RECLAMATION

Managing Water in the West

Draft Environmental Assessment and Plan of Development

San Luis Solar Project

EA-14-059

U.S. Department of the Interior
Bureau of Reclamation

December 2015

Mission Statements

The mission of the Department of the Interior is to protect and manage the Nation's natural resources and cultural heritage; provide scientific and other information about those resources; and honor its trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

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Acronyms and Abbreviations

AADT	annual average daily traffic
AC	alternating current
APE	Area of Potential Effect
Applicant	San Luis Renewables and/or their Assignee(s)
BESS	battery energy storage system
BMP	best management practice
CalEEMod	California Emissions Estimator Model
Cal Fire	California Department of Forestry and Fire Protection
Caltrans	California Department of Transportation
CDFW	California Department of Fish and Wildlife
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO_2e	carbon dioxide equivalents
DC	direct current
dB	decibel
dBA	A-weighted decibel
DWR	California Department of Water Resources
EA	Environmental Assessment
EPA	(United States) Environmental Protection Agency
gen-tie	generation interconnection
GHG	greenhouse gas
I-5	Interstate 5
Interior	United States Department of the Interior
KOP	key observation point
kV	kilovolt
L_{dn}	day-night level
L_{eq}	equivalent sound level
L_{max}	maximum sound level
LOS	level of service
MBTA	Migratory Bird Treaty Act
mph	miles per hour
MW	megawatt
NAHC	Native American Heritage Commission
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO_x	nitrogen oxides
NRHP	National Register of Historic Places
OHV	Off-Highway Vehicle
OSHA	Occupational Safety and Health Administration
$PM_{2.5}$	Particulate matter less than 10 microns
PM_{10}	Particulate matter less than 2.5 microns
Project	San Luis Solar Project
PV	photovoltaic
Reclamation	Bureau of Reclamation

RMP/GP	Resource Management Plan/General Plan
San Luis Dam	B.F. Sisk (San Luis) Dam
SHPO	State Historic Preservation Officer
SLDMWA	San Luis and Delta-Mendota Water Authority
SR	State Route
SRA	State Recreation Area
State Parks	California State Parks
Strategy	Sustainable Energy Strategy
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
USFWS	United States Fish and Wildlife Service
VOC	volatile organic compounds
WAPA	Western Area Power Administration

Section 1 Introduction

San Luis Renewables and/or their Assignee(s) (Applicant) have requested a 30-year Land Use Authorization from the Bureau of Reclamation (Reclamation) to access, install, operate, maintain and remove on its Federal lands a 26-megawatt (MW) alternating current (AC) solar photovoltaic (PV) energy generating project known as the San Luis Solar Project (Project).

The Project would be constructed on three sites along O'Neill Forebay in and adjacent to the San Luis Reservoir State Recreation Area (SRA), to the northwest of the State Route (SR) 152/SR 33 interchange in Gustine, Merced County, California (Figure 1).

This Environmental Assessment (EA) has been prepared to satisfy the requirements of the National Environmental Policy Act (NEPA). A Solar Energy Plan of Development has also been incorporated into this EA to satisfy the information requirements set forth by the United States Department of the Interior (Interior).

The decision to approve the issuance of the Land Use Authorization for the San Luis Solar Project will be based, in part, on the incorporated Plan of Development that outlines the Applicant's proposal for the Project and the evaluation of the Project's potential environmental effects through the NEPA review process.

1.1 Background

1.1.1 Renewable Energy on Federal Lands

In October 2009, Governor Arnold Schwarzenegger and Secretary of the Interior Ken Salazar signed an agreement to begin the development of renewable energy on Federal lands in California. The initiative directed Interior agencies and State of California agencies to identify areas suitable for renewable energy development, identify renewable energy zones based on development potential, and prioritize application processing for solar development in renewable energy zones (U.S. Department of Energy 2009).

