. Canopy within stands is open and sparse to continuous and dense. Composition and density within stands are influenced by fire frequency and intensity.

Additional species observed occurring within this community type in the action area include oak gooseberry (*Ribes quercetorum*), linear-leaved goldenbush (*Ericameria linearifolia*), bush lupine (*Lupinus albifrons*), one-sided bluegrass (*Poa secunda*), common lomatium (*Lomatium utriculatum*), and California poppy (*Eschscholzia californica).* Additional common herbaceous species include lupine species, blue dicks, slender tropidocarpum (*Tropidocarpum gracile*), and fiddleneck species.

Many of the same wildlife species that occur in annual grassland habitat are found in coastal oak woodlands. Coastal oak woodlands also provide nesting and foraging habitat for many bird species.

Elderberry shrubs that provide suitable habitat for the federally listed VELB occur along an access road on the east slope of the Temblor Range in oak woodland.

2.2.1.3 Saltbush Scrub

Saltbush scrub stands occur throughout the action area but are primarily concentrated and best represented within the lower, eastern portion of the action area, east of the Temblor Range. Saltbush scrub within the action area is dominated by allscale (*Atriplex polycarpa*), an intricately branched woody perennial shrub that reaches an average height of 1 to 2 meters. Shrub canopy within stands varies from open and sparse to continuous and dense. Allscale exhibits a high tolerance for drought and some tolerance for saline conditions. Natural stand replacement is primarily via flooding events in lowland areas. Natural stand replacement in upland areas is typically via fire events.

The herbaceous understory in these stands commonly supports plant species such as ripgut brome, barley, filaree species, Arabian schismus (*Schismus arabicus*), fiddleneck species pepper-grass, and several commonly occurring native annual plant species, including Sierra tidytips, pygmy weed, goldfield species, tansy leafed phacelia (*Phacelia tanacetifolia*), and slender tropidocarpum. Kern mallow, a species federally listed as endangered and a CNPS List 1B.1 species (rare, threatened, or endangered in California and elsewhere), is known to occur in saltbush scrub habitat within portions of the action area east of the Temblor Range.

Wildlife species that use saltbush scrub habitat include coast horned lizard, San Joaquin whipsnake, California towhee (*Pipilo crissalis*), California quail (*Callipepla californica*), California thrasher (T*oxostoma redivivum*), brush rabbit (*Sylvilagus bachmani*), and coyote. Federally listed wildlife species that could occur within the saltbush scrub habitat in the action area include blunt-nosed leopard lizard, giant kangaroo rat, Tipton kangaroo rat, and San Joaquin kit fox.

2.2.1.4 California Juniper Woodland

California juniper (*Juniperus californica*) woodland occurs in a limited portion of the action area within the Temblor Range. California juniper is an evergreen shrub that reaches an average height of 4 meters. Canopy within stands is open to intermittent, often consisting of a few scattered individuals. Natural stand replacement is via seed; California juniper does not sprout after moderate to intense fire events.

Additional species observed occurring within this community type in the action area include bracted alkali goldenbush, linear-leaved goldenbush, one-sided bluegrass, fiddleneck species, common lomatium, blue dicks, slender tropidocarpum, pepper-grass, and bush lupine.

2.2.1.5 Irrigated Row and Field Crops

Irrigated row and field crop habitat consists of currently cultivated lands (i.e., row crops) and fallow fields (Mayer and Laudenslayer 1988). This habitat occurs at the eastern end of the action area. Dominant vegetation in irrigated row and field crop habitat in the action area consists of agricultural cultivars such as alfalfa, cabbage, onions, and lettuce.

Agricultural lands were established on habitat that historically supported an abundance of wildlife. The diversity of wildlife greatly diminishes when row crops are planted. The understory consists of low-growing grasses and is commonly sprayed with herbicides to prevent the growth of herbaceous vegetation. Many species of rodents and birds have adapted to agricultural lands but are controlled

by fencing, trapping, and poisoning to prevent excessive crop losses. Wildlife species associated with agricultural lands include mourning dove (*Zenaida macroura*), American crow (*Corvus branchytrhynchos*), Brewer's blackbird (*Euphagus cyanocephalus*), and many species of rodents, among others. Irrigated row and field crops do not provide suitable habitat for any federally listed plant or wildlife species, although the federally listed San Joaquin kit fox could move through agriculture lands.

2.2.1.6 Disturbed Areas

Disturbed areas, although not designated as WHR habitats, are distinct habitats within the action area. Disturbed habitats are mostly bare areas that support ruderal species whose life history enables them to quickly colonize areas that have undergone some level of disturbance, either as the result of human activity or natural events (e.g., fire).

Disturbed areas typically provide low habitat value for many wildlife species, although there are exceptions, as in the case of burrowing owls (*Athene cunicularia*). California ground squirrels often colonize disturbed areas; their burrows often provide habitat for other wildlife species. Other wildlife species that commonly use disturbed areas include mourning dove, house sparrow (*Passer domesticus*), American crow, and Brewer's blackbird. Disturbed areas do not provide suitable habitat for any federally listed plant or wildlife species, although the federally listed San Joaquin kit fox could move through disturbed areas.

2.2.2 Other Waters

2.2.2.1 Ephemeral Drainages

One named ephemeral drainage (Salt Creek) and three unnamed ephemeral drainages were identified in the action area, for a total of 0.419 acre of other waters. The drainages occur in the foothills of the Temblor Range, with two drainages draining to the Carrizo Plain and eventually into Soda Lake. Two other drainages drain east toward the Central Valley, occurring as sheet flow upon reaching the valley floor. The ephemeral drainages occurred on the Las Yeguas Ranch, McKittrick Summit, and Lokern USGS 7.5-minute topographical maps as a blueline stream. All four ephemeral drainages carry water seasonally from winter to late spring during and after rain events; and clearly defined beds and banks are indicated by sediment deposition, sediment sorting, shelving, scour, and an abrupt change in vegetative community. In addition, the drainages all occur in annual grassland habitats and have little or no vegetation in the channels. The ephemeral drainages in the action area do not provide habitat for any federally listed plants or wildlife species.

2.2.2.2 Irrigation Canals

One named irrigation canal (Eastside Canal) and six unnamed irrigation canals were identified in the action area. The Eastside Canal occurs as a named canal on the Buttonwillow USGS 7.5-minute topographical map. All of the mapped canals occur adjacent to farm land along Lokern Road or State Route (SR) 58 near Buttonwillow and are used for irrigation. These canals are well defined by a clear cut bed and bank, with little or no vegetation in the channels. The irrigation drainages in the action area do not provide habitat for any federally listed plant or wildlife species.

2.3 Listed Species

2.3.1 Kern Mallow

2.3.1.1 Status

Kern mallow is federally listed as endangered under the ESA and is a CNPS List 1B.1 species (rare, threatened, or endangered in California and elsewhere). Critical habitat for this species has not been designated.

2.3.1.2 Distribution

Kern mallow in an annual herbaceous plant known to occur within portions of Kern, Kings, San Luis Obispo, and Tulare Counties (U.S. Fish and Wildlife Service 1998).

2.3.1.3 Habitat

Typical habitat type is the herbaceous understory within saltbush scrub stands, valley sink scrub, and valley and foothill grassland on sandy clay-loam soils at elevations of 315 to 900 feet (U.S. Fish and Wildlife Service 1998).

2.3.1.4 Threats

The greatest threat to Kern mallow is the continued conversion and modification of suitable habitat due to agricultural conversion and urban development (U.S. Fish and Wildlife Service 1998).

2.3.1.5 Presence in the Action Area

Kern mallow is known to occur in saltbush scrub habitat within portions of the action area east of the Temblor Range. Specific locations where Kern mallow is known to occur in the action area include the area at and around Tower 109 and between Tower 127 and Tower 128. Although some of these locations are previously known in the action area, the results of assessment-level botanical surveys in 2010 already have resulted in discovery of increased densities within some known locations, as well as additional locations not previously known in the action area.

2.3.2 Valley Elderberry Longhorn Beetle

2.3.2.1 Status

The valley elderberry longhorn beetle is listed as threatened under the ESA. Critical habitat for this species has been designated in Sacramento, approximately 250 miles to the north of the action area.

2.3.2.2 Distribution

The distribution of valley elderberry longhorn beetle extends throughout the Central Valley and associated foothills, from the 3,000-foot contour in the Sierra Nevada foothills, across the valley floor, to the Central Valley watershed in the foothills of the Coast Ranges (U.S. Fish and Wildlife Service 2006).

2.3.2.3 Habitat

The valley elderberry longhorn beetle's life cycle is entirely dependent on its host plants—blue elderberry (*Sambucus mexicana*) and red elderberry (*Sambucus racemosa*). Red and blue elderberry both occur commonly in riparian forest patches along the Sacramento, American, and San Joaquin Rivers and their tributaries, and may also be found as isolated bushes or clumps of bushes in elderberry savannas adjacent to riparian vegetation. Elderberry shrubs usually co-occur with other woody riparian plants, including Fremont cottonwood (*Populus fremontii*), California sycamore (*Platanus racemosa*), various willows (*Salix* spp.), wild grape (*Vitis californica*), blackberry (*Rubus* spp.), and poison-oak (Collinge et al. 2001).

2.3.2.4 Threats

Threats to valley elderberry longhorn beetle include ongoing maintenance of levees and canals where elderberry shrubs occur, urban expansion, use of insecticides, and infestations of aggressive Argentine ants (*Linepthema humile*) (U.S. Fish and Wildlife Service 2006).

2.3.2.5 Presence in the Action Area

There are currently no valley elderberry longhorn beetle CNDDB records within 10 miles of the action area (California Natural Diversity Database 2010). Ten elderberry shrubs that provide potential habitat occur along the access road to Tension/Pull Site at Tower 65. There is no designated critical habitat located in the action area. The USFWS has designated critical habitat for valley elderberry longhorn beetle along the American River in Sacramento, approximately 250 miles to the north of the action area.

2.3.3 Blunt-Nosed Leopard Lizard

2.3.3.1 Status

The blunt-nosed leopard lizard is federally listed as endangered under the ESA and is state listed as endangered. Critical habitat for this species has not been designated. The blunt-nosed leopard lizard was included in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (U.S. Fish and Wildlife Service 1998). USFWS prepared a 5-year review for the status of blunt-nosed leopard lizards in 2010. USFWS concluded that the status of blunt-nosed leopard lizards continues to meet the definition of endangered because the species is in danger of extinction throughout its known range (U.S. Fish and Wildlife Service 2010a).

2.3.3.2 Distribution

Blunt-nosed leopard lizards are endemic to the San Joaquin Valley and the Carrizo Plain in California. Historically, this species was found from Stanislaus County in the north to the Tehachapi Mountains in Kern County in the south. The foothills of the Sierra Nevada and Coast Ranges roughly define the eastern and western boundaries of its distribution, except for populations on the Carrizo Plain and in the Cuyama Valley west of the San Joaquin Valley. Blunt-nosed leopard lizard occurs at elevations below 2,600 feet (U.S. Fish and Wildlife Service 2010a).

2.3.3.3 Habitat

Blunt-nosed leopard lizards are found in sparsely vegetated plains, alkali flats, grasslands, low foothills, canyon floors, and large washes. They inhabit areas with sandy soils and scattered vegetation and are usually absent from thickly vegetated habitats. On the floor of the San Joaquin Valley, they are usually found in nonnative grassland, valley sink scrub habitats, valley needlegrass grassland, alkali playa, and valley saltbush scrub. Blunt-nosed leopard lizards use small rodent burrows for shelter, predator avoidance, and behavioral thermoregulation. These burrows may be abandoned ground squirrel tunnels, or occupied or abandoned kangaroo rat tunnels (U.S. Fish and Wildlife Service 2010a).

2.3.3.4 Threats

The greatest threats to blunt-nosed leopard lizards include the continued conversion and modification of suitable habitat due to agricultural conversion and urban development. Mineral and gas/oil exploration and extraction and water banking activities also have affected significant portions of the range of blunt-nosed leopard lizards. More recently, the proposed siting of solar facilities in blunt-nosed leopard lizard habitat is a potential emerging threat with the potential to substantially affect the blunt-nosed leopard lizard (U.S. Fish and Wildlife Service 2010a).

2.3.3.5 Presence in the Action Area

Protocol surveys for blunt-nosed leopard lizards were not conducted for this project; however, ICF International wildlife biologists previously have observed blunt-nosed leopard lizards in the Lokern Preserve between Tower 109 and Tower 143. Several CNDDB (2010) records for blunt-nosed leopard lizards occur within 10 miles of the proposed action area. Many of the proposed tension/pull sites, landing zones, and areas for crossing guards between Tower 90 and Tower 138 are located within suitable habitat for blunt-nosed leopard lizards.

2.3.4 Golden Eagle

2.3.4.1 Status

Golden eagles and their nests are protected under the Bald Eagle and Golden Eagle Protection Act and under the Migratory Bird Treaty Act.

2.3.4.2 Distribution

Golden eagles are found throughout most of California except for the center portion of the Central Valley. Most commonly found in the grassland of the foothills surrounding the Central Valley

2.3.4.3 Habitat

Golden eagles typically inhabit open grassland areas in foothills surrounding the Central Valley. Golden eagle nests are commonly built on cliff ledges and in large trees in open areas. They typically forage in open grasslands, where they prey on California ground squirrels and black-tailed jackrabbits (Kochert et al. 2002).

2.3.4.4 Threats

Death from human causes account for >70% of golden eagle mortality. Of these, collision with vehicles, and aerial structures account for a majority of deaths followed by electrocution, shooting, and poisoning (Kochert er al. 2002).

2.3.4.5 Presence in the Action Area

No golden eagles were reported by the CNDDB (2010) within 10 miles of the project area. One golden eagle was observed soaring above Tension/Pull Site 013 during the 2010 field surveys. Large trees and towers occurring in or near the project area provide suitable nesting habitat for this species, and grasslands and agricultural areas provide suitable foraging habitat.

2.3.5 California Condor

2.3.5.1 Status

The California condor is federally listed as endangered under the ESA and is state listed as endangered. Critical habitat for this species has been designated. The nearest designated critical habitat is the East Unit of the Hi Mountain-Beartrap Condor Area, approximately 7.1 miles west of the western end of the action area, where captive-raised condors were formerly released. USFWS published a third revision of the *Recovery Plan for the California Condor* in 1996 (U.S. Fish and Wildlife Service 1996). The USFWS is currently in the process of preparing a 5-year review for the status of California condors.

2.3.5.2 Distribution

In the early nineteenth century, the California condor occurred in northern Baja California, northern California, Oregon, Washington, and southern British Columbia—with a few reports from Arizona, Nevada, Utah, Wyoming, Colorado, Idaho, Montana, and southern Alberta. By the mid-twentieth century, its range was confined mostly to southern California. In California, California condors historically occurred along a wishbone-shaped area encompassing 10 counties in the southern and central parts of the state—San Benito, Monterey, San Luis Obispo, Santa Barbara, Kern, Ventura, Tulare, Fresno, Kings, and Los Angeles Counties (U.S. Fish and Wildlife Service 1996).

The wild population was extirpated by mid-1987 (with the trapping of the last individuals for captive breeding). Since 1992, releases of captives have occurred in parts of California and Arizona (Snyder and Schmitt 2002). A third reintroduction area was added in 2002 in Baja California, Mexico (Arizona Department of Game and Fish 2008). Reintroduction sites in California include Big Sur in the Ventana Wilderness Sanctuary; the Sespe Condor Sanctuary; and the Los Padres National Forest in Santa Barbara, Ventura, and Kern Counties (Arizona Department of Game and Fish 2009). As of August 31, 2010 there were 188 California condors in the wild, with 96 in California, 19 in Baja California, and 73 in Arizona. (Condor Program Monthly Status Report 2010).

2.3.5.3 Habitat

California condors are cavity nesters that require caves, cliff ledges, or large trees in which to build nests. Condors also require cliffs for roosting and other California condors forage for carrion in grassland and oak savannah, as well as along the coastline of California. Cliffs, large trees, and snags

are also used for roosting. Roosting areas are often close to nest sites or foraging grounds; scattered roost sites are located through the condor's range (U.S. Fish and Wildlife Service 1996).

Condors feed primarily on the carcasses of medium- to large-sized mammals. Historically, condors fed on the carcasses of mule deer (*Odocoileus hemionus*), tule elk (*Cervus elaphus nannodes*), pronghorn (*Antilocarpa americana*), and marine carrion, including whales (*Cetacea* spp.) and California sea lions (*Zalophus californianus*) along the Pacific Coast. Domestic cattle, sheep, and horses—along with mule deer and California ground squirrel—are the predominant food sources for California condors today (U.S. Fish and Wildlife Service 1996).

2.3.5.4 Threats

Because California condors are characterized by high survival rates and low reproductive rates, they are dependent on low rates of adult mortality for population stability (Meretsky et al. 2000, Snyder and Schmitt 2002, Walters et al. 2008). Condors have a clutch size of one egg, a normal nest success rate of from 40 to 50 percent, and an age of first breeding from 6 to 8 years. Mortality in recent release efforts has been too high to develop a self-sustaining population (Meretsky et al. 2000, Snyder and Schmitt 2002). Reducing mortality factors is necessary to create a self-sustaining wild population (Snyder and Schmitt 2002).

Largely because of their size, California condors have few predators, except humans. Recent evidence from release efforts indicate that condors may occasionally be killed by golden eagles (*Aquila chrysaetos*) (Meretsky et al. 2000). Eggs and nestlings are susceptible to predation by common ravens (*Corvus corax*), golden eagles, and black bears (*Ursus americanus*) (Snyder and Schmitt 2002).

Human causes of mortality prior to the 1980s have been numerous, including strychnine poisoning due to predator-control programs; collisions with overhead wires; drowning in water tanks; and shooting for curiosity, quills, and museum collections (Snyder and Schmitt 2002). Recent evidence (since the 1980s) indicates that lead poisoning caused by ingestion of ammunition fragments in carcasses is a key factor in mortality (Snyder and Schmitt 2002). Other recent sources of mortality in released condors include collisions, drowning, golden eagle predation, anti-freeze poisoning, and feeding of micro-trash to nestlings (Snyder and Schmitt 2002, Walters et al. 2008). Collisions may be especially frequent because of the condors' attraction to human structures and developed areas (Snyder and Schmitt 2002). Although historical condor habitat, especially foraging areas, has been modified, condors do not seem to be habitat specialists and have switched to feeding on domestic livestock with the conversion of native grasslands to pasture (Snyder and Schmitt 2002). Current condor populations may be too low to be affected by low habitat availability (Snyder and Schmitt 2002).

2.3.5.5 Presence in the Action Area

The Carrizo Plain was part of the California condor's foraging range prior to the initiation of the captive breeding program. Condors subsequently have been returned to the Los Padres National Forest to the south and west of the Carrizo Plain. The Ventana Wildlife Society has been tracking the flight patterns of released condors fitted with radio transmitters. As of April 2009, there had been no recent California condor records on the Carrizo Plain. There have been no reports of injury or death of California condors resulting from collisions with the Carrizo-Midway 230 kV transmission line or any other nearby transmission lines.

The nearest designated critical habitat for California condor is the East Unit of the Hi Mountain-Beartrap Condor Area, approximately 7.1 miles west of the western end of the action area.

2.3.6 Mountain Plover

2.3.6.1 Status

Mountain plovers have been proposed for listing as threatened under the federal ESA and their nests are protected under the Migratory Bird Treaty Act.

2.3.6.2 Distribution

Mountain plovers breed in the short-grassland prairies of the high plains east of the Rocky Mountains. Mountain plovers are a winter resident in California in the San Joaquin Valley, the Carizzo Plain, and Imperial Valley. They primarily occur in California from September through February (Shuford and Gardali 2008).

2.3.6.3 Habitat

Mountain plovers are associated with short-grass prairie habitats. They prefer areas that are relatively flat and devoid of vegetation (Shuford and Gardali 2008).

2.3.6.4 Threats

Loss of winter and breeding habitat is the primary threat to this species. Conversion of grassland habitats to agricultural production that is incompatible with this species, urban development, detrimental range management practices, and oil and gas production are all contributing factors negatively affecting Mountain plovers.

2.3.6.5 Presence in the Action Area

No mountain plovers were reported by the CNDDB (2010) within 10 miles of the project area. Mountain plovers were observed between January and March 2010 by Althouse and Meade biologists during surveys conducted between November 2009 and March 2010 (Althouse and Meade 2010).

2.3.7 Giant Kangaroo Rat

2.3.7.1 Status

The giant kangaroo rat is federally listed as endangered under the ESA and is state listed as endangered. Critical habitat for this species has not been designated. The giant kangaroo rat was included in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (U.S. Fish and Wildlife Service 1998). USFWS prepared a 5-year review for the status of giant kangaroo rats in 2010. USFWS concluded that the status of giant kangaroo rats continues to meet the definition of endangered because the species in danger of extinction throughout its known range (U.S. Fish and Wildlife Service 2010b).

2.3.7.2 Distribution

Historically, the range of giant kangaroo rats extended from the base of the Tehachapi Mountains north to approximately 10 miles south of Los Baños, Merced County; in the Carrizo Plain and San Juan Creek watershed in the west; and the floor of the San Joaquin Valley to the east (U.S. Fish and Wildlife Service 2010b)

Currently, giant kangaroo rats occupy only 5 percent of their former range. The current distribution of giant kangaroo rats is fragmented into six major geographic regions: (1) the Ciervo-Panoche region in western Fresno and eastern San Benito Counties; (2) Kettleman Hills in southwestern Kings County; (3) San Juan Creek Valley in eastern San Luis Obispo County; (4) the Lokern area, Elk Hills previously known as the National Petroleum Reserve Number One (NPR-1), which includes Buena Vista and McKittrick Valleys; National Petroleum Reserve Number Two (NPR-2); and Taft and Maricopa in western Kern County; (5) the Carrizo Plain in eastern San Luis Obispo County; and (6) Cuyama Valley along the eastern Santa Barbara County-San Luis Obispo county line (U.S. Fish and Wildlife Service 2010b).

2.3.7.3 Habitat

Giant kangaroo rats inhabit annual grassland and shrub community habitats with various soil types and slopes up to 22 percent. It is believed that historical populations occupied annual grassland habitat with few or no shrubs, sandy-loam soils, and gentler slopes of approximately 10 percent or less. This change in habitat usage suggests that current populations occupy suboptimal lands in response to large-scale agricultural development of optimal grassland habitat that supported historical populations. Inhabited areas receive an average of 6–7 inches of rain and are free from flooding (U.S. Fish and Wildlife Service 2010b).

Changes in rainfall have been linked to expansions and declines in giant kangaroo rat populations. Changes in rainfall also can affect the availability of forage plant species, the development of toxic pathogentic molds, and fire fuel loads—affecting habitats inhabited by giant kangaroo rats (U.S. Fish and Wildlife Service 2010b).

2.3.7.4 Threats

Historically, the greatest threat to giant kangaroo rats was the conversion of natural habitat to agricultural lands. The amount of suitable lands that are currently being converted to agricultural use has slowed because the remaining suitable habitats are too rugged for agricultural uses. Currently, there are numerous potential threats to suitable habitat. These include development of certain large-scale renewable solar energy projects and construction of large transmission lines; potential increases in oil and gas developments in the southern portion of the species range and Kettleman Hills; increased off-road vehicle use throughout the species range, but particularly in the southern portion of the range; and urban and residential development in western Kern County. Road widening projects continue to threaten giant kangaroo rats, although these road projects currently affect less habitat area than the threats listed previously (U.S. Fish and Wildlife Service 2010b).

2.3.7.5 Presence in the Action Area

Protocol surveys for giant kangaroo rats were not conducted for this project. Several CNDDB (2010) records for giant kangaroo rat occur within 10 miles of the proposed action area. Many of the

proposed tension/pull sites, landing zones, and areas for crossing guards between Tower 73 and Tower 138 are located within suitable habitat for giant kangaroo rats. ICF International wildlife biologists observed potential giant kangaroo burrows north of Tower 75 and in the Lokern Preserve between Tower 128 and Tower 130 during habitat assessment in February and March 2010.

2.3.8 Tipton Kangaroo Rat

2.3.8.1 Status

The Tipton kangaroo rat is federally listed as endangered under the ESA and is state listed as endangered. Critical habitat for this species has not been designated. The Tipton kangaroo rat was included in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (U.S. Fish and Wildlife Service 1998). USFWS prepared a 5-year review for the status of Tipton kangaroo rats in 2010. USFWS concluded that the status of Tipton kangaroo rats continues to meet the definition of endangered because the species in danger of extinction throughout its known range (U.S. Fish and Wildlife Service 2010c).

2.3.8.2 Distribution

Historically, the geographic range of Tipton kangaroo rats was distributed on arid-land communities occupying the valley floor of the Tulare Basin. By 1985, the inhabited area had been reduced, primarily by cultivation and urbanization, to only about 4 percent of the historical acreage. Current occurrences are limited to scattered, isolated areas in Kings, Tulare, and Kern Counties (U.S. Fish and Wildlife Service 2010c).

2.3.8.3 Habitat

Tipton kangaroo rats inhabit valley saltbush scrub and valley sink scrub habitats located on the San Joaquin Valley floor. They occur on level to nearly-level terrains with alluvial fan and floodplain soils ranging from fine sands to clay-sized particles with high salinity. Although Tipton kangaroo rats occur in terrace grasslands devoid of woody shrubs, sparse to moderate shrub cover is associated with populations of high density. Densities typically are low, but populations are known to fluctuate greatly in response to climatic conditions (precipitation) and to vary across habitat type (seasonal/short-lived invasion of vegetation, particularly by non-native grasses, can exacerbate Tipton kangaroo rat declines) (U.S. Fish and Wildlife Service 2010c).

2.3.8.4 Threats

The large-sale conversion of suitable habitat for agriculture or urban development was principally responsible for the decline and endangerment of the Tipton kangaroo rat. Current threats of habitat destruction or modifications are increasing. Urban sprawl and associated human activities are currently the greatest threat to Tipton kangaroo rats (U.S. Fish and Wildlife Service 2010c).

2.3.8.5 Presence in the Action Area

Protocol surveys for Tipton kangaroo rats were not conducted for this project. There are four Tipton kangaroo rat CNDDB (2010) occurrences within 10 miles of the action area. One record is located approximately 0.70 mile south of Tower 139. The proposed tension/pull sites between Tower 138 and Tower 139 and the road crossing at Tower 162 are located within suitable habitat for Tipton kangaroo rats.

2.3.9 San Joaquin Kit Fox

2.3.9.1 Status

The San Joaquin kit fox is federally listed as endangered under the ESA and is state listed as threatened. Critical habitat for this species has not been designated. San Joaquin kit fox was included in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (U.S. Fish and Wildlife Service 1998). USFWS prepared a 5-year review for the status of the San Joaquin kit fox in 2010. USFWS concluded that the status of the San Joaquin kit fox continues to meet the definition of endangered because the species is in danger of extinction throughout its known range (U.S. Fish and Wildlife Service 2010d).

2.3.9.2 Distribution

The historical range of San Joaquin kit fox included most of the San Joaquin Valley as well as low-elevation basins and ranges along the eastern side of the central Coast Ranges. By 1930, this range had been reduced by more than half, with the largest populations occurring in the southern and western portions of the San Joaquin Valley. Today, the San Joaquin kit fox occurs in the remaining native valley and foothill grasslands and chenopod scrub communities of the valley floor and surrounding foothills, from southern Kern County north to Los Baños, Merced County. Smaller, less dense populations may be found further north and in the narrow corridor between Interstate 5 and the Interior Coast Ranges from Los Baños to Contra Costa County. The range of the San Joaquin kit fox also includes portions of Monterey, Santa Clara, and San Benito Counties and the upper Cuyama River watershed in northern Ventura and Santa Barbara and southeastern San Luis Obispo Counties (U.S. Fish and Wildlife Service 1998). Monitoring of kit fox populations has indicated that the occupied range of kit foxes is contracting and is increasingly fragmented. It is also likely that kit foxes have disappeared from areas of extant habitat within the central and northern portions of their historical range (U.S. Fish and Wildlife Service 2010d).

2.3.9.3 Habitat

The San Joaquin kit fox inhabits a variety of habitats, including grasslands; scrublands; vernal pool areas; alkali meadows and playas; and agricultural irrigated pastures, orchards, and vineyards. They prefer habitats with loose-textured soils and are primarily found in arid grasslands and open scrublands that are suitable for digging, but they occur on virtually every soil type (U.S. Fish and Wildlife Service 2010d).

Dens generally are located in open areas with grass or grass and scattered brush, and seldom occur in areas with thick brush. Preferred sites are relatively flat, well-drained terrain. They are seldom found in areas with shallow soils resulting from high water tables or impenetrable bedrock or

hardpan layers. However, kit fox may occupy soils with high clay content where they can modify burrows dug by other animals, such as ground squirrels (U.S. Fish and Wildlife Service 1998).

2.3.9.4 Threats

The greatest threats to San Joaquin kit fox and its habitat is the conversion of natural habitat to agricultural lands, infrastructure construction, and urban development. The amount of suitable lands that are currently being converted to agricultural use has slowed because the remaining suitable habitats are too rugged for agricultural uses. The proposed siting of large-scale renewable solar energy projects in core, satellite, and linkage San Joaquin kit fox habitat is a potential emerging threat to San Joaquin kit foxes (U.S. Fish and Wildlife Service 2010).

2.3.9.5 Presence in the Action Area

Protocol surveys for San Joaquin kit foxes were not conducted for this project. There are numerous San Joaquin kit fox CNDDB (2010) occurrences within 10 miles of the action area. One San Joaquin kit fox was observed just south of SR 58 in the Carrizo Plain by an ICF International wildlife biologist during the March 2010 field surveys. Suitable San Joaquin kit habitat occurs between the Solar Switching Station on the western end of the project east to Tower 38 and between Tower 72 and Tower 140.

Chapter 3
Project Description

This section identifies the specific transmission line segment that would be reconductored by PG&E, and provides an overview of the reconductoring process. It describes the basic work involved in reconductoring a transmission line, as well as specific designs (when known) for the reconductoring project (project or proposed project) which is referred to as the "proposed action".

3.1 Reconductoring

Reconductoring would occur on both circuits of the PG&E Morro Bay–Midway double-circuit 230 kV transmission line between a new 230 kV PG&E switching station (Solar Switching Station) at the point of interconnection of the Topaz Solar Farm Project and the existing Midway Substation in Kern County. The existing transmission line extends from PG&E's Morro Bay Substation in the City of Morro Bay, San Luis Obispo County, California to PG&E's Midway Substation in the City of Buttonwillow, Kern County, California. However, only the portion of the line between the solar energy projects on the Carrizo Plain and the Midway Substation would be reconductored, as shown in Figure 1a-1f. In all, approximately 35 miles of the transmission line would be reconductored, ranging in elevation from 80 feet above mean sea level (msl) (at the Midway Substation) to 3,600 feet above msl (in the Temblor Range). Figure 1a-1f shows an overview of the entire project.

The 35-mile portion of the existing transmission line proposed for reconductoring is supported by 171 lattice steel towers (LSTs), some of which would require modification or replacement to accommodate the new conductors, which are heavier and operate at a higher temperature than the existing conductors. The existing 1113 AA conductor is 1.0440 lbs/foot, and the replacement 954 ACSS conductor would be 1.2270 lbs/foot. Most of these towers are double-circuit towers, with the exception of eight single-circuit transposition towers, two single-circuit substation dead-end structures at Midway Substation, and one double-circuit tubular steel pole (TSP) at Midway Substation. The average height of existing towers is approximately 118 feet, and the average height of towers with proposed extensions would be approximately 127 feet. PG&E's right-of-way (ROW) for the existing transmission line between the Solar Switching Station and the Midway Substation varies between 75 and 128 feet wide. For approximately 6 miles extending easterly from the Topaz Solar Farm on the Carrizo Plain, the transmission line is adjacent to a ROW with a 115 kV transmission line. The wider sections of ROW within the 230 kV transmission corridor are located near transposition towers (where the positions of the conductors are changed at four separate sites along the path). The transmission line segment to be reconductored would begin at the Solar Switching Station required for interconnection of the Topaz Solar Farm to the PG&E 230 kV transmission system.

From milepost (MP) 0, the reconductored transmission line follows a path due east for 7.2 miles, passing within 325 feet of a residence at MP 0.5, crossing Soda Lake Road at MP 1.5, and east to MP 7. At MP 7.3, the transmission line turns east-southeast for 3.0 miles and crosses the Temblor Range into Kern County at MP 10.3. The line then proceeds east for 4.7 miles and northeast for 3.5 miles, crossing a number of tributaries of Salt Creek between MP 11 and MP 16. The transmission line then

turns due east for 1.2 miles, northeast for 0.4 mile, and east again for another 14.1 miles, crossing Lost Hills Road at MP 21.7, Highway 33 (West Side Highway) at MP 22.8, a petroleum pipeline at MP 27.2, the California Aqueduct at MP 29.0, SR 58 at MP 29.5, and the West Side Canal (Kern River Flood Canal) at MP 29.8. The transmission line turns northeast for 0.4 mile and then north for 0.4 mile, once again crossing SR 58 at MP 30.0 before entering Midway Substation at MP 35.0 and elevation 80 feet above msl. A detailed illustration of the route is included on Figures 1a-1f.

3.1.1 Switching Stations

3.1.1.1 Solar Switching Station (Topaz Project)

The Topaz Solar Farm would interconnect with PG&E transmission lines using a three-bay, six-position breaker and a half configuration switching station. PG&E's Switching Station, called the Solar Switching Station, would contain nine 230 kV gas-insulated circuit breakers. Two positions of this switching station would be used to connect the Topaz Solar Farm output to the switching station, and the remaining four positions would be used to loop the PG&E line through the switching station. The PG&E Solar Switching Station work area would be approximately 600 feet by 650 feet (9 acres) with a buffer zone and would be enclosed by a fence separate from the adjacent Topaz Solar Farm substation. The switching station would require additional area for the incoming and existing transmission line, and the dimensions with the transmission line would be 880 feet by 715 feet. PG&E would install night lighting at the switching station for security purposes. To interconnect the Topaz Solar Farm, both circuits of the Morro Bay–Midway 230 kV double-circuit line would be looped from the transmission corridor into the new Solar Switching Station adjacent to the transmission corridor and then back to the transmission corridor. The loop lines would be approximately 200 feet to 400 feet in length. A total of four new circuits would be constructed between the existing transmission corridor and the new switching station (two in and two out of the switching station) with two circuits per tower line. Two new double-circuit LSTs and four TSPs would be installed to accommodate the looping of PG&E's 230 kV line into the Solar Switching Station. It is expected that the two LSTs would be located within or adjacent to the existing PG&E transmission line ROW. The four TSPs would be located on either side of the new PG&E Solar Switching Station to position the transmission conductors for proper ingress and egress to the station.

3.1.1.2 Switching Station Equipment

Two short transmission line segments would be required to connect the proposed switching station to the existing Morro Bay–Midway double-circuit 230 kV transmission line. These line segments would require facility modifications on the 230 kV and potentially on the 115 kV lines, as described below.

Modifications to the existing PG&E 115 kV transmission line facilities would include the following:

- Remove two existing 115 kV towers, and
- Install two low-profile, horizontally configured towers.

Modifications to the existing Morro Bay–Midway 230 kV double-circuit transmission line facilities would include the following:

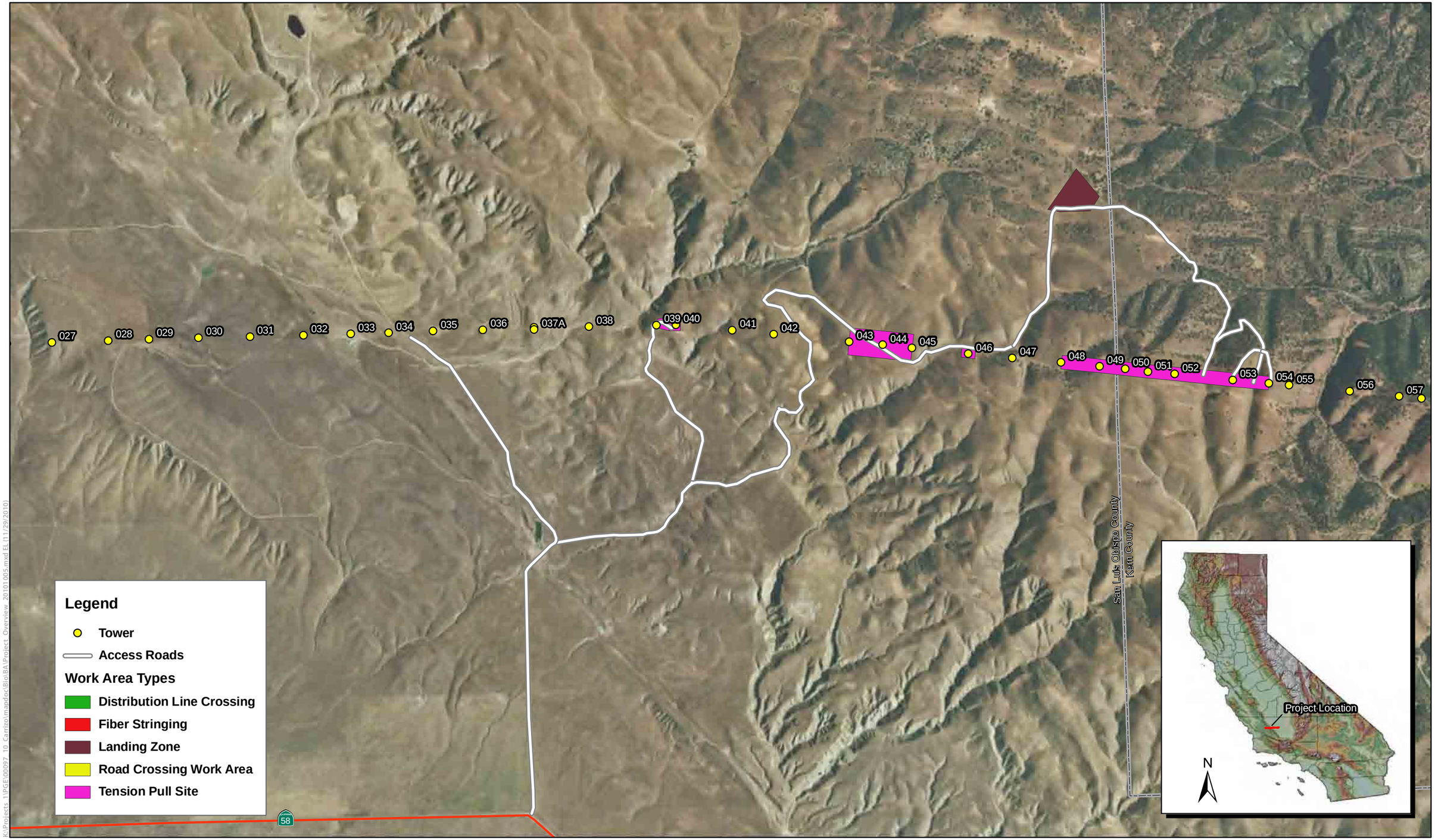
- Install two new 230 kV dead-end towers, and

ICF INTERNATIONAL

N

0 0.5 1 Miles

Figure 1a
Carrizo to Midway Reconductoring Project

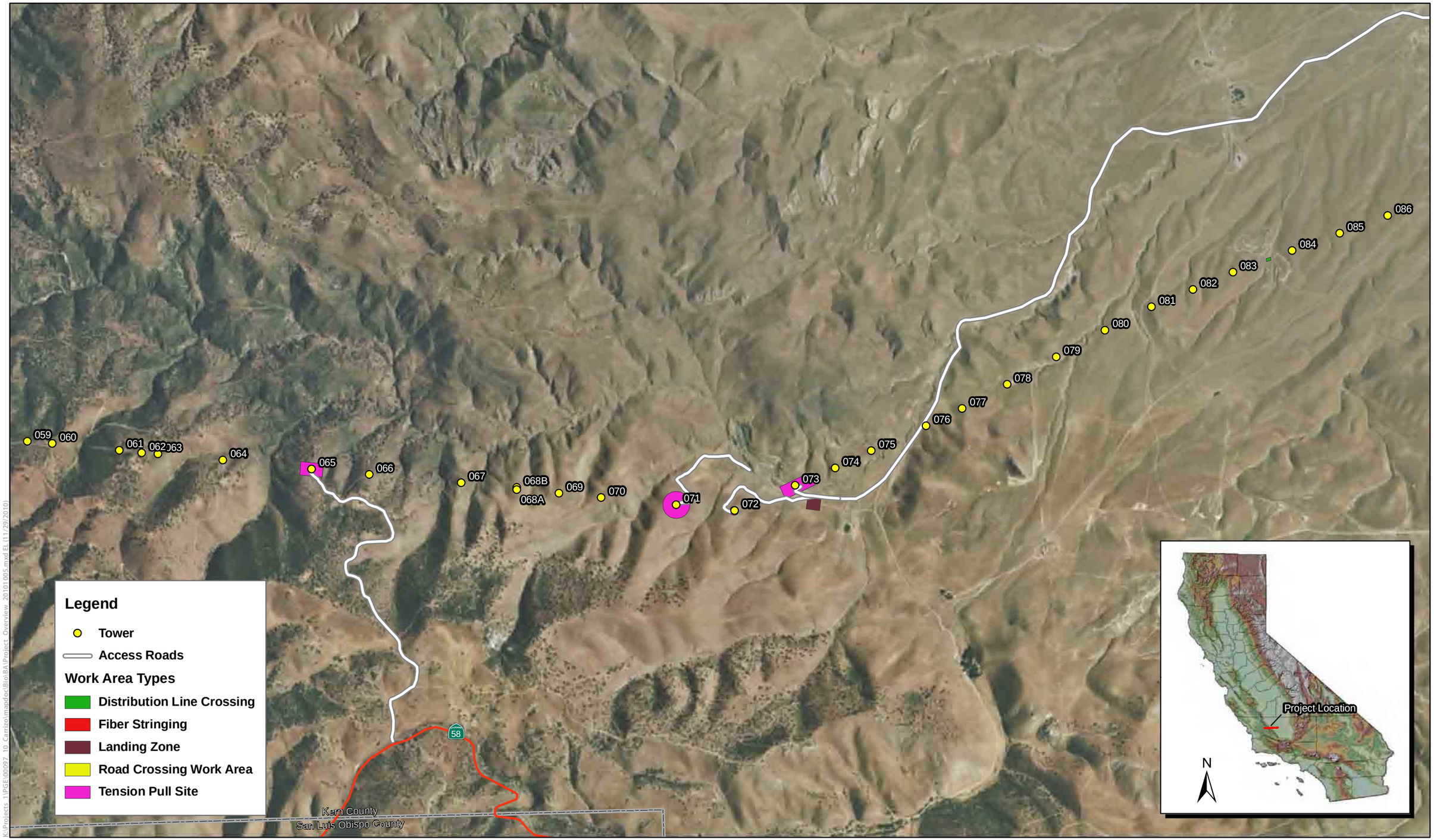


ICF INTERNATIONAL

N

0 0.5 1 Miles

Figure 1b
Carrizo to Midway Reconductoring Project



ICF INTERNATIONAL

N

0 0.5 1 Miles

Figure 1c
Carrizo to Midway Reconductoring Project

K:\Projects_11\PGE\00097_10_Carrizo\mapdoc\Bio\BA\Project_Overview_20101005.mxd EL (11/29/2010)

ICF INTERNATIONAL

N

0 0.5 1 Miles

Figure 1d
Carrizo to Midway Reconductoring Project

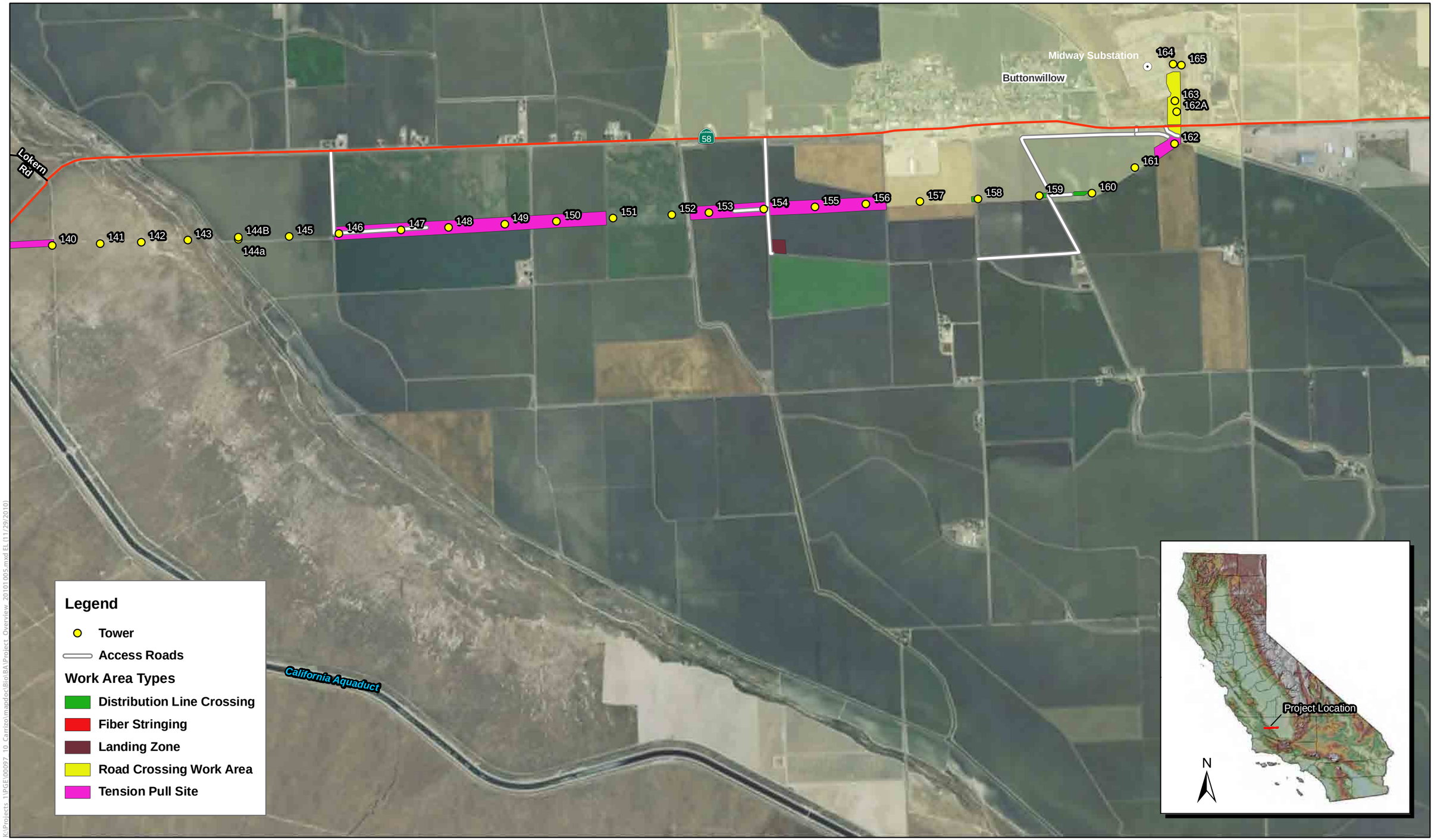
K:\Projects_11\PGE\00097_10_Carrizo\mapdoc\Bio\BA\Project_Overview_20101005.mxd EL (11/29/2010)

ICF INTERNATIONAL

N

0 0.5 1 Miles

Figure 1e
Carrizo to Midway Reconductoring Project



N

0 0.5 1 Miles

Figure 1f
Carrizo to Midway Reconductoring Project

- Remove one existing tangent lattice tower.

Construction of new 230 kV transmission line facilities would include the following:

- Install two new tangent double-circuit, steel monopole towers midway between the existing Morro Bay–Midway 230 kV transmission line and the proposed switching station (one tangent tower would be required in each line segment), and

Heights of all proposed tower modifications and new towers would be determined based on the heights of existing conductors and the need to provide clearance above ground and to any obstructions, based on the CPUC's General Order 95 and the National Electrical Safety Code. Pending detailed engineering design, the proposed towers may be up to 150 feet in height. This height would be required if it is determined that the 230 kV interconnect lines should pass over the 115 kV line located between the switching station and the 230 kV line without modifying the existing 115 kV structures.

3.1.2 Microwave Tower and Reflector

PG&E would install an approximately 175-foot-tall microwave tower at the Solar Switching site. The microwave tower would be a self supporting lattice steel structure. The microwave antennas are typically grey, but may be painted a particular undetermined color at the discretion of San Luis Obispo County and the California Public Utilities Commission.

At least one microwave reflector would be required off-site. Depending on the final locations of the switching stations, it is possible that one microwave reflector would suffice for both switching stations. However, the number and location(s) of the microwave reflector(s) would be determined based on the final location of the switching stations. The location of the microwave reflector for the Solar Switching Station is unknown at this time. The reflector would be mounted on a structure approximately 30 feet tall and would be approximately the size of a billboard. A typical microwave reflector is approximately 10 feet by 24 to 32 feet.

3.2 Land Uses along Transmission Line Right-of-Way

The area around the transmission line corridor and switching stations is primarily undeveloped along the westernmost 30 miles of the route of the Solar-Midway segment. Only two residential structures are located near the reconductoring project, the closest of which is approximately 325 feet from the ROW. Petroleum settling ponds associated with active petroleum extraction activities are located directly adjacent to and south of the ROW at MP 22 to MP 24. Active agricultural operations occur within and adjacent to the ROW. These are grazing and dry land grain cultivation operations west of MP 30.8 and irrigated crop production east of MP 30.8. Portions of the ROW have been disturbed by vegetation management practices beneath the existing transmission line, by the construction of access roads, and by ongoing maintenance activities. Between where the line crosses SR 58 near MP 30 until it enters the Midway Substation at about MP 35, the transmission line parallels SR 58 (Jeppi Road) approximately 0.3 mile to the south of the road. Between MP 31 and MP 33.4, the highway has scattered individual homes along its northern side. From MP 33.4 until it enters the Midway Substation near MP 35, the alignment is approximately 0.3 mile south of the town of Buttonwillow, which is primarily on the north side of the highway. Existing land uses along the 35-mile transmission line are shown in Table 3-1.

Table 3-1. PG&E Reconductoring Project Existing Land Uses in Action Area

Location	Jurisdiction(s)	Land Use Classifications	Specific Land Uses
MP 0.2.7	County of San Luis Obispo	Agriculture, Public Facilities and Utilities	Tracy Lane, Grazing, Dryland Grain Production, Soda Lake Road, Unnamed Drainages
MP 2.7.10.3	County of San Luis Obispo	Agriculture	Grazing, Unnamed Drainages
MP 10.3.21.7	County of Kern	Agriculture	Grazing, Salt Creek, Lost Hills Road, Petroleum Pipeline, Temblor Creek, Unnamed Drainages
MP 21.7.22.8	County of Kern, Caltrans (State Highway 33)	Agriculture, Public Facilities and Utilities	Grazing, State Highway 33, Lost Hills Road, Natural Gas Pipeline
MP 22.8 - 30.8	County of Kern, Caltrans (State Highway 58)	Agriculture, Public Facilities and Utilities	Grazing, Crop Production, State Highway 58, Petroleum Settling Ponds and Pipelines, Natural Gas Pipeline, California Aqueduct, Unnamed Drainages
MP 30.8-35.0	County of Kern, Caltrans (State Highway 58)	Agriculture, Public Facilities and Utilities	Crop Production, West Side Canal, (Kern River Flood Canal), Unnamed Canals, Elk Grove Road, Unnamed Road, Palomas Road, Buttonwillow Drive, Mirasol Avenue, Southern Pacific Railroad, State Highway 58,Midway Substation; individual residences

3.3 Construction Methods

3.3.1 Reconductoring

In general, reconductoring is accomplished by disconnecting an old conductor and using it to pull a sock line (rope) through travelers or sheave blocks (temporary pulleys) mounted on each tower, until the sock line reaches the end of the section to be reconductored. Workers climb the tower or use a helicopter to access the tower in order to place the travelers on each tower and route the old conductor through the travelers. Once in place, the sock line is then used to pull the new conductors into place. An alternative is to connect the old conductor directly to the new conductor and use it to pull the new conductor into place.

The work would involve 20-person work crews on each end of the segment being replaced. Crews would generally be equipped with large tractor/trailer units used to feed out the new line or wind in the old line on trailer-mounted spools. Two or three utility trucks carrying tools and other materials would also be employed. One crew would set up at a “pull site” near a tower at one end of the pull, and the other crew would set up a “tension site” near a tower at the other end of the pull. As a safety precaution, ground rods (copper rods, 5/8-inch in diameter and long enough to be driven to firm

ground with approximately 1 foot protruding above ground) would be installed on each end of designated pull sites prior to pulling and tensioning work and removed once work is complete. Ground rods would also be attached to any equipment used near an energized conductor. The tensioning crew would employ a tensioner truck, which carries a large drum winch that is used to put rear tension on the conductor being pulled. Each pull is generally from 1 to 5 miles in length, and each conductor is pulled separately (one phase of each circuit per pull) until all three phases of a circuit are in place. The tensioning site crew would access the tower and disconnect the old conductor. The old conductor would be attached to a sock line or directly, to the new conductor located on spools on tensioner trucks.

The pull site crew would also climb each tower or be transported to the tower arms via helicopter, disconnect the old conductors, and attach them to take up spools on trucks below the tower. Other crews would set up temporary netting structures across busy roads and other areas as needed to protect those areas in the unlikely event that a conductor breaks and falls to the ground.

Once all protective structures are in place and the pull and tension sites are ready, the pulling crew would begin to wind the old conductors onto spools mounted on trucks, thereby pulling the sock line (or new conductor) through the pulleys. The tensioning crew would keep the old conductor taut, preventing it from sagging to the ground or into other objects in the ROW. If a sock line is used, once the sock line is in place, the crews would repeat the process, winding the sock line onto a take-up reel, thereby pulling the new conductor in place. Once the new conductor is in place, it would be disconnected from the pulleys, relocated to a higher position (if a cage top tower extension was installed), and permanently mounted to the end of new insulator strings.