The Secretary of the Interior's Secretary's Order 3285A1, amended February 22, 2010, established a policy encouraging the production, development, and delivery of renewable energy as one of Interior's highest priorities. In furtherance of this policy, agencies and bureaus within Interior work collaboratively with each other and with other Federal agencies, departments, tribes, states, local communities, and private landowners to encourage the timely and responsible development of renewable energy and associated transmission while protecting and enhancing the nation's water, wildlife, cultural, and other natural resources. Specifically, Reclamation has

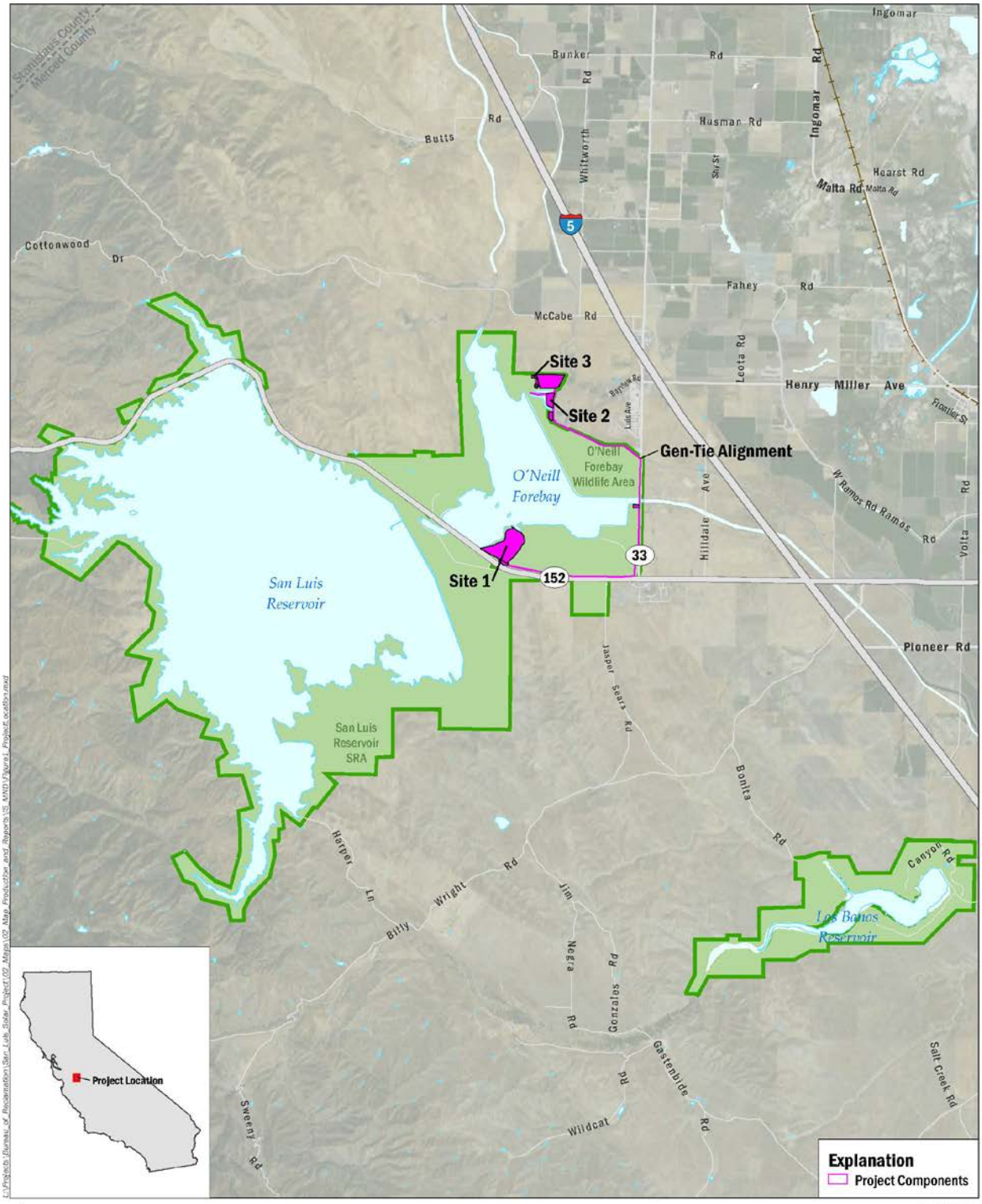

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FIGURE 1
Project Location

made the bringing online of non-hydro renewable energy sources one of its top five priorities (Memorandum of Understanding between Interior and the State of California on Renewable Energy, January 13, 2012; U.S. Department of the Interior, Bureau of Reclamation, Commissioner Connor: Mission and Priorities; U.S. Department of the Interior News Release, "Secretary Salazar, Governor Brown Expand Partnership to Expedite Renewable Energy Projects in California," dated January 13, 2012).