Generally, new conductors are pulled through 1 to 5 miles of transmission towers at a time, depending on the length of conductor on the reels, the presence of angle towers, and the availability of suitable set-up locations.

Because the work is overhead between the pull and tensions sites, the potential for ground impacts is generally nonexistent between the two sites. Therefore, this analysis focuses particularly on examining potential effects at the pulling and tensioning sites and other locations that could be disturbed by truck movement or helicopter operations. Activities between the pull and tension sites are generally restricted to (1) accessing the towers (by pickup truck to the tower then climbing, by truck-mounted aerial bucket, or by helicopter) to place pulleys, remove the old conductor, and fasten the new conductor once stringing is completed; and (2) work on the tower structure to repair or replace spars that are damaged, or to replace insulators.

Figures 1a-1f show the full range of anticipated pull and tension sites along the 230 kV corridor and Table 3-2 includes preliminary estimates of ground disturbance for the work areas. Some of the criteria used in selecting the final pull and tension sites include accessibility for vehicles; presence of a flat or nearly flat land in-line along the ROW for equipment set-up; and land use, habitat, environmental, or cultural factors that may restrict work at various locations. Pulling and tensioning would normally take place at “deadend” sites, which are towers where the transmission line is physically connected to the tower rather than merely passing through insulator clamps. In general, they are located where one spool of conductor is spliced to the next spool. Dead-end sites are generally located at angle towers (where the alignment changes direction), but also can be located at towers that are in-line with the route, such as where the conductor is spanning long distances across canyons or gorges. Dead-end towers have significant structural strength and resist the forces of pulling. Pull and tension sites could also be established in-line between standard suspension towers

where needed to limit the pulling distance or to address areas that have limited access or setup restrictions. Along the route, pull and tension sites would be located approximately 1 to 6 miles apart.

During reconductoring, work crews replace the insulator strings connected to the towers. This work involves accessing the towers by climbing, truck-mounted aerial bucket, or helicopter in order to get personnel and material to the appropriate position on the tower. For the reconductoring project, depending on terrain and work required by helicopter, approximately nine landing zones would be used. Crews would then remove the old insulator strings and install new ones. The new insulators would be delivered by aerial bucket truck and trailer or by helicopter and held in place by the aerial bucket or rigging attached to the tower. The towers would also be inspected for corrosion prior to reconductoring and, if necessary, would be repaired. Repairs can include corrosion removal by mechanical means, re-galvanizing, and repainting.

Construction equipment would mostly be refueled at landing zones or construction yards along the transmission line. Equipment may be refueled along the transmission line if necessary. This would occur at least 100 feet from drainages, with secondary containment and appropriate clean up equipment onsite in case of a spill.

Once the old conductors and insulators are removed, they would be recycled or disposed of in an appropriate landfill facility.

3.3.2 Tower Replacement

For the purposes of the biological assessment, it is assumed that 10 percent of the 171 LSTs (17 towers) would be replaced. Replacement LSTs would generally be erected within 75 feet of the original tower and would be sited to avoid sensitive resources.

As pull and tension sites are generally flexible, their locations would be selected by PG&E upon completion of the biological reconnaissance surveys and cultural resources surveys for the reconductoring project to minimize impacts to sensitive resources. Figures 1a-1f show the preliminary locations of potential tension and pull sites; however, the exact locations would be developed during detailed project engineering. Depending on the terrain and the number of angles and dead-end towers, approximately 17 pull and tension sites and three construction work areas at road crossings would be used. In addition, there would be a work area at each switching station and 6 helicopter landing zones (see Table 3-2). Some pull and tension sites may also be used as staging areas and landing zones. Towers either would be constructed and erected at the tower site using a crane or constructed offsite and transported to the site by helicopter.

The new LSTs would require the installation of new tower foundations, which are typically poured concrete piers. For each lattice structure, four holes would be drilled using a truck-or track-mounted excavator equipped with augers of various sizes depending on the diameter and depth requirements of the hole to be drilled. The final depth of each foundation pier would be determined by soil and geologic conditions and by the design requirements of the tower structure. Each foundation would extend approximately 2 feet above the ground surface for bolting the tower in place.

Drilling, rock hauling, or the use of a rock anchoring or a mini-pile system may be required if solid rock is encountered. The rock anchoring or mini-pile system would be used in areas where site access is limited and sufficient rock is available for proper rock anchoring. Such anchoring systems may also be used where economically and technically justified. In environmentally sensitive areas, a

HydroVac, which uses water pressure and a vacuum, may be used to excavate material into a storage tank. In areas where it is not possible to operate large drilling equipment due to access or environmental constraints, hand digging using compressed air tools may be required. Soil excavated for foundations dug by hand would be distributed locally. At some of these sites it may be necessary to deliver and remove equipment, material, and personnel via helicopter.

At the LST component fabrication plant, structural members would be bundled and shipped by rail or truck to the construction yards, and then trucked to the individual tower sites (if the crane method is to be used) or a central assembly yard (if the helicopter method is to be used). For towers that are to be erected using the crane method, LSTs would be assembled at laydown areas at each site, and then erected and bolted to the foundations. Tower assembly would begin with the hauling and stacking of bundles of steel at tower locations. This activity would require use of several tractors with 40-foot trailers and a rough terrain forklift. After steel is delivered and stacked, crews would proceed with assembly of leg extensions, body panels, boxed sections, and bridges. The steel work would be completed by a combined erection and torquing crew with a lattice boom crane. The construction crew may opt to install insulators and travelers at this time. Ground disturbance would generally be limited to work areas around towers to be replaced, typically 200 feet by 200 feet for individual towers and 300 feet by 300 feet for centralized laydown areas or landing zones.

A minimum 80 ton crane would be used to assemble tower sections in areas where road access is available to tower sites and impacts to biological and cultural resources would be minimal. The crane pad would be set up in-line, within approximately 100 feet to the side of the existing transmission tower.

A helicopter would be used to erect towers at tower sites inaccessible by crane due to terrain or avoidance measures for sensitive resources. Use of helicopters for installation eliminates land disturbance associated with crane pads, tower site laydown areas, and vehicle traffic from steel delivery to structure sites. All construction work in remote work sites would be completed by hand with the assistance of portable compressors, portable hydraulic accumulators, portable concrete mixers, or buckets of ready-mix concrete that would be flown into the tower sites. Remote work sites would be located on disturbed land to avoid biological or cultural impacts or to land where impacts could be reduced to a less-than-significant level with appropriate measures incorporated.

Temporary guard structures would be used if necessary to protect roadways should a non-energized line fall during reconductoring. Guard structures typically consist of two or four wooden poles and cross beams attached to the tow poles. They are generally installed in pairs with a net strung between them, but in some cases a net would not be required. A line truck would be used to auger and set the wood poles. Guard structure poles would be removed following reconductoring and the holes backfilled.

The use of helicopters for the erection of LSTs would be in accordance with PG&E specifications and would be similar to methods detailed in the Code of Safe Practices (CSP Section 11), 2002 Edition, and the PG&E Helicopter Operations Manual, which was completed by PG&E and its International Brotherhood of Electrical Workers (IBEW) Union in 2002.

The operations area of the helicopters would be limited to helicopter staging areas near construction locations (landing zones) that are considered safe locations for take-off and landing and the transmission line corridor. Final siting of helicopter fly yards and staging areas would be conducted with the input of the helicopter contractor, affected private landowners, and land management agencies. Each staging area would be a maximum of 300 feet by 300 feet.

Helicopter fueling would occur at landing zones, and offsite at an existing licensed refueling facilities or airports using the helicopter contractor's fuel truck. Fueling would be supervised by the helicopter fuel service provider, and Storm Water Pollution Prevention Plan measures would be followed, as applicable. The helicopter and fuel truck would stay overnight at a local airport or at a staging area if adequate security is in place.

3.3.3 Tower Modifications

The height of approximately every other tower (approximately 85 towers) would be raised by approximately 20 feet in order to accommodate the new conductor and simultaneously satisfy conductor ground clearance requirements. The new conductor would be about the same diameter and weight as the existing conductor, but it would operate at higher operating temperatures, which would cause it to sag more than the existing conductor. In addition, certain towers may require modification of their foundations or superstructures to accommodate the new, higher-temperature conductor as the new conductor would contain a steel core that enables higher tensioning between towers.

To strengthen tower foundations, concrete from the existing footings is broken away to expose the steel reinforcements. A new/replacement concrete footing, called a grade beam, is poured between each existing footing. Superstructures are typically strengthened by replacement, modification, or addition of pieces of steel lattice, as determined by engineering analysis specific to each tower. In a worst-case situation, a new, stronger replacement tower with new foundations would need to be installed, in-line, within approximately 50 to 75 feet of the existing tower.

One of two methods is used to raise the heights of towers, including:

- Adding "mid-cage" or base extensions to the towers, or
- Adding "cage-top" extensions to the top of the tower.

The first method requires lifting the tower at the middle of the cage. A tower lift crane is staged in-line next to the tower, and its four arms are clamped to the four outside tower support legs. The tower support legs are unbolted from the lower tower section mid-cage (below the crane attachment points), the tower is lifted, and the mid-cage extension is installed. Once the mid-cage extension is installed and secured to the lower tower section, the crane is detached, leaving the tower in its new elevated position. If a tower lift crane cannot be used, tower leg extensions can be completed at ground level using a larger crane, manual construction techniques, track style equipment, or helicopters. A level area of approximately 25 by 40 feet would be graded immediately adjacent to the tower to serve as a crane pad. Temporary wood pole support(s) (shoo-fly) would be constructed adjacent to the tower to support the conductors while the crane lifts the tower. The tower extension would then be installed, the conductors replaced, and the temporary wood pole supports removed.

The second method entails installing the new extension at the top of the tower with the use of a crane or helicopter. The cage top extension is installed on the top of the tower, above all the cross arms. For the crane method, a level area of about 25 by 40 feet would be graded immediately adjacent to the tower to serve as a crane pad. Existing conductors would be left in place. During a helicopter cage top extension installation, one 230 kV circuit would remain energized and the other de-energized, but if a crane lifts the cage top into place on the tower, both 230 kV circuits would be de-energized. Once the cage top extensions are installed on a string of towers, the conductors would

be de-energized and elevated to their new position. The new insulator strings and conductor pulleys would be installed at this time to facilitate the reconductoring activities that follow. The old tower arms and insulator strings would be removed once the conductors are relocated to their new positions.

Complete tower replacement would occur where mid-cage, base, or cage top extensions are deemed to be too difficult.

3.3.4 Access Road Modification

Existing access roads would be maintained and widened as required for construction activities. Access roads serving towers requiring modification or replacement and roads serving associated pull and tension sites, laydown areas, and landing zones would be evaluated for vegetation removal, repair, and restoration requirements. The roads would be required to be sufficiently wide to accommodate large bucket trucks and semi-truck traffic for delivery of material and large equipment (e.g., cranes, graders, and dozers). Access roads would typically be graded with a six-wheel road grader and/or a D-6 bull dozer to a standard 10-foot width, with possible 12-foot-wide sections required at sharp road angles. Federal jurisdictional waters will be avoided and PG&E would use temporary bridges to span sensitive water crossings during the wet season. Gravel would not typically be used for the road bed except to stabilize soft underlying soils.

3.3.5 Switching Stations

Construction of the Solar Switching Station and the interconnection between the existing Morro Bay–Midway 230 kV line and the new station would be undertaken by PG&E. Construction of transmission facilities would be scheduled roughly in parallel with the switching station construction to ensure adequate transmission line capacity is available when the new switching stations become active.

Construction of the loop lines would include disturbance at locations where excavation for tower and pole locations would occur and towers and poles would be installed. Wheeled vehicles for transportation of conductor spools, and line-pulling and tensioning equipment would traverse the transmission line construction area.

3.3.6 Optical Ground Wire

A new OPGW would be installed between the Solar Switching Station and Midway Substation. The OPGW is both a static line (lightning protection) and a fiber optic communication line. It would be installed along with a pure static line on the top of the towers using a small tent-like structure for mounting to the tower tops. The static wire and OPGW would be installed at the same time the new conductors would be installed on the tower line and pulled in a similar fashion. Installation of the static wire and OPGW would be finished by the completion of the reconductoring project installation.

3.3.7 Ground Disturbance

Estimated ground disturbance associated with access roads, switching stations, tension and pull sites, land zones, line and roadway crossings, and other components are preliminarily estimated in Table 3-2 below and would be finalized during final project engineering and design.

The work areas for each of the anticipated 17 pull sites would be approximately 300 feet by 300 feet (2.1 acres each, 35.7 acres total) and would be located within the ROW outside of the existing access road footprint. Each of the switching stations would require an approximately 9-acre work area, and access roads would disturb approximately 27.2 acres. Landing zones, power line and roadway crossings, and fiber optic stringing would disturb approximately 21 additional acres.

Table 3-2. Preliminary Areas of Disturbance by Work Area

Work Area	County	Dimensions & Site Description
Solar Switching Station Work Area	SLO	600 feet x 650 feet (9.0 acres)
Tension/Pull (T/P) Sites	SLO and Kern	300 feet x 300 feet (2.1 acres) each . Approximately 22 T/P sites required (9 in SLO County and 13 in Kern County; 35.7 acres total)
Landing Zones	SLO and Kern	300 feet x 300 feet work area next to PG&E warehouse (2.1 acres) in SLO County . Triangle shape layout (4.5 acres) in SLO County . 300 feet x 300 feet (2.1 acres) in Kern County . 75 feet x 200 feet (0.3 acres) in Kern County . 150 feet x150 feet (0.5 acres) in Kern County . 300 feet x 300 feet (2.1 acres) in Kern County
Access Roads	SLO and Kern	Approximately 27.2 acres total
Single Distribution Line Crossing	Kern	50 feet x 50 feet potential disturbance (0.4 acres) each . Approximately 7 separate distribution line crossings required
Two Distribution Line Crossings	Kern	100 feet x 50 feet potential disturbance (0.6 acres) . Approximately 5 separate double distribution line crossings required
Foreign Line Crossing	Kern	100 feet x 50 feet potential disturbance (0.1 acres)
Caneras-Taft 70 kV and Temblor-Kernridge 115 kV Transmission Line Crossings	Kern	100 feet x 50 feet potential disturbance (0.1 acres)
Belridge Tap 70 kV Transmission Line Crossing	Kern	75 feet x 50 feet potential disturbance (0.1 acres)
Diablo Midway #2 500 kV Transmission Line Crossing	Kern	100 feet x 50 feet potential disturbance (0.1 acres)

Work Area	County	Dimensions & Site Description
Fiber Line Stringing	Kern	1,250 feet x 30 feet (0.9 acres)
Road Crossing Work Areas	Kern	Highway 33: 75 feet x 50 feet potential disturbance (0.1 acres) . Highway 58: 50 feet x 50 feet potential disturbance (0.1 acres) . Highway 58: 7.0 acres

Source: PG&E, 2010; updated April 9, 2010.

3.4 Construction Requirements

3.4.1 Equipment and Personnel

Reconductoring work, including tower replacement and modification, would be completed primarily by PG&E employees. Some work would likely be contracted out, including helicopter and crane operations, foundation construction, specialty transport, grading and earth work. The construction activities related to this project are expected to take approximately 20 months to complete.

The maximum estimated number of personnel required for construction labor would be approximately 50 individuals. Table 3-3 summarizes required construction equipment and its intended use for construction of access roads, laydown areas, and landing zones and the replacement or removal of towers.

3.4.2 Schedule

As described above, reconductoring work, including tower replacement and modification, is expected to last approximately 20 months. According to current plans, construction would begin in August 2011 and would be substantially complete by February 2013. Construction would proceed as follows:

- **Access road modifications.** Beginning in August 2011, access roads serving towers to be modified or replaced and associated tension and pull sites, laydown areas, and landing zones would be graded and widened, as required for construction activities. Road modifications would take approximately 1 month to complete.
- **Fly yards and staging areas.** Beginning in August 2011, crews would spend several days bringing equipment and materials to staging areas within the substations or laydown area/fly yard locations. A given fly yard would be in use during work on the corresponding section of the transmission line. Helicopters would be used for both tower modification work and replacement of conductors along the line, especially in biologically-sensitive and difficult-to access areas. Populating fly yards and staging areas would take approximately 1 month.

- **Tower work.** Beginning in August 2011, tower replacement and modification would occur along the transmission line in advance of reconductoring. The duration of tower replacement and modification work would be approximately 18 months. Construction work on towers would follow multiple steps over the course of several visits to the tower site, as described chronologically below:
  - Initial evaluation and site preparation for construction,
  - Installation of required tower extensions or tower replacement,
  - Raising of existing conductor to new conductor height on the towers,
  - Installation of travelers and insulators on all towers,
  - Reconductoring of the line,
  - Removal of travelers and placement of conductors on the insulators ("clipping" the conductors), and
  - Removal of all unused arms and associated equipment below the new conductor.

Tower work would be complete by approximately February 2013.

- **Guard structures.** From June 1, 2011, to January 1, 2012, any required guard poles (with or without nets) would be placed prior to pulling and tensioning any section of line crossing a state highway or other obstacle in which guard poles and/or nets are deemed necessary. Guard poles and nets would be placed and removed during the dry season to avoid access during the wet season in biologically sensitive areas. Guard poles and nets would be removed between or April 1, 2012, and November 1, 2012.
- **Reconductoring.** Reconductoring would occur over the course of 12 months, beginning by August 2011, and would be completed in sections as towers are raised or replaced. Because the line that would be under construction is an active transmission line, the timing of pulling and tensioning would depend on load conditions and the ability to take the line out of service. This activity would be restricted to low load conditions when line clearances could be achieved and would be complete by December 2012. In some cases, one side (one circuit) of the 230 kV line may be de-energized to enable reconductoring work on that side of the corridor while the other side (second circuit) of the 230 kV line would remain energized. Some work activities may require both circuits to be de-energized. This would be scheduled with PG&E's Transmission Operations group in coordination with the CAISO.
- **Restoration.** Restoration of any temporarily disturbed areas would occur within 1 year of disturbance for all sites. For access roads modified for construction, these would be re-established with an emphasis on long-term erosion control to support long-term operations and maintenance activities. This may involve seeding roads with a native seed mix and/or installing water bars on steep slopes. Road restoration would be in compliance with the General Construction Stormwater National Pollutant Discharge Elimination System Permit. Final restoration of all temporary work sites is expected to occur no later than December 2013.
- **Switching Station.** The area used for the Solar switching station would be cleared and graded during the start of the construction period. The station will be constructed after the site preparation activities are completed. The switching station will be completed during the first year of installation, allowing the proposed solar project to begin operation as soon as the first tracker systems or solar modules are deployed and can generate solar power.

Table 3-3. Solar-Midway 230 kV Reconductoring Equipment and Intended Use

Equipment	Use
1/2-ton pickup trucks	Transport construction personnel
3/4-ton pickup trucks	Transport construction personnel
Crew-cab trucks (3/4 to 1 ton)	Transport construction personnel
Jeep vehicles	Construction and environmental inspectors
Road grader, six wheel	Site grading
Dozer with sheepsfoot	Grading/shaping and soil compaction/tensioning support
Powered road roller	Subgrade compaction
ASV mower	Vegetation clearing
Water trucks	Dust and fire control
Cranes	Tower installation and reconductoring (one at each end)
2-ton flat bed trucks	Haul materials
Flat-bed boom truck	Haul and unload materials
Dump trucks (5 to 10 ton)	Haul spoil and import materials
Construction trucks and trailers (2 to 60 ton)	Haul materials
Tiltbed and lowboy trailers	Haul equipment
Rigging truck	Haul tools and equipment
Mechanic truck	Service and repair equipment
Shop vans	Store tools
Crawler-mounted auger	Excavate foundations
D6 and D8 Bulldozer	Site grading and excavation
Puller (semi-truck and trailer)	Pull conductor wire
Tensioner (semi-truck and trailer)	Pull conductor wire
Helicopters (Bell 500 Long Ranger, Bell 205 Huey, Sikorsky Skycrane)	Tower installation/transport , cage top transport/installation, personnel and material delivery
Semi with wire reel trailer	Haul wire
Air compressor	Operate air tools
Air tampers	Compact soil around foundations
Portable generators	Power tools for tower assembly
Fuel trucks	Refuel equipment (helicopters)
Aerial lift trucks	String conductor wire
Fork Lift	Manage and assemble material at laydown area.
2 large bucket trucks	Pulling sites, insulator replacement, reconductoring
Water Truck	Dist control and compaction at grading locations.
2 standard line bucket trucks	Reconductoring activities
Fire Suppression Equipment	Laydown Areas, Landing Zones

Chapter 4
Proposed Conservation Measures

As part of PG&E's standard best management practices (BMPs), conservation measures have been incorporated into the project design that will be implemented to avoid or minimize impacts to biological resources. PG&E also has proposed the following general and resource-specific measures to minimize potential adverse effects. These conservation measures are modeled from the conservation measures identified in PG&E's San Joaquin Valley O&M HCP.

4.1 General Measures

As part of PG&E's standard construction practices, the following conservation measures will be incorporated into the project design and will be implemented to avoid or minimize the proposed action's impacts on biological resources:

- An environmental awareness education program will be conducted by a qualified biologist for construction crews prior to initiating construction of the proposed action. The program will be conducted for new crew members throughout the duration of the project. The education program will include information about potentially occurring federally listed species (i.e., Kern mallow, valley elderberry longhorn beetle, blunt-nosed leopard lizard, California condor, giant kangaroo rat, Tipton kangaroo rat, and San Joaquin kit fox), a review of conservation measures that are being implemented during project construction, and the consequences for noncompliance with environmental laws.
- A qualified biologist will monitor all ground-disturbing construction activity in sensitive areas and near designated resources within the action area. All monitors will be biologists with formal training. The resumes of all biological monitors will be submitted to USFWS for approval. The qualified biological monitor will train an individual or individuals to act as work site construction monitor(s) to assist the qualified biological monitor with overseeing remaining work at work areas after ground-disturbing activities are completed. The biological monitor will have the ability to stop or redirect work activities to ensure protection of sensitive resources and compliance with all environmental permits and conditions of the proposed action. The biological monitor will complete a daily log summarizing activities and environmental compliance, and will prepare a weekly report summarizing the monitoring activities and environmental compliance for the activities performed within the action area. This report will be submitted to the PG&E biologist. The biological monitor will also be the initial contact person for any employee who might inadvertently injure or kill a federally listed species or who finds a dead, injured, or entrapped individual. A communication protocol will be established between the biological monitor, PG&E, and the agencies. The monitor's name and number will be provided to USFWS prior to the initiation of ground-disturbing activities.
- Vehicles will be restricted to established roadways and approved access routes and staging areas within the action area. Cross-country access routes will be clearly marked in the field with appropriate flagging and signs as necessary.
- A vehicle speed limit of 15 miles per hour will be enforced on all non-public access roads.

- All vehicles will be brought into the work areas cleaned and free of weeds prior to entry.
- Staging areas will be set back at least 50 feet from streams, creeks, or other water bodies to avoid impacts on sensitive habitat. All fueling of vehicles will occur at least 100 feet from wetlands and other water bodies.
- If federally listed species are encountered during construction work, activities that could cause direct harm to the species, as determined by the biological monitor will cease until the animal is removed and relocated, or allowed to leave the work site by the USFWS-approved biologist. USFWS and CDFG will be notified within 24 hours of the encounter.
- Photographic documentation of preconstruction habitat conditions will occur at all major work areas, including staging areas, landing zones, and tension/pull sites, prior to the start of construction and immediately after construction activities are performed.
- Construction personnel will not bring firearms or pets to any project-related work areas and will not leave trash on the project site during construction.
- A litter control program will be instituted at each of the work areas. All workers will ensure that their food scraps, paper wrappers, food containers, cans, bottles, and other trash are deposited in covered or closed trash containers. The trash containers will be removed from the work areas at the end of each work day. After completion of the proposed action, all construction materials will be removed from each of the work areas.
- To prevent the inadvertent entrapment of federally listed species during the proposed action, all excavated, steep-walled holes and trenches more than 6 inches deep will be covered at the end of each work day by plywood or similar materials or escape ramps will be installed. In situations where the trenches or holes cannot be covered, earthen escape ramps will be dug into the sides of trenches. All holes and trenches will be thoroughly inspected at the start of each workday for trapped animals before they are filled. If at any time a trapped listed animal is discovered, escape ramps or other appropriate structures will be placed to allow the animal to escape. USFWS will be notified of the incident by telephone and electronic mail within 1 working day.
- A set of BMPs will be developed to control erosion during construction and will be detailed in the project-specific Storm Water Pollution Prevention Plan (SWPPP). All temporarily disturbed areas will be restored as necessary. A project-specific Restoration Plan detailing specific revegetation plans, monitoring guidelines, and success criteria, will be developed as part of the Habitat Mitigation Plan (see below). Together, the SWPPP and Restoration Plan will facilitate the restoration of construction areas and will contain information on site-specific implementation plans.
- Temporary construction disturbances and other types of project-related disturbances to federally listed species will be minimized to the maximum extent practicable and confined to designated work areas. To minimize temporary disturbances, all sensitive habitats will be delineated with highly visible flagging or fencing in order to prevent encroachment of construction personnel and equipment during work activities. At no time will equipment or personnel be allowed to adversely affect areas outside of project work areas, staging areas, or landing zones without authorization from USFWS.
- PG&E will prepare a Habitat Mitigation Plan, which will contain mitigation plans for listed species (Kern mallow, blunt-nosed leopard lizard, giant kangaroo rat, Tipton kangaroo rat, and San Joaquin kit fox) as well as a restoration plan for sensitive habitats. The purpose of the

Habitat Mitigation Plan will be to provide more detailed information on those measures that will result in the restoration of areas temporarily affected by the proposed action. The Habitat Mitigation Plan will be submitted to USFWS for review prior to the start of construction. The purpose of the Habitat Mitigation Plan is to provide more detailed information on the measures that PG&E will implement to restore areas temporarily affected by the proposed project. The Habitat Mitigation Plan will include how restoration at the work areas will be completed and will include success criteria to ensure that restoration of the work areas is successful.

4.2 Kern Mallow

The following conservation measures are proposed as part of the proposed action to directly or indirectly minimize or eliminate potential adverse effects specific to Kern mallow associated with direct or indirect effects of the proposed action.

- To the extent feasible, areas providing suitable habitat for Kern mallow will be avoided. During the habitat assessment, biologists identified certain tension/pull site and landing zones that PG&E proposed that were in areas with substantial populations of Kern mallow. Biologists recommended that these work areas be moved to areas without known populations of Kern mallow. As a result, PG&E agreed to move these tension/pull sites and landing zones to areas without known populations of Kern mallow.
- Some of the work areas were not previously surveyed for the presence of Kern mallow. Surveys for the presence of Kern mallow, according to the most recent agency protocols, will be conducted prior to any construction activities occurring in work areas that were not previously surveyed for Kern mallow. Global positioning system (GPS) coordinates will be taken of newly discovered populations within work areas.
- If populations of Kern mallow are located within work areas, these populations will be avoided to the greatest extent feasible. Populations that can be avoided will be flagged for avoidance prior to the start of construction and a biological monitor will be present to ensure compliance with off-limit areas. Indirect impacts to Kern mallow populations will be minimized by creation of a buffer zone around known populations. The buffer zone will be determined by a qualified biologist in consultation with the USFWS and will be of sufficient size to eliminate potential disturbance that may negatively affect the population. The buffer zone will depend on the proposed action on immediate adjacent lands and will include consideration of the plants' ecological requirements.
- If habitat occupied by Kern mallow will be temporarily impacted, the upper 4 inches of topsoil will be stockpiled separately during excavations or scraping, so that it can be used to re-seed the affected areas during restoration according to the Habitat Mitigation Plan.

4.3 Valley Elderberry Longhorn Beetle

The following conservation measures are proposed as part of the proposed action to directly or indirectly minimize or eliminate potential adverse effects associated with direct or indirect effects specific to VELB.

Direct impacts on VELB will be avoided by PG&E ensuring that no road improvement activities occur within 20 feet of the elderberry shrubs. Suitable habitat is considered all elderberry stems larger than 1 inch in diameter when measured at ground-level. Improvements to the access road where the elderberry shrubs were observed will be designed or selected such that elderberry shrubs are avoided whenever possible.

- A qualified biologist will survey for the presence of elderberry plants within 20 feet of the work area and will flag all elderberry shrubs with stems measuring 1 inch or greater in the vicinity of the access route to Tension/Pull Site at Tower 65;
- Orange fencing will be erected at least 20 feet from the shrubs to ensure that no road improvement activities occur within 20 feet of the shrubs;
- Field workers will be briefed on the location of elderberry plants in or near the work area and will review appropriate avoidance, protection, and minimization measures outlined in USFWS' Conservation Guidelines for Valley Elderberry Longhorn Beetle (1999);
- Ground disturbing activities will include erosion control measures that prevent soil from leaving the work area or encroaching on an elderberry shrub;
- PG&E will utilize a water truck to spray the access road during vehicle travel to keep fugitive dust to a minimum.

4.4 Blunt-Nosed Leopard Lizard

The following conservation measures are proposed as part of the proposed action to directly or indirectly minimize or eliminate potential adverse effects specific to blunt-nosed leopard lizards associated with direct or indirect effects of the proposed action.

- To the extent feasible, areas providing suitable habitat for blunt-nosed leopard lizard will be avoided. During the habitat assessment, biologists identified certain work areas for tension/pull sites and landing zones that PG&E proposed that were in areas that could significantly affect blunt-nosed leopard lizards because (1) the lizards are known to occur in the work areas based on previous observations or CNDDB records; (2) the large number of burrows occurring within the proposed work areas; and (3) the relatively high density of the shrubs would have made it extremely difficult to see all of the burrows. Biologists recommended that these work areas be moved. As a result, PG&E agreed to move these tension/pull sites and landing zones to areas with significantly fewer burrows and less dense shrubs, thus allowing for greater avoidance of burrows.
- Prior to any ground disturbing activities occurring within suitable habitat, protocol blunt-nosed leopard surveys will occur in those work areas. The work areas that occur within suitable blunt-nosed leopard habitat will be fenced using material that blunt-nosed leopard lizards cannot climb immediately following the protocol surveys. The protocol surveys (involving 17 separate surveys) will be conducted to determine whether blunt-nosed leopard lizards occur within the fenced area. If blunt-nosed leopard lizards do occur, these active burrows will be avoided by a 50-foot buffer. If necessary, a CDFG or USFWS representative will be contacted so that the lizards may be passively relocated.
- When construction vehicles must travel off existing access roads located within suitable habitat, a qualified biologist will walk ahead of the vehicles and identify a route for the vehicles to follow

that will avoid burrows to the greatest extent practicable. To avoid direct mortality of blunt nosed leopard lizards when working in suitable habitat, plywood boards will be placed to cover suitable burrows that occur along the vehicle access routes. These boards will be removed immediately after the construction vehicles have driven over them. To the greatest extent possible, the construction vehicles will avoid parking on burrows.

- If guard crossing poles need to be established within suitable blunt-nosed leopard lizard habitat, a biologist will work with construction crews to ensure that the poles are sited to avoid burrows. When removal of shrubs is necessary to allow vehicle access, it is recommended that the shrubs be removed by hand.
- Surface-disturbing activities will be designed to minimize or eliminate effects to rodent burrows that may provide suitable hibernating and aestivation habitat. Areas with a high concentration of burrows will be avoided by surface-disturbing activities to the maximum extent practicable. In addition, when a concentration of burrows is present in a project site, the area will be staked or flagged to ensure that work crews are aware of their location and to facilitate avoidance of the area.
- A preconstruction survey will be conducted each day immediately preceding construction activity that occurs in designated blunt-nosed leopard lizard habitat or in advance of any activity that may result in take of this species. Vehicles will be inspected each morning before they are moved.
- All suitable habitat for blunt-nosed leopard lizard that is temporarily affected by project-related activities will be restored to pre-project conditions. Site-specific restoration measures and success criteria will be outlined in the Restoration Plan, which will be part of the overall Habitat Mitigation Plan developed for the project.

4.5 California Condor and Golden Eagle

The following conservation measures are proposed as part of the proposed action to directly or indirectly minimize or eliminate potential adverse direct or indirect effects of the proposed action specific to California condors and golden eagles.

- All transmission and sub-transmission towers and poles will be designed to be raptor-safe in accordance with PG&E's Avian Protection Plan (PG&E 2007). This will include:
  - Increasing separation of cables to achieve adequate distance for the California condor,
  - Covering energized parts and/or covering grounded parts with materials appropriate for providing incidental contact protection for birds, and
  - Install perch guards on distribution line poles to discourage raptors from perching on the poles.
- All fuels, fluids, and components with hazardous materials/wastes will be handled in accordance with applicable regulations. All such materials will be kept in segregated storage with secondary containment as necessary. Records of storage and inspection will be maintained and will provide for proper offsite disposal. Hazardous materials will be stored in a neat, orderly manner in their appropriate containers in an enclosed and secured location such as portable outdoor hazardous materials storage cabinets equipped with secondary containment to prevent

contact with rainwater. The portable hazardous materials storage cabinets may be moved with each block of development, as deemed necessary.

- Project personnel shall collect all litter, small artificial items, and food waste from the action area on a regular basis.

4.6 Giant Kangaroo Rat and Tipton Kangaroo Rat

The following conservation measures are proposed as part of the proposed action to directly or indirectly minimize or eliminate potential adverse effects specific to giant kangaroo rats and Tipton kangaroo rats.

- To the extent feasible, areas providing suitable habitat for giant kangaroo rat and Tipton kangaroo rat will be avoided. During the habitat assessment, biologists identified certain tension/pull sites and landing zones that PG&E proposed that were in areas that could significantly affect giant kangaroo rats and Tipton kangaroo rats because (1) the kangaroo rats are known to occur or have a high probability of occurring in the work areas based on previous observations and CNDDB records; (2) the large number of burrows occurring within the proposed work areas; and (3) the relatively high density of the shrubs would have made it extremely difficult to see all suitable burrows. Biologists recommended that these work areas be moved. As a result, PG&E agreed to move these tension/pull sites and landing zones to areas with significantly fewer burrows and much less dense shrubs, thus allowing for greater avoidance of burrows.
- When construction vehicles must travel off existing access roads within suitable habitat, a qualified biologist will walk ahead and identify a route for the vehicles to follow that will avoid burrows to the greatest extent practicable. To minimize direct mortality to giant kangaroo rats and Tipton kangaroo rats when working in suitable habitat, plywood boards will be placed to cover suitable burrows that occur along the vehicle access routes. These boards will be removed immediately after the construction vehicles have driven over them. To the greatest extent possible, the construction vehicles will avoid parking on burrows.
- If guard crossing poles need to be established within suitable giant kangaroo rat or tipton kangaroo rat habitat, a biologist will work with construction crews to ensure that the poles are sited to avoid burrows. When removal of shrubs is necessary to allow vehicle access, it is recommended that the shrubs be removed by hand.
- If occupied or potentially occupied burrows cannot be avoided, a qualified biologist will stake and flag a work-exclusion zone of at least 30 feet around active burrows prior to covered activities at the job site and remain onsite as a biological monitor. If work must proceed in the exclusion zone, PG&E will pursue techniques to minimize direct mortality. These will include having approved biologists, holding a current ESA 10(a)(1)(A) handling permit for giant kangaroo rats and/or Tipton kangaroo rats, trap and hold species in captivity, and excavating and closing burrows. The trapping and removal of giant kangaroo rats and Tipton kangaroo rats will occur prior to any ground disturbing activities in suitable habitat. In areas that are temporarily disturbed, the approved biologist will release the mammals to areas where they were trapped as soon as possible when the work is complete and habitat is restored.

4.7 San Joaquin Kit Fox

The following conservation measures are proposed as part of the proposed action to directly or indirectly minimize or eliminate potential adverse direct or indirect effects of the proposed action specific to San Joaquin kit fox.

- A qualified biologist(s) will conduct preconstruction den surveys no more than 14 days prior to the initiation of work activities in a given area, to ensure that potential kit fox dens are not disrupted by work activities. If potential dens are located within the survey area, the entrance of the dens will be monitored for 3 consecutive nights with tracking medium or an infrared-beamed remote camera prior to the initiation of work activities to determine the status of the potential dens. If San Joaquin kit fox activity is observed at the den during this period, the den will be monitored for at least 5 consecutive days from the time of the observation to allow any resident kit fox to move to another den during its normal activity. Use of the den can be discouraged during this period by partially plugging its entrance(s) with soil in such a manner that any resident animals can escape easily. Only when the den is determined to be unoccupied may the den be excavated under the direction of a qualified biologist. If the animal is still present after 5 or more consecutive days of monitoring, the den may be excavated when, in the judgment of the qualified biologist, it is temporarily vacant (i.e., during the animal's normal foraging activities). USFWS and CDFG encourage hand excavation, but realize that soil conditions may necessitate the use of excavating equipment. Extreme caution will be exercised under these circumstances. Destruction of the den will be accomplished by careful excavation until it is certain that no San Joaquin kit fox or other animals are present. The den will be fully excavated, filled with dirt, and compacted to ensure that kit foxes cannot reenter or use the den during construction period. If at any point during the excavation a San Joaquin kit fox is discovered inside the den, the excavation will cease immediately and monitoring of the den described above will be resumed. Destruction of the den may be completed when, in the judgment of a qualified biologist, the animal has escaped from the partially destroyed den.
- Should it be determined that a den site within a work area is a natal den, destruction of the den will not be permitted until the pups and adults have vacated and then only after consultation with USFWS and CDFG. Project activities at the location of the natal den will be postponed to avoid disturbance.
- Exclusion zones will be established around suitable dens and construction activities will be greatly restricted within these exclusion zones. The radius of these zones will follow current standards or will be as follows:
- Potential den – 50 feet
- Known den – 100 feet
- Natal/pupping den – to be determined on a case-by-case basis in coordination with USFWS and CDFG
- Atypical den – 50 feet
- San Joaquin kit foxes are attracted to den-like structure such as pipes and may enter stored pipe, becoming trapped or injured. All pipes, culverts, or similar structures with a diameter of 4 inches or greater that are stored near the work areas for 1 or more overnight periods must be thoroughly inspected for kit foxes before the structure is subsequently buried, capped, or otherwise moved in any way. If a kit fox is discovered inside a pipe, that section of pipe will not

be moved until USFWS has been consulted by phone. If necessary, and under direct supervision of a USFWS-approved biologist, the pipe may be moved once to remove it from the path of repair activity, until the fox has escaped.

- All trenches will be covered at the end of each work day, or escape ramps will be installed in the trench at regular intervals to allow San Joaquin kit fox and other animals that fall in the trench means of escape.
- PG&E will restore all areas identified as San Joaquin kit fox habitat that are temporarily disturbed by work activities to pre-project conditions within 12 to 18 months of completion of the proposed action, according to pre-defined vegetative success criteria. Success criteria and the methods used to attain them will be outlined as part of the Habitat Mitigation Plan.

4.8 Compensation

Although PG&E will avoid and minimize effects to the extent practicable, some take of habitat is likely to result from project-related activities. To reduce potential impacts on sensitive habitats and species, PG&E will fund the acquisition, enhancement, and maintenance of habitat to conserve and promote the recovery of sensitive species within the action area. The approach to compensation, determination of compensation needs, compensation mechanisms, and attributes and management of compensation land are discussed below.

4.8.1 Compensatory Conservation Strategy

The primary goal of the proposed project's conservation strategy is to ensure that the proposed project has no net adverse effect to populations of the federally listed species that will be potentially affected by the proposed project. This goal will be accomplished through the following:

- PG&E will focus on acquiring habitat in the northern Carrizo Plain for temporary and permanent impacts to habitat for giant kangaroo rat, and San Joaquin kit fox that occur in San Luis Obispo County. This may be done in conjunction with First Solar who is also proposing to acquiring habitat in the northern Carrizo Plain to compensate for impacts associated with their solar project.
- PG&E will focus on purchasing credits at a suitable bank in western Kern County for temporary impacts to suitable habitat for Kern mallow, blunt-nosed leopard lizard, giant kangaroo rat, Tipton kangaroo rat, and San Joaquin kit fox. If a bank is not available, PG&E will contribute monies for habitat restoration and preservation to the Center for Land Management or other conservation entity. The amount that will be given will be determined through consultation with the USFWS and CDFG.

Preactivity surveys will verify the suitable habitat assumptions made in this biological assessment at each of the work areas. Post-construction surveys will be conducted to determine the actual area of disturbances that occurred at each of the work areas. Compensation will be based on these post-construction acreages. All temporary losses of suitable habitat will be mitigated at a 0.5:1 ratio. The compensation for impacts to multiple species can be done simultaneously as long as those lands support all those species.

Prior to the initiation of the proposed project activities, PG&E will provide an irrevocable letter of credit, in a form approved by USFWS and CDFG , to ensure funding for the performance of all

required mitigation, including site preparation, re-vegetation, restoration, and enhancement activities, maintenance activities (e.g., mulching, weeding, and watering), monitoring and reporting activities, and long-term management.

Chapter 5
Analysis of Effects

5.1 Kern Mallow

5.1.1 Direct Effects

Planned construction activities in staging areas, pull sites, and temporary access roads are anticipated to temporarily affect 0.11 acre of suitable habitat for Kern mallow in Kern County.

Direct effects to populations of Kern mallow are anticipated on those work areas where populations are known to occur and could occur if individuals are present in work areas not yet surveyed. Individual Kern mallow plants could be lost due to trampling or earth moving. Construction activities could result in removal or modification of Kern mallow seed banks through grubbing and clearing of work sites. Increase of fugitive dust during construction due to movement of vehicles in work areas and on access roads could reduce survivorship and productivity of individual plants close to dust sources by decreasing photosynthetic output, reducing transpiration, and adversely affecting reproductive success.

Conservation measures described in Chapter 4 will be implemented to avoid and minimize direct effects on populations of Kern mallow and compensate for temporary impacts to suitable Kern mallow habitat.

5.1.2 Indirect Effects

Noxious weeds could be spread within the project work areas if construction equipment is contaminated with noxious weed seeds. Noxious weeds could adversely affect populations of Kern mallow by increased competition for soil nutrients, competition for growing space, and decreasing photosynthetic output.

Soil compaction, erosion, and sedimentation resulting from construction activities may indirectly affect populations of Kern mallow by altering soil conditions and then what are the effects on Kern mallow due to alteration of soil conditions.

5.2 Valley Elderberry Longhorn Beetle

5.2.1 Direct Effects

Road improvements on the access Tower 65 could directly impact elderberry shrubs by smothering shrubs with soil that is pushed down-slope from the access road which in turn could adversely affect valley elderberry longhorn beetle. Direct effects to valley elderberry longhorn beetle could occur if these shrubs were lost or greatly stressed due to construction activities. All of the conservation measures described in Chapter 4 will be implemented to avoid and minimize direct effects on valley

elderberry longhorn beetle. PG&E will ensure that no road improvements occur within 20 feet of the elderberry shrubs to avoid any direct impacts to the elderberry shrubs.

5.2.2 Indirect Effects

Indirect effects to valley elderberry longhorn beetle could result from increased fugitive dust during and changes in hydrology due to movement of vehicles on the access roads. Fugitive dust could reduce survivorship and productivity of the elderberry shrubs by decreasing photosynthetic output, reducing transpiration, which could affect the health of the shrub and may lead to the death of the shrub. This in turn could directly affect valley elderberry longhorn beetle. PG&E will utilize a water truck to spray the access road during travel on the access road to keep the fugitive dust to a minimum.

5.3 Blunt-Nosed Leopard Lizard

5.3.1 Direct Effects

Planned construction activities in staging areas, pull sites, and temporary access roads are anticipated to temporarily affect 20.15 acres of suitable habitat for blunt-nosed leopard lizards in Kern County and temporarily affect 4.12 acres of suitable habitat in San Luis Obispo County.

Direct effects will include injury or mortality if blunt-nosed leopard lizards are hit by construction equipment or vehicles. Blunt-nosed leopard lizards are more likely to be hit by vehicles or construction equipment when weather is cool, causing blunt-nosed leopard lizards to be less active because of low body temperature.

Direct mortality could result by entombment of blunt-nosed leopard lizards in burrows that may collapse during construction activity.

Installation of buried power and communication cables in suitable habitat could directly affect blunt-nosed leopard lizards by creating impassable barriers between burrows and foraging areas. Additionally, blunt-nosed leopard lizards could fall into deep, steep-walled trenches and not be able to escape. The lizards would be vulnerable to predation, starvation, or entombment.

All of the conservation measures described in Chapter 4 will be implemented to avoid and minimize direct effects on blunt-nosed leopard lizards and compensate for potential temporary impacts to suitable blunt-nosed leopard lizard habitat.

5.3.2 Indirect Effects

Potential indirect temporary habitat loss or degradation could result from habitat disturbances that increase the likelihood of colonization by invasive weeds. Blunt-nosed leopard lizards need open areas in which to bask, move, and catch prey. Invasive weeds often out-compete with native plants and can establish themselves in open areas. These open areas can become over-run with invasive plants, which make the movement of blunt-nosed leopard lizards and the ability to catch prey much more difficult Implementation of conservation measures to discourage the introduction of weeds would reduce the potential of invasive weeds colonizing suitable blunt-nosed leopard lizard habitat.

Blunt-nosed leopard lizards may be passively displaced from work sites and adjacent occupied habitat by human activity and noise associated with construction activities. Such temporary displacement could be considered take by harassment under the federal ESA.

5.4 California Condor and Golden Eagle

5.4.1 Direct Effects

Construction activities associated with the project are expected to temporarily directly affect foraging habitat for California condor and golden eagle, although the amount of foraging habitat that will be affected is small compared to the amount of foraging habitat that is available in the Carrizo Plain (roughly 20 acres of compared to 1,000s of acres of suitable foraging habitat). The project entails reconductoring of an existing power line that has existed as part of the landscape for approximately 50 years. The new reconductor will not change the location of this line nor will it change the configuration of the line. All of the conservation measures described in Chapter 4 will be implemented to avoid and minimize direct effects to individual California condors and golden eagles.

5.4.2 Indirect Effects

Project construction activities could potentially introduce microtrash (i.e. glass, plastic trash, and small pieces of metal). Condors are very inquisitive birds and have been known to collect microtrash. This waste is either ingested or brought back to nest sites where young condors ingest the material. This can lead to mortality of adults and young birds in the nest. Additionally, vehicle use and maintenance can result in the spill of toxic fluids. Ingestion of toxic fluids by condors and golden eagles can result in death. The potential for these impacts will be avoided or minimized with implementation of conservation measures indentified in Chapter 4 that are incorporated into the project.

5.5 Mountain Plover

5.5.1 Direct Effects

Construction activities associated with the project are expected to temporarily directly affect foraging habitat for mountain plovers, although the amount of foraging habitat that will be affected is small compared to the amount of foraging habitat that is available in the Carrizo Plain (roughly 20 acres of compared to 1,000s of acres of wintering habitat). Construction activities will not affect nesting mountain plovers because mountain plovers do not nest in California,

5.5.2 Indirect Effects

No indirect effects to mountain plovers will occur as a result of the project.

5.6 Giant Kangaroo Rat and Tipton Kangaroo Rat

5.6.1 Direct Effects

Planned construction activities in staging areas, pull sites, and temporary access roads within the action area are anticipated to temporarily affect 17.48 acres of suitable giant kangaroo rat habitat in Kern County and temporarily affect 4.12 acres of suitable habitat in San Luis Obispo County.

Planned construction activities in staging areas, pull sites, and temporary access roads are anticipated to temporarily affect 0.22 acres of suitable Tipton kangaroo rat habitat in Kern County.

In giant kangaroo rat precincts or Tipton kangaroo rat burrow complexes that will be impacted to the extent that mortality of individuals will occur, individuals will be trapped and kept to be released once construction activities have been completed and habitat restored. There is potential for injury or mortality of individuals during this process.

Direct effects will include injury or mortality if giant kangaroo rats or Tipton kangaroo rats are hit by construction equipment or vehicles. The extent to which giant kangaroo rats and Tipton kangaroo rats are susceptible to vehicular strikes is dependent on the extent of nighttime construction. More frequent nighttime construction activities in suitable giant kangaroo rat and Tipton kangaroo rat habitat could result in greater potential direct take of giant kangaroo rats and Tipton kangaroo rats by running them over with construction equipment and personal vehicles traveling to and from the work areas.

Direct mortality could result by entombment of giant kangaroo rats or Tipton kangaroo rats in burrows that may collapse during construction activity.

Vehicles and construction equipment could damage vegetation and degrade food resources.

Installation of buried power and communication cables in suitable habitat could directly affect giant kangaroo rat or Tipton kangaroo rats by creating impassable barriers between burrows and foraging areas within the action area. Additionally, giant kangaroo rats or Tipton kangaroo rats could fall into deep, steep-walled trenches and not be able to escape. The kangaroo rats would be vulnerable to predation, starvation, or entombment.

All of the conservation measures described in Chapter 4 will be implemented to avoid and minimize direct effects on giant kangaroo rats and Tipton kangaroo rats and compensate for permanent and temporary impacts to suitable giant kangaroo rat habitat and temporary impacts to suitable Tipton kangaroo rat habitat.

5.6.2 Indirect Effects

Giant kangaroo rats or Tipton kangaroo rats displaced from the action area due to disturbance-related construction activities may increase competition for prey and living spaces with kangaroo rats in other areas.

There is potential for increased predation of giant kangaroo rats or Tipton kangaroo rats by red foxes, coyotes, or domestic dogs that might be attracted to food scraps and other trash discarded within the work areas by construction personnel.

The use of pesticides or rodenticides to control noxious weeds or rodents within work areas could result in poisoning giant kangaroo rats or Tipton kangaroo rats.

Spills or leaks of vehicle fluids, lubricants, or other toxic fluids could result in poisoning of giant kangaroo rats or Tipton kangaroo rats, their seed base, or their habitat.

5.7 San Joaquin Kit Fox

5.7.1 Direct Effects

Planned construction activities in staging areas, pull sites, and temporary access roads are anticipated to temporarily affect 20.15 acres of suitable San Joaquin kit fox habitat in Kern County and temporarily affect 4.12 acres of suitable habitat in San Luis Obispo County within the action area.

Direct effects will include injury or mortality if San Joaquin kit foxes are hit by construction equipment or vehicles. The extent to which San Joaquin kit foxes are susceptible to vehicular strikes depends on the extent of nighttime construction.

Construction activities could result in disturbance of active dens close to work areas or destruction of active dens within work areas.

San Joaquin kit foxes could fall into deep, steep-walled trenches dug for the installation of buried power and communication cables and not be able to escape. The kit foxes would be vulnerable to predation, starvation, or entombment.

Noise generated by construction activities could temporarily exceed the hearing sensitivity thresholds of San Joaquin kit foxes. Even temporary loss or reduction of hearing ability could negatively affect foraging success as San Joaquin kit foxes primarily rely on hearing to locate prey and detect predators. Noise and human activity in work areas may also cause kit foxes to permanently emigrate from work sites, and possibly enter areas where they would be more susceptible to predation (areas with fewer escape burrows) or to areas with lower prey base.

All of the conservation measures described in Chapter 4 will be implemented to avoid and minimize direct effects on San Joaquin kit foxes and compensate for permanent and temporary impacts to suitable habitat for San Joaquin kit foxes.

5.7.2 Indirect Effects

Kit foxes displaced from the project area due to disturbance-related construction activities may increase competition for prey and living spaces with kit foxes in other areas.

There is potential for increased predation of San Joaquin kit foxes by red foxes, coyotes, or domestic dogs that might be attracted to food scraps and other trash discarded within the action area by construction personnel.

The use of pesticides or rodenticides to control noxious weeds or rodents could result in secondary poisoning of San Joaquin kit foxes.

Spills or leaks of vehicle fluids, lubricants, or other toxic fluids could result in poisoning of kit foxes, their prey, or their habitat.

5.8 Critical Habitat

Critical habitat has not been designated for Kern mallow, blunt-nosed leopard lizard, giant kangaroo rat, Tipton kangaroo rat, and San Joaquin kit fox. Therefore, no adverse effects to critical habitat for these species will occur as a result of the proposed action.

Critical habitat that has been designated for valley elderberry longhorn beetle is located along the lower American River in Sacramento. No designated critical habitat for valley elderberry longhorn beetle is located in or in near the action area. Therefore, the Project will not affect critical habitat for valley elderberry longhorn beetle.

The nearest designated critical habitat for California condor is the East Unit of the Hi Mountain-Beartrap Condor Area, approximately 7.1 miles west of the western end of the action area, where captive-raised condors were formerly released. Therefore, the Project will not affect critical habitat for California condor because none of the proposed project activities will occur within designated critical habitat.

5.9 Interrelated Actions

PG&E's Carrizo-Midway 230kV Power Line Reconductoring Project is interrelated to the Topaz Project because PG&E would not need to reconductor the transmission line were it not necessary to do so to accommodate the final 150 megawatts of power to be generated by the Topaz Project and the power that would be generated by another proposed solar project in the region.. First Solar has prepared a biological assessment that describes its project and identifies their project impacts to federally listed plant and wildlife species (Althouse and Meade, Inc. November 2010). First Solar has included mitigation measures to avoid and minimize direct and indirect affects to federally listed plant and wildlife species and has proposed to compensate for temporary and permanent impacts to habitat for these species. The mitigation measures identified in this biological assessment are similar to those proposed in First Solar's biological assessment for those species that would be affected by PG&E's reconductoring project and the Topaz Project. PG&E has also include mitigation measures to avoid and minimize impacts to species that are not addressed in First Solar's biological assessment because they either only occur in Kern County (Kern mallow, valley elderberry longhorn beetle, and Tipton kangaroo rat) and has proposed compensatory mitigation for temporary impacts to habitat in Kern County.

5.10 Interdependent Actions

An interdependent action is one with no independent utility apart from the action under consultation. No interdependent actions are associated with the proposed action.

5.11 Cumulative Effects

Cumulative effects as defined in the Section 7 implementing regulations include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area considered in the biological opinion. Effects of future federal actions that are unrelated to the proposed action are not considered cumulative impacts in the Section 7 consultation process.