To support future renewable energy projects, Reclamation released its Sustainable Energy Strategy (Strategy) on November 14, 2013. The Strategy creates a framework that will allow Reclamation to plan for future renewable power development, integration, and production in an environmentally and economically sound manner. The Strategy identifies six long-term strategic objectives to help guide Reclamation in this endeavor:

1. Increase renewable generation from Reclamation projects.
2. Facilitate non-Federal development of renewable energy projects.
3. Increase energy savings and conservation at Reclamation projects.
4. Support integration of variable non-dispatchable renewable resources in the United States electrical grid.
5. Increase benefits of renewable energy through technological innovation.
6. Improve management efficiencies related to the implementation of renewable energy and energy savings projects (Reclamation 2013a).

1.1.2 Project Area Background

Reclamation owns most land surrounding San Luis Reservoir and O'Neill Forebay, including the lands on which the Project is proposed. The following agencies are involved in operating and managing these lands: California State Parks (State Parks) (recreation management), California Department of Water Resources (DWR) (reservoir and water distribution operations), and California Department of Fish and Wildlife (CDFW) (San Luis and O'Neill Forebay Wildlife Areas and Upper and Lower Cottonwood Wildlife Areas). In addition, the California Department of Forestry and Fire Protection (Cal Fire) has a fire station on Reclamation lands to the south of SR 152, along Gonzaga Road.

In the Project area, Site 1 is managed by State Parks under a long-term management agreement with Reclamation. The San Luis and Delta-Mendota Water Authority (SLDMWA) has rights to use portions of Sites 2 and 3 within the San Luis Reservoir SRA for operations and maintenance.

The Project area is located in the County of Merced and the San Luis Reservoir SRA Resource Management Plan/General Plan (RMP/GP) is the guiding document for these lands.

The Project area is located within portions of:

- Lot 29 of Rancho San Luis Y Gonzaga on file in Book 2 of Official Plats at Page 4, Merced County Records;
- Sections 1 and 13, Township 10 South, Range 8 East, Mount Diablo Base and Meridian; and
- Sections 6, 7, and 18, Township 10 South, Range 9 East, Mount Diablo Base and Meridian.

1.2 Need for the Proposed Action

As stated in Section 1.1, Reclamation has made the bringing online of non-hydro renewable energy sources one of its top five priorities. In June 2011, Reclamation issued a Request for Interest in a lease arrangement to construct a renewable resource generation project on Federal lands in the vicinity of the San Luis Project.[1] The development of such projects is "intended to curb the dependence on foreign oil, reduce use of fossil fuels, and promote new industries" (Reclamation 2011). The Project was proposed in response to the Request for Interest.

In addition to satisfying this priority, the Project may be used to help offset expected power delivery cost increases for operating the San Luis Unit, which includes the O'Neill Dam and Forebay, O'Neill Pumping-Generating Plant, B.F. Sisk (San Luis) Dam, San Luis Reservoir, and William R. Gianelli Pumping-Generating Plant. Reclamation and its water customers face large increases in transmission costs to deliver energy to the pumps of the San Luis Unit when a Reclamation contract with Pacific Gas & Electric Company (PG&E) from 1965 expires in 2016. A portion of the solar power from the Project may be consumed by pump load at the Gianelli and O'Neill pumping-generating plants, reducing the need for—and thus cost of—replacement transmission. The remaining power produced by the Project would be sold to a municipal or public utility or a private purchaser and transmitted over the WAPA transmission system using a new transmission line that is being constructed to serve the San Luis Unit, making the line more cost efficient. Use of the California Independent System Operator system is also an option. The Project would also help reduce air emissions from non-renewable power generation, including carbon dioxide, by displacing the need for more thermal power plants.