The proposed Carrizo-Midway 230 kV Power Line Reconductoring Project, in combination with other projects in the area and other activities that affect the species that are affected by this project, could contribute to cumulative effects on vegetation communities, common plant and animal species, and federally listed plant and animal species. The geographic extent for the analysis of cumulative impacts related to biological resources includes the Carrizo Plain and the larger Ciervo-Panoche region, including areas of western Fresno County, regions of western Kern County in the San Joaquin Valley, eastern San Luis Obispo County, and northern Santa Barbara County. The areas included in this cumulative analysis contain suitable and occupied habitat for species potentially affected by the Carrizo-Midway 230 kV Reconductoring Project, including the San Joaquin kit fox, giant kangaroo rat, Tipton kangaroo rat, California condor, blunt-nosed leopard lizard, and Kern mallow. Each of these locations may also support core, critical, or unique populations essential to recovery and long-term survival of these species (U.S. Fish and Wildlife Service 1996, 1998, 2010a, 2010b, 2010c, 2010d).

Between 1987 and 2006, approximately 120 projects were permitted by USFWS for take of blunt-nosed leopard lizards. These projects impacted approximately 21,200 acres of suitable habitat for blunt-nosed leopard lizard (U.S. Fish and Wildlife Service 2010a). Between 1987 and 2008, USFWS authorized permanent alteration of more than 6,300 acres and temporary disturbance of nearly 3,000 acres of giant kangaroo rat habitat (U.S. Fish and Wildlife Service 2010b). Since 1988, USFWS evaluated 50 projects affecting Tipton kangaroo rats. These projects resulted in permanent impacts to 14,824 acres and temporary impacts to 5,896 acres of suitable habitat (U.S. Fish and Wildlife Service 2010c). Projects permitted by USFWS between 1988 and 2007 have resulted in permanent alteration of over 118,000 acres of San Joaquin kit fox habitat (with an additional 20,000 acres affected by temporary disturbance) for large-scale water storage and conveyance, urban development, agriculture, oil and gas development, and other developments (U.S. Fish and Wildlife Service 2010d). This loss of habitat is substantial and yet includes only the loss of habitat to large projects that required and received environmental review by federal and state resource agencies.

The continued incremental loss of habitat to smaller-scale land conversion is more difficult to quantify and yet may be as substantial or even more substantial. It is apparent that a significant portion of the remaining occupied habitat for these species is on private land and is highly vulnerable to incompatible land use; although typically smaller scale, collectively, incompatible land uses may result in significant and often undetermined cumulative effects.

Chapter 6
Conclusion and Determination

The Carrizo-Midway 230 kV Reconductoring Project will result in the temporary loss of Kern mallow habitat. The project also will result in the permanent loss of denning, foraging, and dispersal habitat for San Joaquin kit fox and will temporarily affect habitat potentially used by blunt-nosed leopard lizards, giant kangaroo rats, Tipton kangaroo rats, and San Joaquin kit foxes for denning, foraging, and dispersal. The project also will affect potential foraging habitat for California condors and could affect elderberry shrubs that provide suitable habitat for valley elderberry longhorn beetles.

Through project design and implementation of conservation measures, the project will avoid or minimize effects to these species to the greatest extent practicable. Furthermore, with implementation of conservation measures, many of which were modeled from PG&E's San Joaquin Valley O&M HCP, the project is not expected to contribute to cumulative impacts to these species.

6.1 Kern Mallow

PG&E has designed its project to avoid Kern mallow to the greatest extent practicable. However, because the project will occur in habitat with known populations of Kern mallow, there is potential for loss of individuals during construction. A take permit for Kern mallow is requested because the proposed action is likely to adversely affect Kern mallow. PG&E will avoid and minimize direct and indirect effects on populations of Kern mallow through implementation of conservation measures described in Chapter 4 of this BA.

6.2 Valley Elderberry Longhorn Beetle

Direct effects on valley elderberry longhorn beetles will be avoided through implementation of conservation measures described in Chapter 4 of this BA. Therefore, the project will not adversely affect valley elderberry longhorn beetles.

6.3 Blunt-Nosed Leopard Lizard

PG&E has designed its project to avoid blunt-nosed leopard lizards to the greatest extent practicable. However, because the project will affect suitable habitat for blunt-nosed leopard lizards a take permit for blunt-nosed leopard lizard is requested because the proposed action is likely to adversely affect blunt-nosed leopard lizards. PG&E will avoid direct take and minimize direct impacts to suitable blunt-nosed leopard lizard habitat and indirect effects to blunt-nosed leopard lizards through implementation of conservation measures described in Chapter 4 of this BA.

6.4 California Condor and Golden Eagle

The project will exchange the conductors on an existing power line that has been part of the landscape for approximately 50 years without changing the location of the line. PG&E will also implement guidelines in its Avian Protection Plan. Therefore the project will not adversely affect individual California condors or golden eagles. The project will directly affect California condor and golden eagle foraging habitat, though the amount of foraging habitat that will be affected is small compared to the amount of foraging habitat that is available in the Carrizo Plain. Furthermore, the loss of foraging habitat will not affect the recovery of the California condor due to the extent of available foraging habitat that is available.

6.5 Mountain Plover

Direct effects to suitable mountain plover habitat will be minimal and will be temporary. The amount of habitat that will be affected is small compared to the amount of habitat that is available in the Carrizo Plain. Construction activities will not affect nesting mountain plovers because mountain plovers do not nest in California, Therefore, the project will not adversely affect mountain plovers.

6.6 Giant Kangaroo Rat and Tipton Kangaroo Rat

PG&E has designed its project to avoid giant kangaroo rats and Tipton kangaroo rats to the greatest extent practicable. However, because the project will affect suitable habitat for giant kangaroo rats and Tipton kangaroo rats and there is potential for loss of individuals during construction, a take permit for giant kangaroo rat and Tipton kangaroo rat is requested because the proposed action is likely to adversely affect giant kangaroo rats and Tipton kangaroo rats. PG&E will avoid and minimize direct and indirect effects to giant kangaroo rats and Tipton kangaroo rats through implementation of conservation measures described in Chapter 4 of this BA.

6.7 San Joaquin Kit Fox

PG&E has designed its project to avoid San Joaquin kit foxes to the greatest extent practicable. PG&E will avoid and minimize direct and indirect effects to San Joaquin kit foxes through implementation of conservation measures described in Chapter 4 of this BA. However, because the project will affect suitable habitat for San Joaquin kit fox and there is potential for loss of individuals during construction, a take permit for San Joaquin kit fox is requested because the proposed action is likely to adversely affect San Joaquin kit foxes.

Appendix A

Species List for the Carrizo-Midway 230kV Power Line Reconductoring Project in Kern and San Luis Obispo Counties, California

These buttons will not appear on your list.

Revise Selection

Print this page

Print species list before going on to letter.

Make Official Letter

U.S. Fish & Wildlife Service

Sacramento Fish & Wildlife Office

Federal Endangered and Threatened Species that Occur in or may be Affected by Projects in the Counties and/or U.S.G.S. 7 1/2 Minute Quads you requested

Document Number: 100928094942

Database Last Updated: April 29, 2010

Quad Lists

Listed Species

Invertebrates

- Branchinecta longiantenna
  - longhorn fairy shrimp (E)
- Branchinecta lynchi
  - vernal pool fairy shrimp (T)
- Desmocerus californicus dimorphus
  - valley elderberry longhorn beetle (T)

Fish

- Hypomesus transpacificus
  - delta smelt (T)

Amphibians

- Ambystoma californiense
  - California tiger salamander, central population (T)
- Rana draytonii
  - California red-legged frog (T)

Reptiles

- Gambelia (=Crotaphytus) sila
  - blunt-nosed leopard lizard (E)
- Thamnophis gigas
  - giant garter snake (T)

Birds

- Gymnogyps californianus
  - California condor (E)

Mammals

- Dipodomys ingens
  - giant kangaroo rat (E)
- Dipodomys nitratoides nitratoides
  - Tipton kangaroo rat (E)
- Sorex ornatus relictus
  - Buena Vista Lake shrew (E)
- Vulpes macrotis mutica
  - San Joaquin kit fox (E)

Plants

- Caulanthus californicus
  - California jewelflower (E)
- Eremalche kernensis
  - Kern mallow (E)
- Monolopia congdonii (=Lembertia congdonii)
  - San Joaquin woolly-threads (E)

Quads Containing Listed, Proposed or Candidate Species:

BUTTONWILLOW (241B)

LOKERN (242A)

BELRIDGE (242B)

CARNEROS ROCKS (243A)

MCKITTRICK SUMMIT (243D)

LA PANZA NE (244A)

County Lists

No county species lists requested.

Key:

- (E) Endangered - Listed as being in danger of extinction.
- (T) Threatened - Listed as likely to become endangered within the foreseeable future.
- (P) Proposed - Officially proposed in the Federal Register for listing as endangered or threatened.
- (NMFS) Species under the Jurisdiction of the National Oceanic & Atmospheric Administration Fisheries Service. Consult with them directly about these species.
- Critical Habitat - Area essential to the conservation of a species.
- (PX) Proposed Critical Habitat - The species is already listed. Critical habitat is being proposed for it.
- (C) Candidate - Candidate to become a proposed species.
- (V) Vacated by a court order. Not currently in effect. Being reviewed by the Service.
- (X) Critical Habitat designated for this species

Important Information About Your Species List

How We Make Species Lists

We store information about endangered and threatened species lists by U.S. Geological Survey 7½ minute quads. The United States is divided into these quads, which are about the size of San Francisco.

The animals on your species list are ones that occur within, or may be affected by projects within, the quads covered by the list.

- Fish and other aquatic species appear on your list if they are in the same watershed as your quad or if water use in your quad might affect them.
- Amphibians will be on the list for a quad or county if pesticides applied in that area may be carried to their habitat by air currents.
- Birds are shown regardless of whether they are resident or migratory. Relevant birds on the county list should be considered regardless of whether they appear on a quad list.

Plants

Any plants on your list are ones that have actually been observed in the area covered by the list. Plants may exist in an area without ever having been detected there. You can find out what's in the surrounding quads through the California Native Plant Society's online Inventory of Rare and Endangered Plants.

Surveying

Some of the species on your list may not be affected by your project. A trained biologist and/or botanist, familiar with the habitat requirements of the species on your list, should determine whether they or habitats suitable for them may be affected by your project. We recommend that your surveys include any proposed and candidate species on your list.
See our Protocol and Recovery Permits pages.

For plant surveys, we recommend using the Guidelines for Conducting and Reporting Botanical Inventories. The results of your surveys should be published in any environmental documents prepared for your project.

Your Responsibilities Under the Endangered Species Act

All animals identified as listed above are fully protected under the Endangered Species Act of 1973, as amended. Section 9 of the Act and its implementing regulations prohibit the take of a federally listed wildlife species. Take is defined by the Act as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any such animal.

> Take may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or shelter (50 CFR §17.3).

Take incidental to an otherwise lawful activity may be authorized by one of two procedures:

- If a Federal agency is involved with the permitting, funding, or carrying out of a project that may result in take, then that agency must engage in a formal consultation with the Service.
- During formal consultation, the Federal agency, the applicant and the Service work together to avoid or minimize the impact on listed species and their habitat. Such consultation would result in a biological opinion by the Service addressing the anticipated effect of the project on listed and proposed species. The opinion may authorize a limited level of incidental take.
- If no Federal agency is involved with the project, and federally listed species may be taken as part of the project, then you, the applicant, should apply for an incidental take permit. The Service may issue such a permit if you submit a satisfactory conservation plan for the species that would be affected by your project.
- Should your survey determine that federally listed or proposed species occur in the area and are likely to be affected by the project, we recommend that you work with this office and the California Department of Fish and Game to develop a plan that minimizes the project's direct and indirect impacts to listed species and compensates for project-related loss of habitat. You should include the plan in any environmental documents you file.

Critical Habitat

When a species is listed as endangered or threatened, areas of habitat considered essential to its conservation may be designated as critical habitat. These areas may require special management considerations or protection. They provide needed space for growth and normal behavior; food, water, air, light, other nutritional or physiological requirements; cover or shelter; and sites for breeding, reproduction, rearing of offspring, germination or seed dispersal.

Although critical habitat may be designated on private or State lands, activities on these lands are not restricted unless there is Federal involvement in the activities or direct harm to listed wildlife.

If any species has proposed or designated critical habitat within a quad, there will be a separate line for this on the species list. Boundary descriptions of the critical habitat may be found in the Federal Register. The information is also reprinted in the Code of Federal Regulations (50 CFR 17.95). See our Map Room page.

Candidate Species

We recommend that you address impacts to candidate species. We put plants and animals on our candidate list when we have enough scientific information to eventually propose them for listing as threatened or endangered. By considering these species early in your planning process you may be able to avoid the problems that could develop if one of these candidates was listed before the end of your project.

Species of Concern

The Sacramento Fish & Wildlife Office no longer maintains a list of species of concern. However, various other agencies and organizations maintain lists of at-risk species. These lists provide essential information for land management planning and conservation efforts. More info

Wetlands

If your project will impact wetlands, riparian habitat, or other jurisdictional waters as defined by section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act, you will need to obtain a permit from the U.S. Army Corps of Engineers. Impacts to wetland habitats require site specific mitigation and monitoring. For questions regarding wetlands, please contact Mark Littlefield of this office at (916) 414-6580.

Updates

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be December 27, 2010.

Appendix F
Cultural Resources, Including Section 106 Consultation

Department of Energy
Washington, DC 20585

October 26, 2010

William Wyatt
Tribal Administrator
Santa Ynez Band of Chumash Mission Indians of the Santa Ynez Reservation
P.O. Box 517
Santa Ynez, California 93460

SUBJECT: Intent to Prepare an Environmental Impact Statement (EIS) in consideration of a Federal loan guarantee for Topaz Solar Farm Project

Dear Mr. Wyatt:

Under Title XVII of the Energy Policy Act of 2005 (EPAct 2005), the U.S. Department of Energy (DOE) is evaluating whether or not to provide a Federal loan guarantee to Topaz Solar Farms, LLC (Topaz) to support construction of the Topaz Solar Farm Project located in San Luis Obispo County, California (the Project). Based on our review of the currently available information, DOE has determined the appropriate level of analysis to be an EIS under the National Environmental Policy Act (NEPA) (42 U.S.C. 4321 *et seq.*).

Topaz proposes to develop the Project on approximately 4,000 acres of land. As proposed, the approximately 550-megawatt electric generation project would include the installation of about nine million photovoltaic solar modules within approximately 437 arrays and associated electric equipment. At full capacity, the Project would generate enough electricity to power an estimated 160,000 California homes annually. Generated electricity would be sold to Pacific Gas and Electric (PG&E) under a long-term power purchase agreement. The Project would be interconnected into PG&E's existing Morro Bay-Midway 230-kilovolt (kV) transmission line, which runs in an east-to-west direction through the site.

The DOE NEPA regulations (10 CFR Part 1021) require DOE to publish in the *Federal Register* a Notice of Intent (NOI) to prepare an EIS. The publication of the NOI serves as the official notification to the host Tribe of NEPA determinations. A copy of the NOI, including the associated Notice of Proposed Floodplain Action, for the proposed Project is enclosed. Our records indicate that the Santa Ynez Band of Chumash Mission Indians has an historic interest in San Luis Obispo County. Accordingly, DOE invites your Tribe to government-to-government consultation, regarding the project, in accordance with Section 106 of the National Historic Preservation Act (NHPA) (36 CFR Part 800) of 1966, as amended. Compliance with Section 106 requires consideration of the effects of a proposed project on those cultural resources that are included in, or eligible for inclusion in, the National Register of Historic Places. The DOE recognizes that the Santa Ynez Band of Chumash Mission Indians may have information on resources in this area and an interest in federal undertakings located in the project area. The

Printed with soy ink on recycled paper

DOE would therefore appreciate any input you can provide in identifying cultural resources, including properties of traditional, religious, or cultural importance that may be affected by the proposed undertaking. The DOE will ensure that any information you provide will remain subject to the confidentiality provisions of the NHPA (Section 304).

Please let us know if you need more information regarding this project, whether you would like to initiate formal government-to-government consultation for this project, or if you wish to identify any issues or concerns that need to be addressed during the NHPA or NEPA review process. You may contact us by phone, letter, or email to let us know of your interest or preference for involvement in this proposed project. The DOE contact representative for the Project is:

Angela F. Colamaria
U.S. Department of Energy
Loan Programs Office
Environmental Compliance Division
1000 Independence Avenue, S.W., LP-10
Washington, DC 20585

Direct: (202) 287-5387
Email: angela.colamaria@hq.doe.gov

Ms. Colamaria will also be available for a face-to-face meeting on November 16, 2010, before the Federal scoping meeting. The scoping meeting will be held at the Carrisa Plains Heritage Association Community Center, 10750 Carrisa Highway (Highway 58), Santa Margarita, CA. There will be an open house from 5:00 - 7:00 pm, followed by oral presentations/comments from 7:00 pm - 9:00 pm.

If you have any questions concerning the DOE process to be followed for the review of this project, you can contact Ms. Colamaria (see contact information above), or me at 202-586-7248 or matthew.mcmillen@hq.doe.gov.

Sincerely,

Matthew McMillen
Director, Environmental Compliance Division
Loan Programs Office

Enclosure

Department of Energy
Washington, DC 20585

March 10, 2011

Honorable Ryan Garfield
Chairman
Tule River Indian Tribe
Tule River Reservation
340 N. Reservation Road
Porterville, CA 93257

SUBJECT: Upcoming Publication of Draft Environmental Impact Statement (EIS) in consideration of a Federal loan guarantee for Topaz Solar Farm Project

Dear Chairman Garfield:

Under Title XVII of the Energy Policy Act of 2005 (EPAct 2005), the U.S. Department of Energy (DOE) is evaluating whether or not to provide a Federal loan guarantee to Topaz Solar Farms, LLC (Topaz) to support construction of the Topaz Solar Farm Project located in San Luis Obispo County, California (the Project). Based on our review of the currently available information, DOE has determined the appropriate level of analysis to be an EIS under the National Environmental Policy Act (NEPA) (42 U.S.C. 4321 *et seq.*).

Topaz proposes to develop the Project on approximately 4,000 acres of land. As proposed, the approximately 550-megawatt electric generation project would include the installation of about nine million photovoltaic solar modules within approximately 437 arrays and associated electric equipment. At full capacity, the Project would generate enough electricity to power an estimated 160,000 California homes annually. Generated electricity would be sold to Pacific Gas and Electric (PG&E) under a long-term power purchase agreement. The Project would be interconnected into PG&E's existing Morro Bay-Midway 230-kilovolt (kV) transmission line, which runs in an east-to-west direction through the site, as well as portions of Kern County.

A copy of the Notice of Intent to prepare an Environmental Impact Statement (EIS), including the associated Notice of Proposed Floodplain Action, for the proposed Project is enclosed. DOE will be publishing a Draft DEIS in the *Federal Register*, as required by DOE NEPA regulations (10 CFR Part 1021). A copy of the Draft EIS will be forwarded to you when it is published.

Our records indicate that the Tule River Indian Tribe of the Tule River Reservation has an historic interest in San Luis Obispo County. Accordingly, DOE invites your Tribe to government-to-government consultation, regarding the Project. We are also inviting your Tribe to consult in accordance with Section 106 of the National Historic Preservation Act (NHPA) (36 CFR Part 800) of 1966, as amended. Compliance with Section 106 requires consideration of the effects of a proposed project on those cultural resources that are included in, or eligible for

Printed with soy ink on recycled paper

inclusion in, the National Register of Historic Places. The DOE recognizes that the Tule River Indian Tribe of the Tule River Reservation may have information on resources in this area and an interest in federal undertakings located in the project area. The DOE would therefore appreciate any input you can provide in identifying cultural resources, including properties of traditional, religious, or cultural importance that may be affected by the proposed undertaking. The DOE will ensure that any information you provide will remain subject to the confidentiality provisions of the NHPA (Section 304).

Please let us know if you need more information regarding this project, whether you would like to initiate formal government-to-government consultation for this project, or if you wish to identify any issues or concerns that need to be addressed during the NHPA or NEPA review process. You may contact us by phone, letter, or email to let us know of your interest or preference for involvement in this proposed project. The DOE contact representative for the Project is:

Angela F. Colamaria
U.S. Department of Energy
Loan Programs Office
Environmental Compliance Division
1000 Independence Avenue, S.W., LP-10
Washington, DC 20585

Direct: (202) 287-5387
Email: angela.colamaria@hq.doe.gov

Ms. Colamaria will also be available for a face-to-face meeting when she is in the San Luis Obispo area for the public meeting regarding the DEIS in the next month. Once a date and time have been set, we will contact you with the details.

If you have any questions concerning the DOE process to be followed for the review of this project, you can contact Ms. Colamaria (see contact information above), or me at 202-586-7248 or matthew.mcmillen@hq.doe.gov.

Sincerely,

Matthew McMillen
Director, Environmental Compliance Division
Loan Programs Office

Enclosures

Department of Energy
Washington, DC 20585

March 10, 2011

Honorable Ruben Barrios
Chairman
Tachi Yokut Tribe
Santa Rosa Rancheria
P.O. Box 8
Lemoore, CA 93245

SUBJECT: Upcoming Publication of Draft Environmental Impact Statement (EIS) in consideration of a Federal loan guarantee for Topaz Solar Farm Project

Dear Chairman Barrios:

Under Title XVII of the Energy Policy Act of 2005 (EPAct 2005), the U.S. Department of Energy (DOE) is evaluating whether or not to provide a Federal loan guarantee to Topaz Solar Farms, LLC (Topaz) to support construction of the Topaz Solar Farm Project located in San Luis Obispo County, California (the Project). Based on our review of the currently available information, DOE has determined the appropriate level of analysis to be an EIS under the National Environmental Policy Act (NEPA) (42 U.S.C. 4321 *et seq.*).

Topaz proposes to develop the Project on approximately 4,000 acres of land. As proposed, the approximately 550-megawatt electric generation project would include the installation of about nine million photovoltaic solar modules within approximately 437 arrays and associated electric equipment. At full capacity, the Project would generate enough electricity to power an estimated 160,000 California homes annually. Generated electricity would be sold to Pacific Gas and Electric (PG&E) under a long-term power purchase agreement. The Project would be interconnected into PG&E's existing Morro Bay-Midway 230-kilovolt (kV) transmission line, which runs in an east-to-west direction through the site, as well as portions of Kern County.

A copy of the Notice of Intent to prepare an Environmental Impact Statement (EIS), including the associated Notice of Proposed Floodplain Action, for the proposed Project is enclosed. DOE will be publishing a Draft DEIS in the *Federal Register*, as required by DOE NEPA regulations (10 CFR Part 1021). A copy of the Draft EIS will be forwarded to you when it is published.

Our records indicate that the Tachi Yokut Tribe has an historic interest in San Luis Obispo County. Accordingly, DOE invites your Tribe to government-to-government consultation, regarding the Project. We are also inviting your Tribe to consult in accordance with Section 106 of the National Historic Preservation Act (NHPA) (36 CFR Part 800) of 1966, as amended. Compliance with Section 106 requires consideration of the effects of a proposed project on those cultural resources that are included in, or eligible for inclusion in, the National Register of

Printed with soy ink on recycled paper

Historic Places. The DOE recognizes that the Tachi Yokut Tribe may have information on resources in this area and an interest in federal undertakings located in the project area. The DOE would therefore appreciate any input you can provide in identifying cultural resources, including properties of traditional, religious, or cultural importance that may be affected by the proposed undertaking. The DOE will ensure that any information you provide will remain subject to the confidentiality provisions of the NHPA (Section 304).

Please let us know if you need more information regarding this project, whether you would like to initiate formal government-to-government consultation for this project, or if you wish to identify any issues or concerns that need to be addressed during the NHPA or NEPA review process. You may contact us by phone, letter, or email to let us know of your interest or preference for involvement in this proposed project. The DOE contact representative for the Project is:

Angela F. Colamaria
U.S. Department of Energy
Loan Programs Office
Environmental Compliance Division
1000 Independence Avenue, S.W., LP-10
Washington, DC 20585

Direct: (202) 287-5387
Email: angela.colamaria@hq.doe.gov

Ms. Colamaria will also be available for a face-to-face meeting when she is in the San Luis Obispo area for the public meeting regarding the DEIS in the next month. Once a date and time have been set, we will contact you with the details.

If you have any questions concerning the DOE process to be followed for the review of this project, you can contact Ms. Colamaria (see contact information above), or me at 202-586-7248 or matthew.mcmillen@hq.doe.gov.

Sincerely,

Matthew McMillen
Director, Environmental Compliance Division
Loan Programs Office

Enclosures

Department of Energy
Washington, DC 20585

December 28, 2010

Mr. Dave Singleton
Native American Heritage Commission
915 Capitol Mall, RM 364
Sacramento, CA 95814

Subject: Sacred Lands File Search Request for the Topaz Solar Farm, eastern San Luis Obispo, California

Dear Mr. Singleton:

The Department of Energy is proposing to issue a loan guarantee to the Royal Bank of Scotland to provide funding to Topaz Solar Farms, LLC to develop the Topaz Solar Farm, a nominal 550-megawatt photovoltaic solar energy generating facility. The proposed facility would be developed on disturbed agricultural lands. The project site is within unincorporated eastern San Luis Obispo County, California, approximately two miles north of the community of California Valley and six miles north of the Carrizo Plain National Monument (see attached maps). The project study area includes nearly 10,000 acres of land within the following townships, ranges, and sections (Mount Diablo Base and Meridian):

Township	Range	Sections (all or part)
29S	18E	7, 8, 15, 16, 17, 18, 19, 20, 21, 22, 26, 27, 28, 29, 32, 33, 34, 35
30S	18E	4, 5

The Department of Energy is writing to inform the Native American Heritage Commission of this proposed project and to request a copy of the current Native American contacts list for the area so that we may coordinate with the appropriate tribal leaders. In addition, we are requesting a Sacred Lands File Search to identify areas of traditional importance within the region.