[1] The boundaries of the San Luis Project Lands, shown at http://www.usbr.gov/mp/cvo/renproj/docs/SL_ON_Right-of-Way_Map.pdf, encompass the San Luis State Reservoir Recreation Area and adjacent portions of the Delta-Mendota Canal, San Luis Wasteway, and California Aqueduct.

Section 2 Alternatives Including the Proposed Action

This EA considers two possible actions: the No Action Alternative and the Proposed Action. The No Action Alternative reflects future conditions without the Proposed Action and serves as a basis of comparison for determining potential effects to the human environment.

2.1 No Action Alternative

Under the No Action Alternative, the proposed solar facilities would not be constructed, and its non-hydropower renewable energy sources would not be provided in the Project area.

2.2 Proposed Action

Reclamation proposes to issue to the Applicant a 30-year Land Use Authorization to access, install, operate, maintain, and remove a 26 MW AC solar PV energy generating project in and adjacent to San Luis Reservoir SRA. Specific Project details are included below.

Project construction would not begin until after all applicable approvals and permits have been obtained, including environmental reviews. The Applicant estimates that it would take approximately 6 to 9 months from initial construction mobilization to completion of construction. Table 1 shows key milestone dates associated with Project permitting and approvals, as well as Project construction. Once construction is completed, the Project would be in operation for approximately 30 years. The Applicant submitted interconnection requests for the Project with WAPA in mid 2015.

Table 1 Preliminary Project Schedule

Project Milestone	Start Date	Date Complete
Project Description (Plan of Development) Submittal	December 2014	February 2015
Interconnection Applications Submitted to WAPA	February 2015	June 2015
Admin Draft Environmental Assessment (EA) prepared for review by Reclamation stakeholders	February 2015	October 2015
Land Use Authorization Negotiations	August 2015	January 2016
USFWS Consultation	November 2015	February 2016
Draft EA circulated for public review and comment	November 2015	December 2015
USFWS issues Letter of Concurrence	--	February 2016
Draft EA comments received and Final EA released	December 2015	February 2016
Interconnection Agreements Executed with WAPA	February 2016	March 2016
Project Construction	March 2016	December 2016

2.2.1 General Facility Description, Design, and Operations

The Project would consist of the three separate solar PV systems (Sites 1, 2, and 3), which would consist of solar PV panels, racks to hold the panels, and electrical infrastructure. The electrical infrastructure would consist of cabling, direct current (DC) to AC power conversion units with medium voltage transformers, and medium voltage (34.5 kV) underground lines. Each site would also have access roads, fencing, lighting, and security systems. Other Project components include combining switchgear, control buildings, meteorological stations, and substations (34.5 kV / 70 kV), depending on the site. Gen-tie lines (70 kV) would connect each site to the existing O'Neill Substation.

In addition, a battery energy storage system (BESS) would be included as part of the Project to help the Applicant better deliver energy at a controlled and more constant level.

Additional details of these Project components are provided below. For Project location, land ownership, jurisdiction, and legal land description, see Section 1.2.

2.2.1.1 Total Acreage and Solar PV System Overview

The maximum construction footprint of the Project consists of the boundaries of Sites 1, 2, and 3; the gen-tie corridor (70 kV poles and lines centered within a 75-foot easement); potential temporary staging areas; and potential spoils pile relocation areas. Together, these areas cover up to 246.5 acres. Acreages of specific Project components are provided in Table 2, and components are discussed further in the following sections.

Table 2 Project Components and Acreages

Project Component	Number of Components	Approximate Area (acres)
Solar PV system sites	3	Site 1: 108 Site 2: 14 Site 3: 47
Staging areas	Up to 5 potential	15.2 (total)
Stockpile relocation areas	2 potential	5.7 (total)
BESS	1	Up to 0.7
Gen-tie corridor	6.2 linear miles	56.4 (including 75-foot-wide easement)
Within solar PV system sites		
Roads (improved and new; assumed 20 feet wide)	Site 1: 15,363 linear feet (lf) Site 2: 3,236 lf Site 3: 6,748 lf	Site 1: 7.1 Site 2: 1.5 Site 3: 3.1
Substations	2 (Sites 1 and 2)	Site 1: 0.2 Site 2: 0.5
Combining switchgear	1 (Site 3)	<0.1
Control buildings	2 (Sites 1 and 2)	<0.1
Solar PV panels	Site 1: 66,840 Site 2: 28,080 Site 3: 7,440	Site 1: 32.2 Site 2: 3.6 Site 3: 13.7
Power conversion units	17	0.27

Placement of PV systems and other components within each site accounts for constraints including topography, hydrology, and biological considerations.