This information can be emailed to Angela.Colamaria@hq.doe.gov or mailed to the address below:

Angela Colamaria
U.S. Department of Energy
Loan Programs Office
Environmental Compliance Division
1000 Independence Avenue, S.W., LP-10
Washington, DC 20585

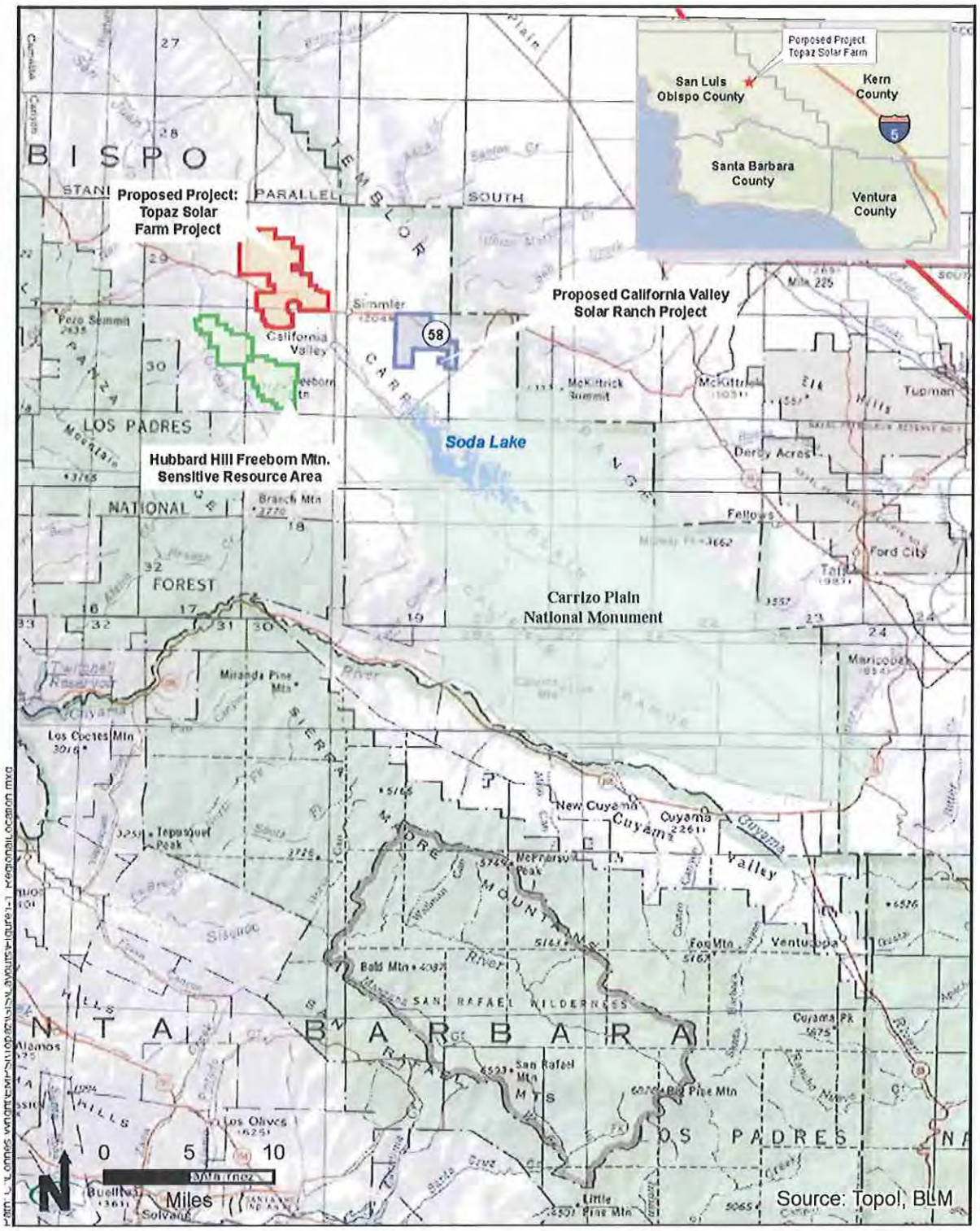
Printed with soy ink on recycled paper

Please feel free to contact me at (202) 287-5387 or via email if you have any questions.

Sincerely,

Angela Colamaria
NEPA Document Manager

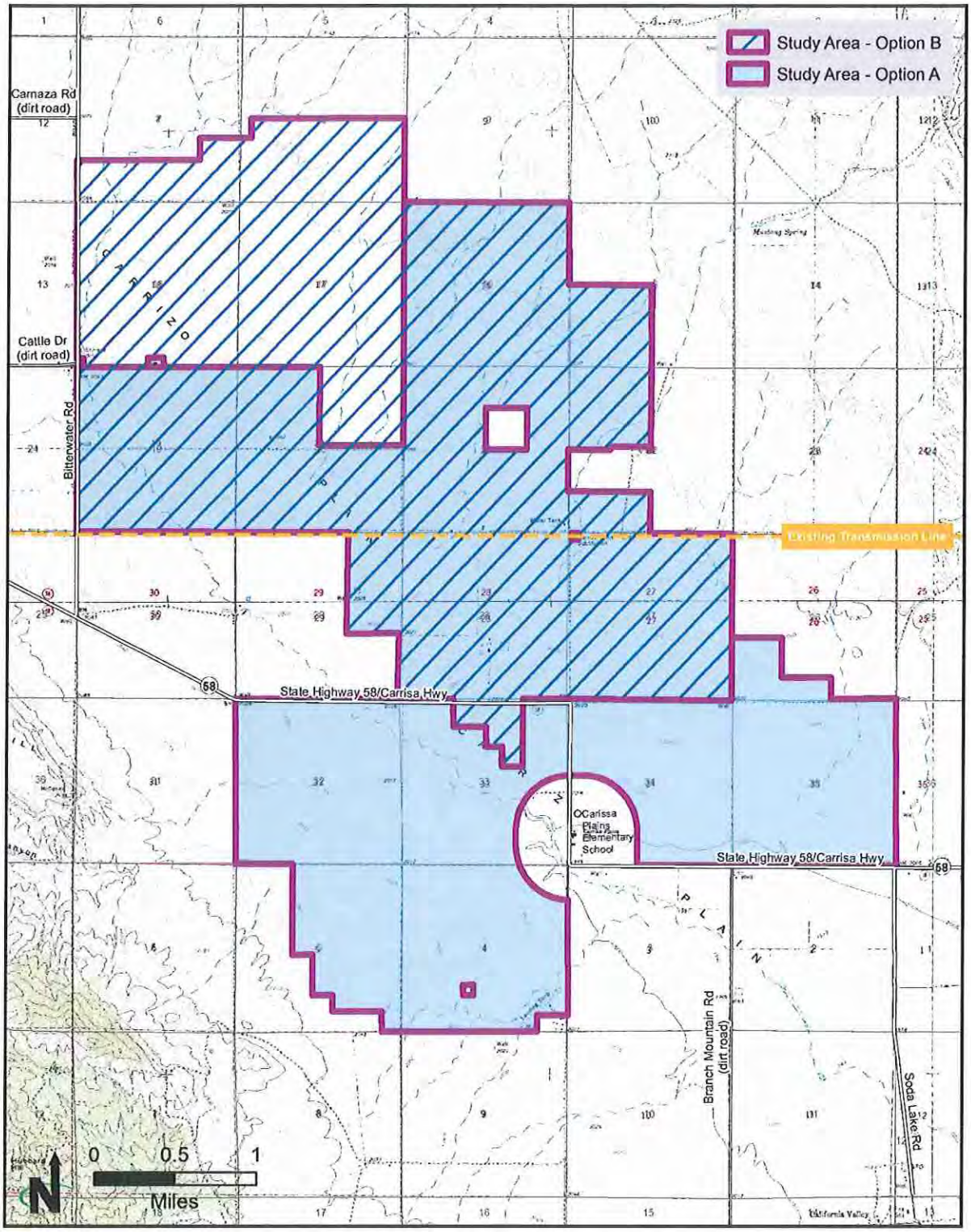
Enclosures: Project Location Maps (2)



Regional Location Map

Topaz Solar Farm
San Luis Obispo County, CA

Figure 1



Project Site Map

Topaz Solar Farm
San Luis Obispo County, CA

Figure 2

STATE OF CALIFORNIA Edmund G. Brown Jr., Governor

NATIVE AMERICAN HERITAGE COMMISSION
915 CAPITOL MALL, ROOM 364
SACRAMENTO, CA 95814
(916) 653-4082
Fax (916) 657-5390
Web Site www.nahc.ca.gov

January 6, 2011

Angela Colamaria
U.S. Department of Energy
Loan Programs Office
Environmental Compliance Division
1000 Independence Avenue, S.W., LP-10
Washington, DC 20585

Sent by Fax: 202-586-7809 and Mail
Number of Pages: 3

Re: Proposed Topaz Solar Farm; San Luis Obispo County

Dear Ms. Colamaria:

A record search of the sacred land file has failed to indicate the presence of Native American cultural resources in the immediate project area. The absence of specific site information in the sacred lands file does not indicate the absence of cultural resources in any project area. Other sources of cultural resources should also be contacted for information regarding known and recorded sites.

Enclosed is a list of Native Americans individuals/organizations who may have knowledge of cultural resources in the project area. The Commission makes no recommendation or preference of a single individual, or group over another. This list should provide a starting place in locating areas of potential adverse impact within the proposed project area. I suggest you contact all of those indicated, if they cannot supply information, they might recommend others with specific knowledge. By contacting all those listed, your organization will be better able to respond to claims of failure to consult with the appropriate tribe or group. If a response has not been received within two weeks of notification, the Commission requests that you follow-up with a telephone call to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from any of these individuals or groups, please notify me. With your assistance we are able to assure that our lists contain current information. If you have any questions or need additional information, please contact me at (916) 653-4040.

Sincerely,

Gloria Tomei for

Katy Sanchez
Program Analyst

Native American Contact List
San Luis Obispo County
January 4, 2011

Beverly Salazar Folkes
1931 Shadybrook Drive
Thousand Oaks, CA 91362
folkes@msn.com
805 492-7255
(805) 558-1154 - cell
folkes9@msn.com

Chumash
Tataviam
Ferrnandeño

San Luis Obispo County Chumash Council
Chief Mark Steven Vigil
1030 Ritchie Road
Grover Beach CA 93433
chelfmvigil@fix.net
(805) 481-2461
(805) 474-4729 - Fax

Chumash

Santa Ynez Band of Mission Indians
Vincent Armenta, Chairperson
P.O. Box 517
Santa Ynez , CA 93460
varmenta@santaynezchumash.
(805) 688-7997
(805) 686-9578 Fax

Chumash

Peggy Odom
1339 24th Street
Oceano , 93445
(805) 489-5390

Chumash

Barbareno/Ventureno Band of Mission Indians
Julie Lynn Tumamait
365 North Poli Ave
Ojai , CA 93023
jtumamait@sbcglobal.net
(805) 646-6214

Chumash

Santa Ynez Tribal Elders Council
Adelina Alva-Padilla, Chair Woman
P.O. Box 365
Santa Ynez , CA 93460
elders@santaynezchumash.org
(805) 688-8446
(805) 693-1768 FAX

Chumash

Lei Lynn Odom
1339 24th Street
Oceano , CA 93445
(805) 489-5390

Chumash

Randy Guzman - Folkes
655 Los Angeles Avenue, Unit E
Moorpark , CA 93021
ndnRandy@yahoo.com
(805) 905-1675 - cell

Chumash
Fernandeño
Tataviam
Shoshone Paiute
Yaqui

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of the statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regard to cultural resources for the proposed Topaz Solar Farm; San Luis Obispo County.

Native American Contact List
San Luis Obispo County
January 4, 2011

Coastal Band of the Chumash Nation
Vennise Miller, Chairperson
P.O. Box 4464 Chumash
Santa Barbara CA 93140
805-964-3447

Salinan-Chumash Nation
Xielolixii
3901 Q Street, Suite 31B Salinan
Bakersfield , CA 93301 Chumash

408-966-8807 - cell

Mona Olivas Tucker
660 Camino Del Rey Chumash
Arroyo Grande CA 93420
(805) 489-1052 Home
(805) 748-2121 Cell

Northern Chumash Tribal Council
Fred Collins, Spokesperson
67 South Street Chumash
San Luis Obispo CA 93401
fcollins@northernchumash.
(805) 801-0347 (Cell)

Matthew Darian Goldman
495 Mentone Chumash
Grover Beach CA 93433
805-748-6913

Frank Arredondo
PO Box 161 Chumash
Santa Barbara Ca 93102
ksen_sku_mu@yahoo.com
805-617-6884
ksen_sku_mu@yahoo.com

Santa Ynez Band of Mission Indians
Tribal Administrator
P.O. Box 517 Chumash
Santa Ynez , CA 93460
info@santaynezchumash.
(805) 688-7997
(805) 686-9578 Fax

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of the statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regard to cultural resources for the proposed Topaz Solar Farm; San Luis Obispo County.

Appendix G
Draft Wildfire Management Plan

Wildfire Management Plan

Topaz Solar Farm

San Luis Obispo County
California

Prepared for

Topaz Solar Farms, LLC
1111 Broadway, 4th Floor
Oakland, CA 94607

by

BENJAMIN W. PARKER
California Registered Professional Forester #2057
4423 Poinsettia Street
San Luis Obispo, CA 93401
(805) 540-1901

January 3, 2010

Table of Contents

Abbreviations and Definitions ii
1.0 Introduction 1
1.1 Project Location 1
1.2 Project Description 1
1.3 Existing Topography 2
1.4 Vegetation/Fuel Production 2
1.5 Historical Weather Near Project Site 3
2.0 Fire Modeling Methods 4
2.1 Vegetation Fuel Model Data 4
3.0 Wildfire Management Plan 4
3.1 Vegetation Maintenance 4
3.2 Recommendations based on potential hazards and proposed mitigations. 5
3.3 Summary of Fire Management Recommendations 6
3.4 Resources for More Information 8
4.0 Conclusion 8
5.0 Wildfire Management Plan Exhibit 9
6.0 References 11
Appendix A. Specifications A-1
Appendix B. Option A Plan Sheets B-1

Abbreviations and Definitions

AC: Alternating current

Cal Fire: synonym for CDF

CDF: California Department of Forestry and Fire Protection

CPUC: California Public Utilities Commission

DC: Direct current

kV: Kilovolt (one thousand volts)

MW: Megawatt (one million watts)

MWac: Megawatt of alternating current

NFFL: Northern Forest Fire Laboratory

O&M: Operations and Maintenance

PCS: Power conversion stations

PG&E: Pacific Gas and Electric Company

PV: Photovoltaic

PV Array: A block of photovoltaic modules

PV Module: An individual solar panel

PVCS: Photovoltaic combining switchgear, in a pad-mounted electrical cabinet

TSF: Topaz Solar Farm; name of the Proposed Project

TSF Project: Topaz Solar Farm Project; used generically to describe the project, without distinction between the project layout options

1.0 Introduction

This Wildfire Management Plan covers the entire Topaz Solar Farm (TSF) Project (Figure 1, Section 5.0). The exact location and extent of the TSF Project is dependent upon approval of a final Project option, expected to have a fenced area of approximately 4,000 acres. This plan includes evaluation of wildfire potential effects, as well as ingress and egress for people who may be affected by wildfire in the vicinity of TSF.

1.1 Project Location

The Proposed Project is located in the northern Carrizo Plain area of San Luis Obispo County, California. The Project is within the La Panza NE and California Valley United States Geological Survey (USGS) 7.5 minute quadrangles. Elevation varies from approximately 2,010 to 2,200 feet above mean sea level. The TSF Project is located east of Bitterwater Road to Soda Lake Road, along PG&E's electric transmission lines at the north end of the Carrizo Plain, northwest of California Valley.

1.2 Project Description

The Topaz Solar Farm Project ("Topaz" or "Proposed Project") proposed by Topaz Solar Farms, LLC, a wholly owned subsidiary of First Solar, Inc. (the Applicant). The Applicant proposes to construct and operate a 550 megawatt (MW) photovoltaic (PV) solar power plant (Topaz) in the Carrizo Plains, an unincorporated portion of eastern San Luis Obispo County, adjacent to Highway 58 and east of Bitterwater Road. The Proposed Project would be installed over an approximate 4,000- to 4,100-acre (six-square-mile) site. The final Proposed Project site would accommodate solar arrays, as well as an electric substation, Solar Energy Learning Center, and maintenance facilities. In addition, as discussed later in this description, the project would also require an interconnection into the transmission grid that would be constructed by PG&E (e.g. switching station) and permitted by the CPUC.

The key Proposed Project components will include:

- Installation of up to approximately nine million PV solar modules within approximately 460 arrays, and associated electrical equipment enclosures.
    - Power Conversion Stations [PCS] including an inverter enclosure (236 sq. ft.) and adjacent transformer (48 sq. ft.)
    - PV Combining Switchgear [PVCS];
- Direct conversion of sunlight to electricity without the use of water for power generation;
- PV arrays that are approximately five and a half feet in height (the distance from the ground to the top of the PV module table may vary depending on the topography); and,
- PV arrays of approximately 1.3 MWac, occupying approximately seven acres that would be equipped with a PCS, which includes two DC to AC inverters and one transformer.

Note that the description above is based on an assumed 1.3 MWac PV array configuration. First Solar is constantly evaluating possible ways to improve upon the PV array design to achieve

greater environmental and economic benefits, so that it may be configured differently if the variation offers benefits relative to the 1.3MWac design. However, any PV array configuration variations would maintain the core fire safety features described in this plan.

Arrays will have a 20-foot access break every 500 feet.

In addition to the PV arrays the Proposed Project will include the construction and operation of:

- PG&E Switching Station
- Topaz Electrical substation
- Buildings
  - Operation and Maintenance (O&M) facility (11,250 square feet)
  - Solar Energy Learning Center (900 sq. ft.)
- Power cables
  - Above ground medium-voltage DC collector cables, specifications provided in Appendix A
  - Underground medium-voltage DC feeder cables
  - Above-ground medium-voltage (34.5 kV) AC collector line corridors (8 to 12 miles)
- On-site access roads (including existing agricultural roads)
- Fenced PV arrays
  - Fenced PV array areas that may vary in size from 30 to 1600 acres.
  - Perimeter fencing consisting of six-foot-high chain link with three strands of barbed wire on top and small openings approximately every 100 yards to allow for kit fox passage.

The Applicant has proposed sheep pulse grazing as a part of the site vegetation management plan, subject to validation by additional testing in spring 2011. If grazing is found not to be suitable to the application based on further testing, an alternate methodology, such as mowing, will be utilized.

Additional information regarding Proposed Project elements is included in Appendix A.

1.3 Existing Topography

For wildland fire behavior predictive purposes, the topography of the project site is essentially flat, and has little direct effect on fire behavior calculations.

1.4 Vegetation/Fuel Production

The Proposed Project site contains active farm fields and grazed annual grassland. Vegetation at the site (mostly annual grasses and forbs) is proposed to be managed by grazing with sheep to control height and volume of the fuels (Photos 1 and 2, below). Vegetative growth (fuel production) is highest in farmed barley fields and lowest in grasslands that have not been farmed for over 20 years.

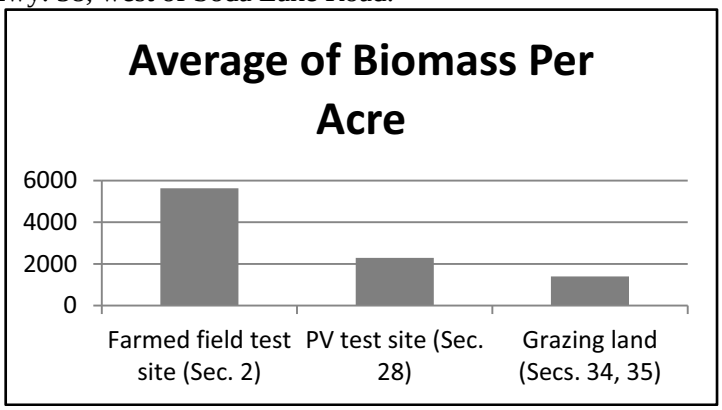
PHOTOS OF UNGRAZED AND GRAZED PV TEST SITE. The PV test site was grazed in June 2010.

1. Vegetation prior to grazing.

2. Vegetation after grazing.

Clip plot measurements by Althouse and Meade, Inc. documented almost 6,000 pounds per acre in the barley field vegetation test site prepared in October 2009, less than 3,000 pounds per acre fuel in the PV vegetation test site, and approximately 1,500 pounds per acre in grazing land that has not been farmed for over 20 years (Figure 1, below). The graph below illustrates biomass production (also known as residual dry matter) measured in June 2010, an above-average rainfall year. Clip plot data by Althouse and Meade, Inc. in 2010 is documented in Figure 1 below.

FIGURE 1. Biomass from clip plots in June 2010. The farmed field test site is the location of the compaction test site. Inactive PV modules are installed at the PV test site. Grazing land is located north of Hwy. 58, west of Soda Lake Road.



1.5 Historical Weather Near Project Site

Historical fire weather at the Topaz site is based on observations from the Carrizo Remote Automated Weather Station (RAWS) and indicates that winds are predominantly from the southeast.

Precipitation primarily occurs during the November to May period. Grasses and forbs cure and dry after May 1 of a typical year.

Humidity is often below 20 percent during the day in the summer. The low humidity increases potential for spread of fire.

Lightning is a common event during summer storms that occur over the southern San Joaquin valley and occasionally ignite fires in the Proposed Project area if the storms are not accompanied by rain. Historical fires in the area have been primarily as a result of lightning, equipment use (usually associated with grain harvesting) and illegal trash burning. This project would convert use of the site and reduce the probability of the equipment use and illegal burning risks.

2.0 Fire Modeling Methods

Using Behave-PLUS, a fire behavior predictive modeling program, fire behavior was modeled in the area of the Proposed Project assuming: (a) no vegetation management program is employed (e.g., no grazing); and (b) the Applicant's proposed vegetation management plan is implemented. The model runs indicate that when the vegetation management plan was implemented, the potential for damage to Project facilities and difficulty of containment of a fire are significantly reduced. Flame length of a typical fire on a grazed plot was reduced from two to six feet to negligible flame length because of the fuel height reduction to two to six inches.

2.1 Vegetation Fuel Model Data

As determined by sample clip plot data conducted by Althouse and Meade and others on the project area or similar sites, the representative fuel model would be (Northern Forest Fire Lab) Model 1 Annual Grasses. The wildland fuel loading from sheep grazing tests (Horney et al. 2010) at the Topaz site would be either:

(i) **Unmitigated (Ungrazed)** Annual grasses and forbs, 1340 to 1632 pounds/acre of fuels 2 to 12 inches tall with potential for creating 2 to 6-foot flame length and greater difficulty of control and containment of a fire. This would be representative of lands adjacent to the project that are not grazed or otherwise treated.

(ii) **Mitigated (Grazed)** Annual grasses and forbs 864 to 1046 pounds/acre of fuels 2 to 8 inches tall, with the potential to create fires with negligible flame length and easily contained. This would be representative of those areas proposed to be grazed within the project area.

3.0 Wildfire Management Plan

3.1 Vegetation Maintenance

Routine grazing and/or mechanical removal of grasses and forbs will manage wildland vegetation within those areas where wildland fuel (grasses and forbs) mitigation is designated.

Most annual grasslands within the project area are proposed to be grazed in the late spring of each year, effectively reducing fuel loads. This reduction in fuels combined with the extensive

network of roads and perimeter paths around the arrays will significantly reduce or eliminate the potential of a wildland fire spreading in or escaping from the project area. The rate of spread, and flame length of a fire that does become established would be reduced, providing relative ease of suppression and reduced potential of damage to onsite improvements.

In areas adjacent to structures or non-exempt electrical equipment where clearance is mandated by code, clearance may be achieved by a combination of mechanical clearance techniques, and/or herbicide treatment, and/or grazing. This would include a 30-foot clearance around structures required by California Public Resources Code (PRC) to approximately a 4-inch stubble and 10-foot clearance of flammable material around non-exempt power poles required by PRC 4292. These clearances would preferably be completed prior to May 1 of each year and managed based on proper timing of grazing and maintenance cycles.

3.2 Recommendations based on potential hazards and proposed mitigations.

The Proposed Project's all-weather access roads as well as access paths within the PV arrays should be designed to act as fuelbreaks – creating 10-20 foot wide paths where grasses and forbs are grazed and /or compressed by occasional equipment use to create a space with reduced vertical and horizontal continuity of the grass. Prevailing winds would push fires away from more developed areas adjacent to the project area. Additionally, because of the network of roads and modification of fuels in the Proposed Project area, wind effect would be significantly reduced in the spread of any wildland fires.

With the planned clearances around structures, reduced fuel loading due to the vegetation management plan, and the network of paths and roads around PV arrays, a fire would be less likely to become established and, if established, would be relatively easy to suppress onsite. All workers onsite, during and after construction, will be briefed on procedures for monitoring the areas they are working in and reporting any fires or medical emergencies directly through the 911 systems.

Fenced areas will be numbered and clearly labeled as each phase is constructed.

Fire risk can also be mitigated by ensuring that all mechanized equipment have appropriate spark arrestors and non-critical maintenance be conducted during higher humidity periods when possible to reduce exposure to fire causing activities and ignition sources. During construction in the dry season, April to November, TSF will maintain fire suppression capable equipment for construction crews in the field: a mobile pumper, hand tools and backpumps. Equipment will follow Cal Fire's Industrial Operations Fire Prevention Field Guide (CDF 2009). In addition, O&M vehicles will have some equipment capable of fire suppression.

The Topaz Solar project will schedule regular briefings with CAL FIRE representatives to provide an update on project construction activities.

In addition, to best utilize the road network for fire suppression and public safety in the Proposed Project area, roads shall be identified with a nomenclature to easily identify locations throughout the project area using a county standard for signage. An effective road network combined with the impact of grazing would reduce the need for heavy equipment, like bulldozers, for fire suppression within the project area. In the event that heavy equipment did need to access the project area, surface areas with underground utilities below should be well marked with signage and markers for easy identification in adverse visual conditions. Heavy equipment would typically only skim the surface of the ground to remove light fuels for a firebreak ahead of a fire.

The network of roads and access paths within the Proposed Project should minimize the need for this level of disturbance.

Additionally, any water sources developed as part of the Proposed Project should have standard access for fire department use on fires onsite as well as offsite on adjacent lands. This will improve the ability to suppress fires on lands throughout the Carrizo area.

In the event of a fire, the complete facility AC power system can be shut down by opening the main AC breaker in the onsite Substation or each block can be isolated by opening a local breaker at its PVCS. The inverters automatically shut down, when they no longer sense voltage from the grid. The solar modules create electricity whenever the sun shines, including cloudy days, and cannot be de-energized until after sundown.

There are no additional precautions required due to the presence of CdTe encapsulated in the PV modules. Heating experiments to simulate high-temperature residential fires showed that the content of CdTe PV modules was 99.96% encapsulated in the molten glass matrix during tests that reached 1100 degrees Celsius (Fthenakis et al. 2005). Wildfires tend to burn at lower temperatures, below the melting point of CdTe at 1041 °C (Fthenakis and Zweibel 2003). For wildfires, residence times in grass fuels are approximately 15 seconds, and maximum temperatures, observed at the base of the flame (the hottest part), are approximately 800 °C to 1000 °C (Wotton 2009), although flame temperatures are expected to be much cooler in managed grassland on the Topaz site. Additional information about the use of CdTe PV has been submitted by the Applicant in their comment letter on the Draft EIR dated January 3, 2011.

3.3 Summary of Fire Management Recommendations

FR 1. Provide all-weather access roads to most fenced PV areas.

FR 2. Manage access paths through arrays to act as fuel breaks; maintain paths with minimal fuel loads.

FR 3. Maintain less than 1200 lbs per acre during fire season.

FR 4. Maintain 30-foot clearance around structures, preferably with less than 1000 pounds per acre of grassland fuels.

FR 5. Brief all workers on site during construction and operation phases regarding procedures for monitoring work areas and reporting fire and medical emergencies through the 911 system.

FR 6. Schedule regular (quarterly or more frequent) briefings with Cal Fire representatives to provide an update on project construction activities.

FR 7. Install lightning protection for the substation.