Solar PV System Overview

The Project would use approximately 102,360 high-efficiency, commercially available Underwriters Laboratory-listed solar PV panels made from crystalline silicon, anti-reflective

glass, aluminum frames, copper electrical wires with plastic sheathing, and weather-resistant "quick connect" wire connectors. Together, these items are referred to as solar modules.

The solar PV panels collect light energy (photons) from the sun and convert them directly into electricity through the *photovoltaic effect*, in which photons of light "excite" electrons into a higher state of energy, allowing them to act as charge carriers for an electric current. The panels would be tempered for impact resistance and use anti-reflective glass, which is less reflective than standard residential and commercial glass.

At each site, the solar PV panels would be mounted on steel brackets to a horizontal single-axis tracking system, which is essentially a moving rack that tilts the panels to track the sun in an east-west direction throughout the day and seasons. Each tracker unit would consist of 16 rows with 40 solar PV panels each, which would be mechanically connected by a common rod. The rod would be moved by a single electric motor and gear train. The maximum height of the solar PV panels when mounted on the tracking system would be less than 7.5 feet. A photograph of a solar PV system is shown in Figure 2.

Figure 2. Representative View of a Solar PV System
Photo courtesy of HORUS Renewables

A number of electrical connections are needed to convey and convert power collected by the solar PV panels to the electrical grid. Solar energy is captured by the PV panels as DC electricity. The solar PV panels would be electrically connected by wire harnesses that are part of the tracking system assembly. Combiner boxes would collect DC power from the wire harnesses of several rows of panels and convey it through underground cables to power conversion units. The power conversion units convert the DC input into grid-quality AC output, and a transformer within the unit then "steps up" the voltage. The power conversion units would consist of outdoor inverter and transformer equipment mounted directly on poured or pre-cast concrete pads/foundations. A photograph of a power conversion unit is shown in Figure 3.

Figure 3. Representative View of a Power Conversion Unit
Photo courtesy of HORUS Renewables

Specific details about each site are provided below. The sites are shown in Figures 4 through 6.

Site 1

Site 1, the southernmost solar PV system (see Figure 4), would be built on approximately 108 acres of land in the Medeiros Use Area. Approximately 32.2 acres would be occupied by the solar PV system, while the remaining acreage would be used for roads, spacing between rows to avoid shading from the panels, power conversion units, detention basins, and a new substation. If a buffer between the west side of Site 1 and adjacent recreation is considered, the buffer would be from 50 feet up to 200 feet, and would not increase the total footprint and is entirely within the area of Site 1 shown in Figure 4. For the purposes of fully identifying and addressing impacts from Site 1, no buffer was assumed.

The Site 1 solar PV system would contain approximately 66,840 solar PV panels with a capacity of approximately 305 watts each. For the Site 1 PV system, a total of 11 power conversion units are projected. Medium-voltage underground lines (placed in conduits or directly buried approximately 36 inches below ground surface) would convey the output of the power conversion units to a new on-site substation. The substation would step up the voltage from the PV system from 34.5 kV to 70 kV for transmission to the existing O'Neill Substation. The total power output is projected to be approximately 16.5 MW AC.

As part of the SRA, Medeiros Use Area is accessible to the visiting public. Site 1 would be fenced, and access within Site 1 would be restricted to Project personnel via a locked gate.