FR 8. Number and clearly label each fenced area.

FR 9. All mechanized equipment must have appropriate spark arrestors.

FR 10. Non-critical vehicle maintenance should be conducted during higher humidity periods (e.g. before 10 a.m. during the summer months) to reduce exposure to fire-causing activities and ignition sources.

FR 11. During construction in the dry season, April to November, maintain fire suppression capable equipment for construction crews in the field: a mobile pumper, hand tools, and 5-gallon backpack pumps. Equipment will follow Cal Fire's Industrial Operations Fire Prevention Field Guide.

FR 12. Identify all roads with well-marked signage and nomenclature to easily identify locations throughout the project area. Use San Luis Obispo County's standards for signage.

FR 13. Clearly mark locations of underground utilities.

FR 14. Provide standard access for water sources within the project boundaries that may be used for fire suppression on lands throughout the Carrizo area.

FR 15. Project staff will perform an annual orientation and site walk down with local Cal Fire department personnel.

FR 16. Water tank storage will be provided at appropriate locations (e.g. by visitor center and operations and maintenance buildings) based on calculations provided by a structural fire protection engineer.

3.4 Resources for More Information

California Department of Forestry and Fire Protection. 1999. Industrial Operations Fire Prevention Field Guide. A*vailable at:* http://www.osfm.fire.ca.gov/codedevelopment/pdf/firesafetyplanning/iofpfg/industrialoperationsguide.pdf

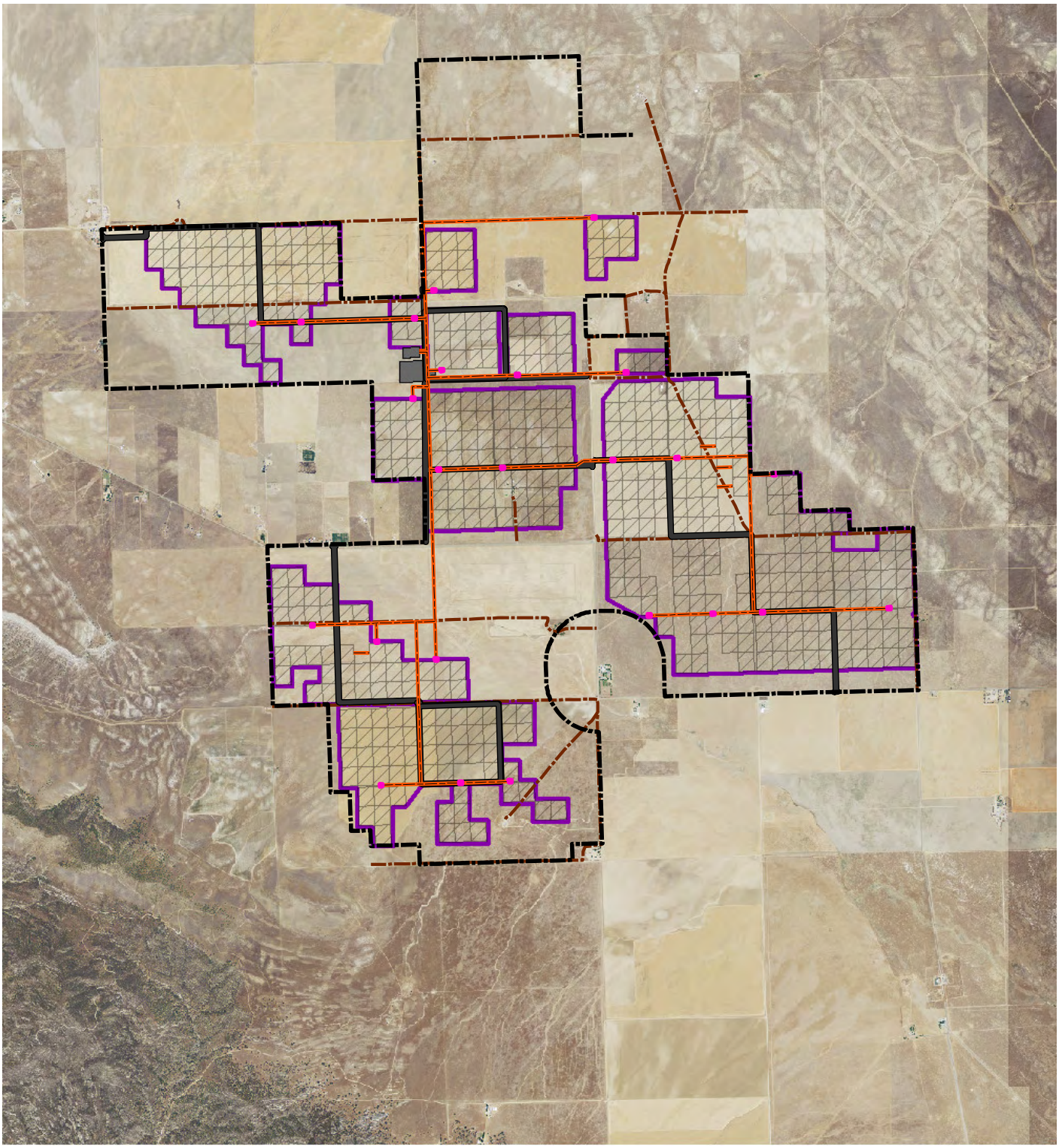
California Department of Forestry and Fire Protection and Pacific Gas and Electric. 2001. Powerline Equipment Identification Pocket Guide. March 27. *Accessible at:* http://www.utilityarborist.org/images/PRC%204292%20e.pdf

4.0 Conclusion

While there is a normal probability of lightning caused fires the project will not increase the occurrence of lightning strikes and will decrease the probability of ignition and spread because of the reduced fuel loading on the site due to the proposed grazing management. While there will be increased equipment use on the site, there will not be an increase in fires becoming established because of increased monitoring, use of equipment less likely to cause fires, and wildland fuel reduction. Any fire that becomes established would be easier to suppress because of the fuel modification and road network.

Proposed mitigations of grazing to reduce fuel loading, development of a road and path network around and within the project, permanent water development available for fire suppression and altering of uses on the site, will result in a reduction in the wildland fire risk and potential within the Project area from its current condition.

5.0 Wildfire Management Plan Exhibit



Appendix H
USACE CWA Section 404
Individual Permit Information

US Army Corps of Engineers
San Francisco District

Regulatory Division
1455 Market Street, 16th Floor
San Francisco, CA 94103-1398

SAN FRANCISCO DISTRICT

PUBLIC NOTICE

PROJECT: Topaz Solar Farm

FILE NUMBER: 2009-00150S DATE: 1 March 2011 RESPONSE REQUIRED BY: 31 March 2011
PERMIT MANAGER: Holly Costa TELEPHONE: 415-503-6780 E-MAIL: holly.n.costa@usace.army.mil

1. **INTRODUCTION:** Topaz Solar Farm LLC (POC: Ashley Kenny; 510.626.7480), 1111 Broadway, 4th Floor, Oakland, California, 94607, through its agent, Althouse and Meade, Inc. (POC: LynneDee Althouse; 805.237.9626), 1602 Spring Street, Paso Robles, California 93446, has applied to the U.S. Army Corps of Engineers (USACE), San Francisco District, for a Department of the Army Permit to discharge fill material into jurisdictional waters of the United States to construct a 550 megawatt solar photovoltaic (PV) energy generating facility. The Topaz Solar Farm (Project) would be constructed on approximately 3,500 acres within approximately 9,700 contiguous acres (Project Site) under private ownership on the Carrizo Plain in eastern San Luis Obispo County, California. This Department of the Army permit application is being processed pursuant to the provisions of Section 404 of the Clean Water Act of 1972, as amended (33 U.S.C. § 1344 *et seq.*).

2. **PROPOSED PROJECT:**

Basic Project Purpose: The basic project purpose comprises the fundamental, essential, or irreducible purpose of the project, and is used by USACE to determine whether the project is water dependent. The basic project purpose is to increase the availability of electricity generated from renewable energy sources through the construction of a photovoltaic (PV) solar facility and associated transmission and support facilities that interconnect with the Morro Bay-Midway 230 kV transmission line.

Overall Project Purpose: The overall project purpose serves as the basis for the Section 404(b)(1) alternatives analysis, and is determined by further defining the basic project purpose in a manner that more specifically describes the applicant's goals for the project, while allowing a reasonable range of alternatives to be analyzed. The overall project purpose is to increase the availability of electricity generated from renewable energy sources through the development, in a high-solar resource area, of a 550 megawatt (MW) photovoltaic (PV) solar facility and associated transmission and support facilities for interconnection to the Morro Bay-Midway 230 kV transmission line within eastern San Luis Obispo County, California.

The Project will generate 550 megawatts of power for the State's electrical power grid, which is enough to provide power to 100,000 to 150,000 households. By producing this sizable amount of electricity through PV generation, the Project will address the public and private need to reduce consumption of fossil fuel and reduce the carbon footprint associated with the generation of energy, as well as provide additional electricity to meet current and future public and private energy needs. Additionally, the generated electricity will support achievement of California's Renewables Portfolio Standard that 20 percent of the state's electricity be supplied by renewable resources, as well as support the Governor's Executive Order that California obtain 33 percent of its electricity from renewable resources by 2020.

Project Site Location: The Project Site is in an unincorporated portion of eastern San Luis Obispo County, California, adjacent to Highway 58 and east of Bitterwater Road (Figures 1 and 2). The boundary straddles Highway 58 between Bitterwater Road and the northern terminus of Soda Lake Road, in relatively flat farm fields west of the Temblor Range and east of the San Juan Hills and La Panza Range. The northern limit of the Project Site is 5.5 miles north of the southern boundary. The western limit is 5 miles from the eastern boundary. The boundary "stair-steps" along the eastern side to avoid areas with significant topographic relief. The western boundary avoids relatively small (60-acre) residential parcels near Highway 58, and hilly ground in the southwest.

Approximate latitude and longitude coordinates for the center of the Project Site are 35.381121º N /120.058898º W in the La Panza NE United States Geological Survey (USGS) 7.5-minute quadrangle. The Project Site is in the La Panza NE and California Valley 7.5-minute topographic quadrangles, on all or portions of sections 7, 8, 15 to 22, 26 to 29, and 32 to 35 of Township 29 South, Range 18 East; and sections 4 and 5 of Township 30 South, Range 18 East, Mount Diablo Base and Meridian.

Project Site Description: The majority of the Project Site consists of rolling hills and gently sloping plains, while the northeastern edge of the Project Site has some larger, steeper. Elevations range from approximately 1,998 to 2,135 feet above mean sea level. Figure 2 is a USGS topographic map of the Project Site.

Approximately 6,205 acres of the Project Site are currently dry-farmed with barley or wheat. The dry-farmed production cycle uses summer fallow, a method widely used in dry climates to conserve soil moisture; fields are planted every other year, and plowed and left bare during years they are not planted. Cattle graze on approximately 3,465 acres of annual grassland that was historically farmed. The remainder, approximately 30 acres of the 9,700 acre total, includes roads and structures.

Under current land use, the Project Site is dominated by upland plant species. Dominant plant communities include dry-farmed grain crops, fallow farmland used as rangeland, and annual grassland habitat. California annual grassland habitat is a dry seasonal habitat consisting of low-lying annual grasses and forbs. It is dominated by non-native and native annual grass species, with varying percentages of native and introduced forbs due to different topography, soils, grazing regimes, and farming history. Wetland vegetation is associated with a few ponded areas in drainages and a small number of localized depressions which typically pond for long periods during normal and above normal rainfall years.

The Project Site is in the Carrizo Plain watershed (HUC 18060003), a 445-square-mile closed basin. Most of the ephemeral drainages that extend across the Project Site are historically interconnected and flow during significant rainfall events toward the main drainage, which drains to Soda Lake, a shallow, ephemeral alkali lake in the Carrizo Plain National Monument. Soda Lake is approximately 9.6 miles southeast of the point where the main drainage leaves the Site. The main drainage is the principal drainage that flows into Soda Lake.

A combination of tectonic activity, semiarid climate, and unique soils in the Carrizo Plain has led to development of many short ephemeral channels that dissipate into gently rolling fields. Stormwater moves as sheet flow across fields and re-enters a few key drainages that convey concentrated flows toward Soda Lake. Water flowing down relatively steep slopes (e.g., hills at the north end of the Project Site) forms distinct channels that become wide swales where the landform is relatively flat in the middle of the Project Site. Water concentrates in the bottom of the valley, and flows in the main drainage toward Soda Lake, carrying sediment, dissolved solids, and other runoff from farmed fields and grazing lands.

Project Description: The applicant proposes to construct and operate a solar photovoltaic (PV) energy generating facility, the Topaz Solar Farm (Project), on lands under private ownership within the Carrizo Plain in eastern San Luis Obispo County,

California. The applicant has a power purchase agreement (PPA) with Pacific Gas and Electric Company (PG&E) that allows for transmission access to the Morro Bay-Midway 230 kV transmission line. The transmission line runs west to east across the Project Site, facilitating direct access without the need for a generation tie-in line. The Project Site comprises 9,700 acres, of which approximately 3,500 acres would be fenced as numerous distinct areas to enclose the solar farm. The fenced PV facilities would be set back from Highway 58, the nearby Carrisa Plains Elementary School, and the main drainage, which conveys floodwaters from the Project Site to Soda Lake. All facilities would be set back from wetlands. The location and proposed configuration of the Project Site are shown on Figures 1 through 3.

The Project would include:

- Solar field of ground-mounted PV modules that collect solar radiation to produce electricity;
- Electrical collection system that converts generated power from direct current (DC) to alternating current (AC) and delivers it to the Project Substation;
- Project Substation that collects and converts the generated power from 34.5 kilovolt (kV) to 230 kV for delivery via a new onsite Pacific Gas and Electric Company (PG&E) Switching Station to PG&E's existing Morro Bay-Midway 230 kV transmission line;
- PG&E Switching Station;
- Operations and Maintenance (O&M) facility near the Project Substation;
- Solar Energy Learning Center near Carissa Plains Elementary School designed to accommodate students and visitors during Project operation; and
- Access and maintenance roads.

Solar Field. The Project's solar field would consist of up to 460 arrays of PV modules with the cumulative capacity to generate 550 MW of power at the point of delivery to PG&E, under peak solar conditions. Each solar array would generate at least 1.26 megawatts alternating current (MWAC) of power and would consist of at least 20,000 PV modules and one power conversion station. Each power conversion station would consist of two inverters in an enclosure and one adjacent transformer. PV modules would be mounted on steel support structures called tables. Tables would be attached at an angle to a bracket on vertical steel posts spaced approximately 8 to 10 feet center-to-center and driven into the ground to a depth of 4 to 7 feet below grade. Once mounted, the front of each table would be approximately 1.5 feet above grade, while the rear would be approximately 5.5 feet above grade. The distance from the ground to the top of the PV module table may vary depending on the topography.

The applicant proposes to install piles to support the PV modules in five jurisdictional drainages. The rows of PV modules would be mounted on 2.12-square inch area metal piles, which would be spaced 10 feet apart in the east to west direction and 14 feet apart in the north to south direction. The PV arrays are designed to have as few support piles as is feasible while still providing the necessary stability for windloading and potential seismic events. Figure 5 shows a typical array configuration. On the basis of 33 CFR § 323.3(c)(2) (Pilings), the use of piles in would not have the effect of a discharge of fill material and therefore would not require Section 404 authorization.

Electrical Collection System. The PV modules would be electrically connected by wiring harnesses running along the bottom of each table to combiner boxes that collect power from several rows of modules. The combiner boxes would feed direct current (DC) power from the modules to the power conversion stations (PCS) via underground cables. The inverters in the PCS would convert the DC electric input into AC (alternating current) electric output, and the isolation transformer would step the current up to 34.5 kV for on-site transmission of the power to the PV combining switchgear (PVCS). Electric feeder cables would be installed in trenches that bisect each array (Figure 4).

Electrical collector cables would connect the power output from the PVCSs to the onsite Project

Substation. Collector cables would be installed in underground trenches (Figure 3).

Project Substation. The Project Substation would collect the output and transform it from 34.5 kV to 230 kV. The Substation would occupy approximately 4.5 acres adjacent to the PG&E Switching Station, where the 230 kV output of the Substation would be connected and delivered to the Morro Bay-Midway 230 kV transmission line.

PG&E Switching Station. PG&E's existing Morro Bay-Midway 230 kV transmission line runs west to east across the Project Site. It extends from PG&E's Morro Bay Substation in the city of Morro Bay in western San Luis Obispo County to its Midway Substation in Buttonwillow, Kern County. The new PG&E Switching Station for the Project would be just north of and adjacent to the Morro Bay-Midway 230 kV transmission line. The Switching Station work area would be approximately 600 feet by 650 feet (9 acres) with a buffer zone and would be enclosed by a fence and separate from the adjacent Topaz Solar Farm Project Substation. The Switching Station would require additional area for the incoming and existing transmission line. Estimated dimensions for the Switching Station and the buffer zones that include the new transmission poles are 880 feet by 715 feet (about 14.5 acres). Two new 100- to 125-foot-high double-circuit lattice steel transmission towers and four steel poles would be installed within or adjacent to PG&E's transmission line right of way to accommodate the looping of the 230-kV line into the Switching Station. The towers and poles would be situated on either side of the new Switching Station to position the transmission conductors for proper ingress and egress to the station. PG&E would be responsible for the construction of the Switching Station and the interconnection to the Morro Bay–Midway 230-kV line.

PG&E Reconductoring Project. Topaz has interconnection agreements in place for the first 400 MW of Project capacity. The California Independent System Operator (CAISO) has determined that local network upgrades would be required to accommodate the Project's remaining 150 MW, as well as a second solar project in the Carrizo Plain – SunPower's California Valley Solar Ranch project. Network upgrades would include the reconductoring of the existing 230 kV transmission line between the new PG&E Switching Station onsite and the Midway Substation, a distance of 35 miles. Reconductoring is the process of installing new conductor wire on existing towers to increase the capacity of an existing transmission line and is considered part of this permit application as defined by NEPA and Section 404 Clean Water Act (CWA) review requirements.

Operations and Maintenance Facility. An approximately 11,250 square foot operations and maintenance (O&M) facility with associated parking would be constructed near the Project Substation for parts storage, security, and project monitoring. A leach field and septic system would be sited adjacent to the O&M facility to serve Project sanitary needs.

Solar Energy Learning Center. Topaz would construct and operate a Solar Energy Learning Center onsite. Topaz would work with local educators to develop exhibits, tours, and educational programs that would complement existing science and sustainability curricula. The center would be able to accommodate several class field trips per day, as well as 100 to 200 visitors per month. The center would be an ADA-compliant, 30-foot-by-30-foot enclosed building with restrooms, and would display a scale model of the solar facilities and other exhibits on solar power.

Project Impacts: Permanent fill impacts of 0.089 acre would result from construction of 10 at-grade road crossings and associated scour arrestors through ephemeral drainages (Figure 3). The 284.3 cubic yards of fill would consist of clean fill material, rip-rap, and pre-cast articulating concrete blankets with steel cable and rebar.

Temporary fill impacts of 0.045 acre (365 cubic yards) would result from the excavation of trenches in which to bury electrical collector and feeder cables.

No direct fill impacts to wetlands of the United States would occur as a result of the Project.

Proposed Mitigation:

Avoidance. Project planning following the EPA Section 404 (b)(1) Guidelines resulted in avoiding all impacts to wetlands, which are EPA "special aquatic sites"; no other special aquatic sites are present onsite. Additionally, all building structure pads and work areas have been oriented so as to avoid impacts to other waters of the U.S.

Minimization. Given the linear and scattered nature of the ephemeral drainages throughout the site, impacts to these "other waters of the U.S." were found to be unavoidable in designing access roads for construction and future project operation (permanent impacts), and trenches for underground electrical lines (temporary impacts). Minimization of unavoidable impacts to the ephemeral drainages includes:

- Minimizing the number of permanent at-grade road crossings to the maximum extent practicable;
- Minimizing roadway width to the maximum extent practicable in consideration of load requirements, vehicle type, and width and safety requirements;
- Utilizing an at-grade temporary trenching crossing approach to underground the electric cables;
- Minimizing ground disturbance by using piles where drainages are over-crossed by PV modules;
- Minimizing ground disturbance during construction and operations in areas adjacent to wetlands and ephemeral drainages;
- Using low-impact Project operations and maintenance adjacent to waters;
- Covering well-used roads on the Project Site with gravel to minimize sediment transport;
- Minimizing trash production in order to protect wildlife from waste materials;
- Burying natural rock scour arresters at crossings and other critical high energy surface water flow locations;
- Installing an "open cell, articulated concrete blanket" at access road crossings to reduce sedimentation;
- Re-vegetating tilled agricultural lands converted to Project use, and maintaining grassland cover during PV facility operation.

Compensation. The Applicant proposes to compensate for the loss of other waters of the U.S. (ephemeral drainage habitat) through in-kind habitat restoration (re-establishment) of a portion of the main drainage at a minimum ratio of 2:1 for permanent impacts of 0.089 acre and at a ratio of 1:1 for temporary impacts of 0.045 acre. This would result in reestablishing a minimum of 0.223 acre of ephemeral drainages by rebuilding a former portion of an aquatic resource (the main drainage), resulting in a gain in aquatic resource area and functions. The re-established drainage area would be revegetated with native vegetation typical of drainages within the Project Site. The re-established habitat would provide at a minimum functions comparable to those prior to project impacts. Implementing compensatory mitigation in the main drainage would expand its flood storage and desynchronization functions and would reduce flood damage by attenuating floodwaters following significant precipitation events. They would be protected from surrounding upland land use activities by an average 50-foot upland buffer. The mitigation area and buffer would be protected from future development by a recorded conservation easement.

3. STATE AND LOCAL APPROVALS:

Water Quality Certification: State water quality certification or a waiver is a prerequisite for the issuance of a Department of the Army Permit to conduct any activity which may result in a fill or pollutant discharge into waters of the United States, pursuant to Section 401 of the Clean Water Act of 1972, as amended (33 U.S.C. § 1341 *et seq.*). The applicant will submit an application to the California Regional Water Quality Control Board (RWQCB) to obtain water quality certification for the project. No Department of the Army Permit will be issued until the applicant obtains the required certification or a waiver of certification. A waiver can be explicit, or it may be presumed, if the RWQCB fails or refuses to act on a complete application for water quality

certification within 60 days of receipt, unless the District Engineer determines a shorter or longer period is a reasonable time for the RWQCB to act.

Water quality issues should be directed to the Executive Officer, California Regional Water Quality Control Board, Central Coast Region, 895 Aerovista Place, Suite 101, San Luis Obispo, California 93401, by the close of the comment period.

Coastal Zone Management: Section 307(c) of the Coastal Zone Management Act of 1972, as amended (16 U.S.C. § 1456(c) *et seq*.), requires a non-Federal applicant seeking a federal license or permit to conduct any activity occurring in or affecting the coastal zone to obtain a Consistency Certification that indicates the activity conforms with the State's coastal zone management program. Generally, no federal license or permit will be granted until the appropriate State agency has issued a Consistency Certification or has waived its right to do so. The project does not occur in the coastal zone or within the San Francisco Bay, and a *preliminary* review by USACE indicates the project would not likely affect coastal zone resources. This presumption of effect, however, remains subject to a final determination by the California Coastal Commission.

Coastal zone management issues should be directed to the District Manager, California Coastal Commission, Central Coast District Office, 725 Front Street, Suite 300, Santa Cruz, California 95060-4508, by the close of the comment period.

Other Local Approvals: The applicant will be applying for the following additional governmental authorizations for the project: Lake and Streambed Alteration Agreement and Endangered/Threatened Species Take Authorization from the California Department of Fish and Game; Portable Engine Registration from California Air Resources Board; CEQA Environmental Impact Report certification; Grading Permit; Building Permit; and Conditional Use Permit from the San Luis Obispo County; Authority to Construct and Permit to Operate (new stationary source) and Fugitive Dust Permit from San Luis Obispo County Air Pollution Control District.

4. **COMPLIANCE WITH VARIOUS FEDERAL LAWS**:

National Environmental Policy Act (NEPA): The applicant has submitted an application to the U.S. Department of Energy (DOE) under the federal loan guarantee program pursuant to the Energy Policy Act of 2005 to support construction of the proposed Project.

DOE is the lead agency for National Environmental Policy Act (NEPA) review of the Project. The Corps is a "cooperating agency" for preparation of the NEPA Environmental Impact Statement (EIS).

DOE is preparing an EIS pursuant to the National Environmental Policy Act of 1969, as amended (NEPA), the Council on Environmental Quality (CEQ) NEPA regulations, and the DOE NEPA implementing procedures to assess the potential environmental impacts of its proposed action of issuing a federal loan guarantee to Topaz. At the conclusion of the public comment period, USACE will assess the environmental impacts of the project in accordance with the requirements of the National Environmental Policy Act of 1969 (42 U.S.C. §§ 4321-4347), the Council on Environmental Quality's Regulations at 40 C.F.R. Parts 1500-1508, and USACE Regulations at 33 C.F.R. Part 325. The final NEPA analysis will normally address the direct, indirect, and cumulative impacts that result from regulated activities within the jurisdiction of USACE and other non-regulated activities USACE determines to be within its purview of Federal control and responsibility to justify an expanded scope of analysis for NEPA purposes. The final NEPA analysis will be incorporated in the decision documentation that provides the rationale for issuing or denying a Department of the Army Permit for the project. The final NEPA analysis and supporting documentation will be on file with the San Francisco District, Regulatory Division

Endangered Species Act (ESA): Section 7(a)(2) of the ESA of 1973, as amended (16 U.S.C. § 1531 *et seq*.), requires Federal agencies to consult with either

the U.S. Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service (NMFS) to insure actions authorized, funded, or undertaken by the agency are not likely to jeopardize the continued existence of any Federally-listed species or result in the adverse modification of designated critical habitat. USACE has made a preliminary determination that the project site is not within any listed species critical habitat, but that the following federally listed species are known to occur on the project site:

- San Joaquin kit fox (*Vulpes macrotis mutica*): ESA Endangered
- Longhorn fairy shrimp (*Branchinecta longiantenna*): ESA Endangered
- Vernal pool fairy shrimp (*Branchinecta lynchi*): ESA Threatened
- Mountain plover (*Charadrius montanus*): ESA Proposed Threatened

Presence of San Joaquin kit fox within and near the Project site was determined by a scat survey, DNA analysis of scat collections and visual surveys. There is a high variation in habitat quality for kit fox utilization within the Project Site, ranging from good to poor. The spring 2010 survey data for kit fox natal dens found 2 occupied dens located in the extreme southern and eastern ends of the Project study area. The den sites are located in annual grassland habitat that has not been plowed in over 20 years. Survey data from winter 2010 indicates these areas are still occupied by kit fox. The Project may adversely affect San Joaquin kit fox through direct and/or indirect effects to individuals, populations and habitat, even though the overall long-term effect of the Project on kit fox is expected to be beneficial.

Longhorn fairy shrimp was detected in two pools within the Project Site in the south half of Section 20, a farm field in active cultivation with dry-farmed grain. Vernal pool fairy shrimp was detected in 11 vernal pools in Section 4, in the extreme south end of the Project Site. Although the likelihood is extremely low, the Project could potentially adversely affect these species during construction or operation of the facility.

Mountain plovers were found on four occasions between January and March 2010, with a high count of 17 birds observed in the eastern end of Section 35 in March. The Project is not expected to appreciably reduce the reproduction numbers or distribution of the wintering mountain plover population in the Carrizo Plain region; therefore the Project may affect, but is not likely to adversely affect this species.

In addition, bald eagle (*Haliaeetus leucocephalus*) and golden eagle (*Aquila chrysaetos*) (both non-nesting) were occasionally detected foraging within the Project Site, but were not found to be nesting. Since bald eagles were delisted from the ESA in 2007, the Bald and Golden Eagle Protection Act (Eagle Act), as implemented by the USFWS, provides the primary legal protection for this species. The golden eagle, although never listed under the ESA, is also governed by the Eagle Act. The Project may affect the bald eagle and golden eagle. However the potential adverse effect would be discountable (i.e., extremely unlikely to occur and essentially not expected to occur) and insignificant (i.e. will not reach a scale where “disturbance” or “take” occurs) due to factors analyzed and explained in the project Biological Assessment.

On February 17, 2011, DOE initiated formal consultation with the USFWS under Section 7 of the federal Endangered Species Act (ESA), for potential impacts to federally listed species. Any required consultation must be concluded prior to the issuance of a Department of the Army Permit for the project. To complete the administrative record and the decision on whether to issue a Department of the Army Permit for the project, USACE will obtain all necessary supporting documentation from DOE and the applicant concerning the consultation process.

Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA): Section 305(b)(2) of the MSFCMA of 1966, as amended (16 U.S.C. § 1801 *et seq*.), requires Federal agencies to consult with the National Marine Fisheries Service (NMFS) on all proposed actions authorized, funded, or undertaken by the agency that may adversely affect essential fish habitat (EFH). EFH is defined as those

waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. EFH is designated only for those species managed under a Federal Fisheries Management Plan (FMP), such as the *Pacific Groundfish FMP*, the *Coastal Pelagics FMP, and* the *Pacific Coast Salmon FMP*. No fishery resources occur within the Project Site as the site contains no permanent or semi-permanent bodies of water, only wetlands and ephemeral drainages.

Marine Protection, Research, and Sanctuaries Act (MPRSA): Section 302 of the MPRS of 1972, as amended (16 U.S.C. § 1432 *et seq*.), authorizes the Secretary of Commerce, in part, to designate areas of ocean waters, such as the Cordell Bank, Gulf of the Farallones, and Monterey Bay, as National Marine Sanctuaries for the purpose of preserving or restoring such areas for their conservation, recreational, ecological, or aesthetic values. After such designation, activities in sanctuary waters authorized under other authorities are valid only if the Secretary of Commerce certifies that the activities are consistent with Title III of the Act. No Department of the Army Permit will be issued until the applicant obtains the required certification or permit. The project does not occur in sanctuary waters, and a *preliminary* review by USACE indicates the project would not likely affect sanctuary resources. This presumption of effect, however, remains subject to a final determination by the Secretary of Commerce, or his designee.

National Historic Preservation Act (NHPA): Section 106 of the NHPA of 1966, as amended (16 U.S.C. § 470 *et seq*.), requires Federal agencies to consult with the appropriate State Historic Preservation Officer to take into account the effects of their undertakings on historic properties listed in or eligible for listing in the *National Register of Historic Places.* Section 106 of the Act further requires Federal agencies to consult with the appropriate Tribal Historic Preservation Officer or any Indian tribe to take into account the effects of their undertakings on historic properties, including traditional cultural properties, trust resources, and sacred sites, to which Indian tribes attach historic, religious, and cultural significance. The DOE will consult with the State Historic Preservation Officer regarding Section 106 of the NHPA. If unrecorded archaeological resources are discovered during project implementation, those operations affecting such resources will be temporarily suspended until DOE concludes Section 106 consultation with the State Historic Preservation Officer or the Tribal Historic Preservation Officer to take into account any project related impacts to those resources.

5. **COMPLIANCE WITH THE SECTION 404(b)(1) GUIDELINES**: Projects resulting in discharges of dredged or fill material into waters of the United States must comply with the Guidelines promulgated by the Administrator of the Environmental Protection Agency under Section 404(b) of the Clean Water Act (33 U.S.C. § 1344(b)). An evaluation pursuant to the Guidelines indicates the project is not dependent on location in or proximity to waters of the United States to achieve the basic project purpose. This conclusion raises the (rebuttable) presumption of the availability of a less environmentally damaging practicable alternative to the project that does not require the discharge of dredged or fill material into special aquatic sites. The applicant has submitted an analysis of project alternatives which is being reviewed by USACE.

6. **PUBLIC INTEREST EVALUTION**: The decision on whether to issue a Department of the Army Permit will be based on an evaluation of the probable impacts, including cumulative impacts, of the project and its intended use on the public interest. Evaluation of the probable impacts requires a careful weighing of the public interest factors relevant in each particular case. The benefits that may accrue from the project must be balanced against any reasonably foreseeable detriments of project implementation. The decision on permit issuance will, therefore, reflect the national concern for both protection and utilization of important resources. Public interest factors which may be relevant to the decision process include conservation, economics, aesthetics, general environmental concerns, wetlands, cultural values, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shore erosion and accretion, recreation, water supply

and conservation, water quality, energy needs, safety, food and fiber production, mineral needs, considerations of property ownership, and, in general, the needs and welfare of the people.

7. **CONSIDERATION OF COMMENTS**: USACE is soliciting comments from the public; Federal, State and local agencies and officials; Native American Nations or other tribal governments; and other interested parties in order to consider and evaluate the impacts of the project. All comments received by USACE will be considered in the decision on whether to issue, modify, condition, or deny a Department of the Army Permit for the project. To make this decision, comments are used to assess impacts on endangered species, historic properties, water quality, and other environmental or public interest factors addressed in a final environmental assessment or environmental impact statement. Comments are also used to determine the need for a public hearing and to determine the overall public interest of the project.

8. **SUBMITTING COMMENTS**: During the specified comment period, interested parties may submit written comments to Ms. Holly Costa, San Francisco District, Regulatory Division, 1455 Market Street, 16th Floor, San Francisco, California 94103-1398; comment letters should cite the project name, applicant name, and public notice number to facilitate review by the Regulatory Permit Manager. Comments may include a request for a public hearing on the project prior to a determination on the Department of the Army permit application; such requests shall state, with particularity, the reasons for holding a public hearing. All substantive comments will be forwarded to the applicant for resolution or rebuttal. Additional project information or details on any subsequent project modifications of a minor nature may be obtained from the applicant and/or agent, or by contacting the Regulatory Permit Manager by telephone or e-mail cited in the public notice letterhead. An electronic version of this public notice may be viewed under the *Current Public Notices* tab on the USACE website: http://www.spn.usace.army.mil/regulatory/.

Appendix I
Contractor Disclosure Statement

NATIONAL ENVIRONMENTAL POLICY ACT DISCLOSURE STATEMENT FOR PREPARATION OF THE *TOPAZ SOLAR FARM ENVIRONMENTAL IMPACT STATEMENT*

The Council of Environmental Quality regulations at Title 40 of the *Code of Federal Regulations* (CFR), Section 1506.5(c), which have been adopted by the U.S. Department of Energy (10 CFR 1021), require contractors and subcontractors who will prepare an environmental impact statement to execute a disclosure specifying that they have no financial or other interest in the outcome of the project.

"Financial or other interest in the outcome of the project" is defined as any direct financial benefits, such as a promise of future construction or design work in the project, as well as indirect financial benefits that the contractor is aware of.

In accordance with these requirements, the offeror and any proposed subcontractors hereby certify as follows, to the best of their actual knowledge as of the date set forth below:

a) X Offeror and any proposed subcontractors have no financial or other interest in the outcome of the project.

b)__ Offeror and any proposed subcontractors have the following financial or other interest in the outcome of the project and hereby agree to divest themselves of such interest prior to award of this contract, or agree to the attached plan to mitigate, neutralize, or avoid any such conflict of interest.

Financial or Other Interests

1.
2.
3.

Certified by:

Signature

John King
Name

Principal
Title

Environmental Management and Planning Solutions, Inc.
Company

2/23/2011
Date

NATIONAL ENVIRONMENTAL POLICY ACT DISCLOSURE STATEMENT FOR PREPARATION OF THE *ENVIRONMENTAL IMPACT STATEMENT FOR THE US DEPARTMENT OF ENERGY LOAN GUARANTEE TO ROYAL BANK OF SCOTLAND FOR DEVELOPMENT OF THE TOPAZ SOLAR FARM, SAN LUIS OBISPO COUNTY, CALIFORNIA*

The Council of Environmental Quality regulations at Title 40 of the *Code of Federal Regulations* (CFR), Section 1506.5(c), which have been adopted by the U.S. Department of Energy (10 CFR 1021), require contractors and subcontractors who will prepare an environmental impact statement to execute a disclosure specifying that they have no financial or other interest in the outcome of the project.

"Financial or other interest in the outcome of the project" is defined as any direct financial benefits, such as a promise of future construction or design work in the project, as well as indirect financial benefits that the contractor is aware of.

In accordance with these requirements, the offeror and any proposed subcontractors hereby certify as follows, to the best of their actual knowledge as of the date set forth below:

a) X Offeror and any proposed subcontractors have no financial or other interest in the outcome of the project.

b) __ Offeror and any proposed subcontractors have the following financial or other interest in the outcome of the project and hereby agree to divest themselves of such interest prior to award of this contract, or agree to the attached plan to mitigate, neutralize, or avoid any such conflict of interest.

Financial or Other Interests
1.
2.
3.

Certified by:

Signature

Bart Wright
Name

Principal
Title

Lohnes + Wright.
Company

3/7/11
Date

Appendix J
Distribution List

Topaz Solar Farm EIS
Distribution List

Name	Agency	Number of Paper Copies (with Appendices on CD)	Number of CDs	Number of Summaries	Letter of EIS Availability
Elected Officials					
Federal					
The Honorable Barbara Boxer	US Senator	1	1		
The Honorable Dianne Feinstein	US Senator	1	1		
The Honorable Kevin McCarthy	US Representative, 22nd District	1	1		
The Honorable Lois Capps	US Representative, 23rd District	1	1		
The Honorable Jim Costa	US Representative, 20th District	1	1		
US Congressional Appropriations Committees					
The Honorable Dianne Feinstein	Chairman Subcommittee on Energy and Water Development Committee on Appropriations US Senate	1			
The Honorable Lamar Alexander	Ranking Member Subcommittee on Energy and Water Development Committee on Appropriations United States Senate	1			
The Honorable Rodney P. Frelinghuysen	Chairman Subcommittee on Energy and Water Development, and Related Agencies Committee on Appropriations United States House of Representatives	1			
The Honorable Peter J. Visclosky	Ranking Member Subcommittee on Energy and Water Development, and Related Agencies Committee on Appropriations United States House of Representatives	1			

Topaz Solar Farm EIS
Distribution List

Name	Agency	Number of Paper Copies (with Appendices on CD)	Number of CDs	Number of Summaries	Letter of EIS Availability
US Congressional Authorizing Committees					
The Honorable Jeff Bingaman	Chairman Committee on Energy and Natural Resources United States Senate	1			
The Honorable Barbara Boxer	Chairman Committee on Environment and Public Works United States Senate	1			
The Honorable Lisa Murkowski	Ranking Member Committee on Energy and Natural Resources United States Senate	1			
The Honorable James M. Inhofe	Ranking Member Committee on Environment and Public Works United States Senate	1			
The Honorable Fred Upton	Chairman Committee on Energy and Commerce United States House of Representatives	1			
The Honorable Ralph Hall	Chairman Committee on Science, Space and Technology United States House of Representatives	1			
The Honorable Henry A. Waxman	Ranking Member Committee on Energy and Commerce United States House of Representatives	1			
The Honorable Eddie Bernice Johnson	Ranking Member Committee on Science, Space and Technology United States House of Representatives	1			
State					
Mr. Jerry Brown	CA State Governor	1	1		
Mr. Gavin Newsom	CA Lieutenant Governor		1		
Ms. Debra Bowen	CA Secretary of State		1		
Mr. Sam Blakeslee	CA State Senator 15th District		1		

Topaz Solar Farm EIS
Distribution List

Name	Agency	Number of Paper Copies (with Appendices on CD)	Number of CDs	Number of Summaries	Letter of EIS Availability
K.H. "Katcho" Achadjian	Member of CA State Assembly 33rd District		1		
Local					
Mr. Frank Mecham	SLO County Supervisor, 1st District		1		
Mr. Bruce S. Gibson	SLO County Supervisor, 2nd District		1		
Mr. Adam Hill	SLO County Supervisor, 3rd District		1		
Mr. Paul Teixeira	SLO County Supervisor, 4th District		1		
Mr. James R. Patterson	SLO County Supervisor, 5th District		1		
Mr. Julian Crocker	SLO County Superintendent of Schools		1		
Mr. Gerald T. Shea	SLO County District Attorney		1		
Federal Agencies					
Ms. Susan Bromm, Director, Office of Federal Activities	US Environmental Protection Agency	1 (with paper copy of appendices)	3		
Ms. Ann McPherson, Department of Energy Reviewer	US Environmental Protection Agency Environmental Review Office	1	1		
Mr. Dave Belote, Director	Energy Siting Clearinghouse, ODUSD (I&E),		1		
Mr. Cameron Johnson	US Army Corps of Engineers, San Francisco District	1	1		
Mr. Ken Sanchez Assistant Field Supervisor	US Fish and Wildlife Service, Region		1		
Mr. Art Pearson	US Department of Agriculture, Natural Resources Conservation Service				1
Mr. John (Matthew) Harrington, National Environmental Coordinator	Natural Resources Conservation Service Department of Agriculture		1		
Mr. Mark Plank	Department of Agriculture, Rural Utilities Service		1		

Topaz Solar Farm EIS
Distribution List

Name	Agency	Number of Paper Copies (with Appendices on CD)	Number of CDs	Number of Summaries	Letter of EIS Availability
Ms. Lynn Murphy	Naval Facilities Engineering Command		1		
Mr. Thomas A. Egeland Director, Environmental Planning and Conservation Policy	Office of the Assistant Secretary of the Navy (I&E)		1		
Mr. Alessandro Amaglio, Regional Environmental Officer	DHS/FEMA Region IX				1
Mr. Willie R. Taylor Director	Department of the Interior, Office of Environmental Policy and Compliance	1			
Mr. Marv Keller Chief, Division of Environmental and Cultural Resources Management	Bureau of Indian Affairs		1		
Ms. Shannon Stewart	Bureau of Land Management Division of Decision Support, Planning, and NEPA		1		
Ms. Pat Carter NEPA Coordinator	Fish and Wildlife Service		1		
Mr. Reid Nelson Director, Office of Federal Agency Programs	Advisory Council on Historic Preservation	1	1		
Tribal Contacts					
Federally Recognized Tribes					
Honorable Vincent Armenta, Chairperson	Santa Ynez Band of Mission Indians		1	1	
Honorable Ruben Barrios, Chairperson	Tachi Yokut Tribe Santa Rosa Rancheria		1	1	
Honorable Ryan Garfield Chairman	Tule River Indian Tribe Tule River Reservation		1	1	
Native American Heritage Commission Contact List					
Doug Alger, Cultural Resources Coordinator	Salinan Nation Cultural Preservation Association		1	1	
Frank Arredondo	Chumash		1	1	

Topaz Solar Farm EIS
Distribution List

Name	Agency	Number of Paper Copies (with Appendices on CD)	Number of CDs	Number of Summaries	Letter of EIS Availability
John W. Burch, Traditional Chairperson	Salinan Tribe of Monterey, SLO, and San Benito Counties		1	1	
Gregg Castro, Administrator	Salinan Nation Cultural Preservation Association		1	1	
Fred Collins, Spokesperson	Northern Chumash Tribal Council		1	1	
Matthew Darian Goldman	Chumash		1	1	
Robert Duckworth, Environmental Coordinator	Salinan Nation Cultural Preservation Association		1	1	
Beverly Salazar Folkes	Chumash, Fernandeno Tataviam		1	1	
Jose Freeman, President	Salinan Nation Cultural Preservation Association		1	1	
Janet Garcia, Chairperson	Coastal Band of the Chumash Nation		1	1	
Judith Bomar Grindstaff	Salinan		1	1	
Randy Guzman - Folker	Chumash, Fernandeno Tataviam, Shoshone Paiute, Yaqui		1	1	
Donna Haro	Xolon Salinan Tribe		1	1	
Vennise Miller, Chairperson	Coastal Band of the Chumash Nation		1	1	
Lei Lynn Odom	Chumash		1	1	
Peggy Odom	Chumash		1	1	
Mona Olivas Tucker	Chumash		1	1	
Julie Lynn Tumamait	Barbareno/Ventureno Band of Mission Indians		1	1	
Alex Valencia, Chairperson	Santa Ynez Tribal Elders Council		1	1	
Mark Steven Vigil, Chief	San Luis Obispo County Chumash Council		1	1	
Willie Wyatt, Tribal Administrator	Santa Ynez Band of Mission Indians		1	1	
Xielolixii	Salinan-Chumash Nation		1	1	

Topaz Solar Farm EIS
Distribution List

Name	Agency	Number of Paper Copies (with Appendices on CD)	Number of CDs	Number of Summaries	Letter of EIS Availability
State Agencies					
Mr. Scott Morgan, Acting Director	California State Clearinghouse Governor's Office of Planning and Research		15	15	
Julie Vance Environmental Program Manager	California Department of Fish and Game, Central Region		1		
	Cal Trans District 5				1
	Cal Trans District 6				1
Local Agencies					
Steven McMasters	San Luis Obispo County Department of Planning and Building	3			
Mr. Marty Settevendemie	Deputy Agricultural Commissioner		1		
Mr. Paul Lee	San Luis Obispo County Fire Department		1	1	
	Atascadero Unified School District				1
Ms. Sharee Washer	California Valley Community Service District	2			
Organizations					
Mr. Michael Fry Director of Conservation Advocacy	American Bird Conservancy				1
Ms. Glee Murray Associate Director for Outreach	American Council for an Energy Efficient Economy				1
Mr. Dan Taylor	Audubon Society, California Division		1		
Mr. David Chipping	California Native Plant Society				1
Ms. Kassie Siegel Air, Climate, and Energy Director	Center for Biological Diversity		1		
Ms. Ileene Anderson	Center for Biological Diversity		1		

Topaz Solar Farm EIS
Distribution List

Name	Agency	Number of Paper Copies (with Appendices on CD)	Number of CDs	Number of Summaries	Letter of EIS Availability
Mr. Richard Liebert, Chairman	Citizens for Clean Energy, Inc.		1		
	Condor Research Center				1
	Ducks Unlimited Western Regional Office				1
Ms. Pamela Flick	Defenders of Wildlife		1	1	
Ms. Vickie Patton General Counsel	Environmental Defense Fund				1
Mr. Arjun Makhijani, Ph.D. President	Institute for Energy and Environmental Research		1		
	Kern Audubon Society				1
	Land Conservancy of SLO Co.				1
Ms. Rebecca Baumann Executive Director	The Minnesota Project		1		
	The Nature Conservancy				1
Mr. David Goldstein Energy Program Director	Natural Resources Defense Council		1		
Ms. Anne Rhine	Renewable Fuels Association				1
Mr. Don Hancock Director, Nuclear Waste Safety Program and SRIC Administrator	Southwest Research and Information Center		1		
Paul Friesema	Northwestern University, Environmental Policy and Culture Program				1
Mr. Brandon Liddell, Senior Land Planner	Pacific Gas & Electric Company, Land and Environmental Management				1
Mr. Andrew Christie	Sierra Club		1	1	
	SLO County Archaeological Society				1
Ms. Penny Anderson	Western Resource Advocates, Energy Program				1

Topaz Solar Farm EIS
Distribution List

Name	Agency	Number of Paper Copies (with Appendices on CD)	Number of CDs	Number of Summaries	Letter of EIS Availability
Individuals Who Submitted Scoping Comments					
Mr. Stephen W. Ela			1	1	
Sabry Elsokkary			1	1	
Phil & Denise Emerson			1	1	
Mr. Brendan Hughes			1	1	
Mr. Samuel B. Johnston			1	1	
Dale Kuhnle			1	1	
Ms. Maureen Luebbers			1	1	
Jean Public			1	1	
Mike & Jenny Strobridge			1	1	
Tim & Mary Strobridge			1	1	
Yafet Tekle			1	1	
Darrell & Nola Twisselman			1	1	
Mr. David Webb			1	1	
Merkes S. Woiku			1	1	

Letters were sent to the following individuals notifying them of the availability of the Draft EIS for public review, the date of the public comment period, and how to access copies of the Draft EIS (addresses have been withheld to protect privacy). In addition, an email notice was sent to 150 persons on the project mailing list (these addresses have also been withheld to protect privacy):

Thomas P. Abbott
Fred & Rose Abitia
Kenneth & Lovenia Adams
Adams Broadwell Joseph & Cardoza
Sandy Agalos
Chris Akelian
Bret Allen
John Amonett
Debbie Arnold
Frank Arredondo
Maria Arroyo
Phil Ashley
George Ayres
Marlis A Balogh
Isitiak Balooch
Tim Balooch
Istiak Balooch
George Barber Trust
Geof Bard
Todd Barna
William E. Barr
Janet S. Barton
Beck Ranch LLC
James Bell
Robin Bell
Arthur & Cayetana Bell
Heirs of Arvant M Benjamin
Megan Birney
Cory Black
Jeffrey Blackman
Andrew Blodgett
Steve Bogger
John & Evlyn Bonca
Rick Boothe
Elay & Carol Bowman
Luke Boyer
Robert Boyer
Teresa Brander
Joseph Brolin
Tisha Bryant
Clinton I. Bullard
Jerry Bunin
Pam Burgett
Caleb Residence
Candiff Residence
Salvador & Carolina Cano
Trinidad & Ramona Cano
Daniel Capozzo
Castro Residence
Albert Ceglia
Aaron Chew
John Childers
Carlyn Christenson
Joni Clark
Pierina Clark
Pete Clark
Donn Clickard
Cline Residence
William & Susan Cochrane
Wayne Cooper
Cooper Residence
Corlery Residence
Jackie Crabb
Ellen Cypher
Czapla Residence
Del Santos Residence
Carter Delashmutt
Jerry Diefenderfer
Carl Dudley
Sharon Duggan
John Edmisten
Douglas & Janice Edwards
Leon E. Elwell
Denise Emebon
Gholam Fatemi
Iain Fisher
Forrest Residence
Richard Forth
Tom Foss
Prince Frazier
Don Freeborn
Calvin & Louise French
Friend Residence
Gallagher Residence
George Galvan
Pete & Mary Giambalvo
Marie Giusto
Robert L. Gomez Jr.
Nichola Groom
Tanya Gulesserian
Dimas & Elena Guzman
Maher F Habashi
Dave Hacker
Richard Hall
Kathy Hannemann
Peter H. Harrison
Susan Harvey
Raymond L. Hatch
Hayes Residence
Leslie Haynes
Kelly Haynes
William A Haynes
Beth Hendrickson
Gordon Hensley
Christine Hersey
Robert A. Hill
John Hook
Wallace Houchin
Houchin Family
John & Johna Hurl
Heirs of Walter J. Jadeson
Davit Jeiranian
Gordon Johnson
Ann Jopling
Erik Justesen
Kapeleech
Ermina Karim
Kaskeldt Residence
Janet Keith
John Kessler
Kevin Kester
Michael Khus-Zarate
Sean Kiernan
Janet R Klock
Janet Klock
John Knight
Kevin Knowles
Rachael Koss
Orchell Krier
Kuhnle Residence
Randall L Kuhnle
Charles Kuhnle
Luke Lathrop
Thomas Lebens

Estaban Ledezma
Dawn Legg
Mike A Leprino Trust
Alex Levinson
Albert Lewis
Brandon Liddell
Alfred Look
Shirley Macagni
Maher Residence
Michael Manchak
Lisa Marrone
Jackie Martin
Ken & Debra Martin
Rosa Martinez
Janet Martinez
Don Maruska
Danilo & Edita Masaya
Isaac Matta
Colman & Lydia Matyas
Louise Mayhew
Ruth Mc Laughlin
Sarah Mcbride
Kimberly Mcgrath
Roy Mckee
Paul Mcmillan
Greg Mcmillan
John Mcreynolds
Steve Mcvicar
Mcvicar Residence
Rosendo & Carmen Medina
Patricia Miller
Glenn A Miller
Loreno Montenegro
Josefina Montenegro
John Montgomery
Melissa Mooney
Allen Moore
Bob Morrison
Babak Naficy
S. Natcher
Joseph Nguyen
Nolan Residence
Pati & Bob Nolan
Nate & Nicole Nolen
Normandin Residence
Andrew & Silvia Nunez
Mark J. Nye
Tom O'Malley
Lorelei Oviatt
Robyn Padgett
George Paquette
Steven Paquette
Brian Parker
Al Parker
Randall & Shelly Parker
J J Parsons
Vince Pasquini
Benjamin J. Peters
Jim & Roberta Petersen
Peyron Residence
Mike Post
Robert E Pritchard
Larry C Pritchard
Morgan Rafferty
Barbara I Ratekin
Santos & Alberta Reyes
Morgan Richard
B.K. Richard
Sabrina Roberts
Rudy Rodriguez
Flora Rodriguez
John Rogers
Deborah L. Rogers
John Romanini
Don & Gaynelle Rose
Don & Gaynelle Rowlett
Heirs of Marcus Rudnick
Gary Ruggerone
John A. Ruskovich
Paul Sacks
Karl Salinas
Richard Savage
Joann Sellingston
Settle Residence
Sill Properties, Inc.
Steve Settle
Edwin Silva
Silva Edwin
Richard & Estrella Simpson
Thomas E Simpson
Thomas & Jean Simpson
Rob Simpson
Dawn Skinner
Julie M Slate
Evalena C Smith
David Sneed
Sokkary Residence
Vicki Stach
Starr Residence
Harley Stegman
John R Stephenson
Adele H Stern
Stu Strobridge
Kathleen Sumida
Michael Sumter
Cindy Switzer
Kenneth Tab
Adele H Stern
Takle Residence
William Thoma
Donald T Toretta
Leonard Torgerson
Traver Residence
Pamela Tucker
Grain & Cattle Twisselman
Carl F & Dorothy
Twisselman Residence
Ken Twisselman
Rowland W Twisselman
Darrell & Nola Twisselman
Debra Twisselman
Rowland & Catherine
Twisselman
Stacey Twisselman
Rowland W Twisselman
Carl F Twisselman
K.C. Twisselman
Elena Twisselman-Clark
Cindy Utter
Vanessa Vasquez
Vaughan Residence
Eva Vaughn
Delia Velasquez
Leona Wadhams
Dr. David Warner
Sharee Washer
Larry Werner
Ray Weruth
Mike Whiteford
Isaac & Janet Wiire
Raymond Williams
Kim Williams
Michael Winn
Kenneth Wreden
Dorothy T Yard
Fred Young
Zissa Residence
Shawn Zovod
Rachel Zurer