Site 2

Site 2 would be built on approximately 14 acres of land just south of the canal intake to the O'Neill Pumping-Generating Plant and west of the Delta-Mendota Canal (see Figure 5). Approximately 3.6 acres would be occupied by solar PV panels, while the remaining acreage would be used for roads, spacing between rows to avoid shading from the panels, power

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FIGURE 4
Site 1 Facility Layout

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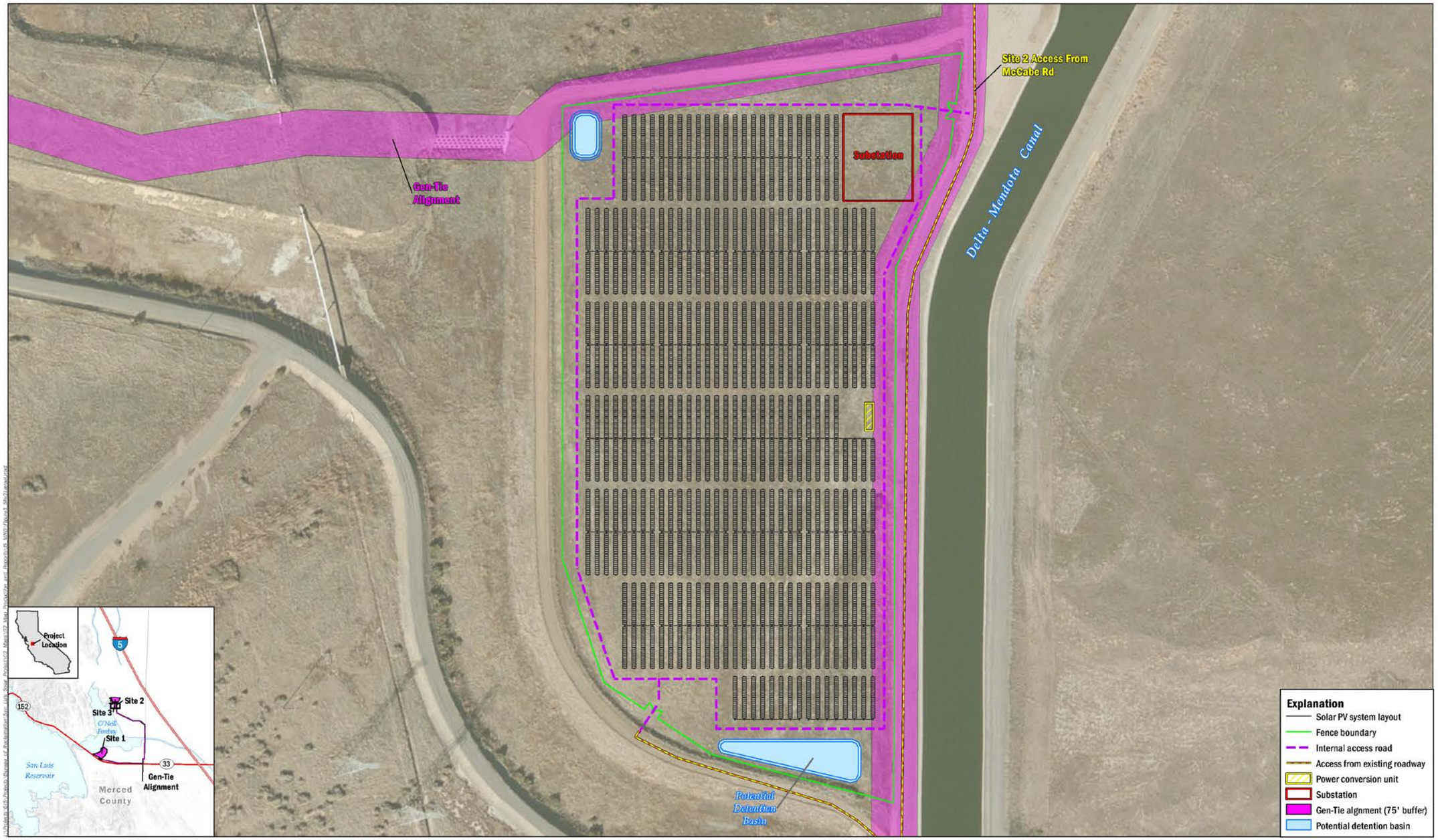

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FIGURE 5
Site 2 Facility Layout

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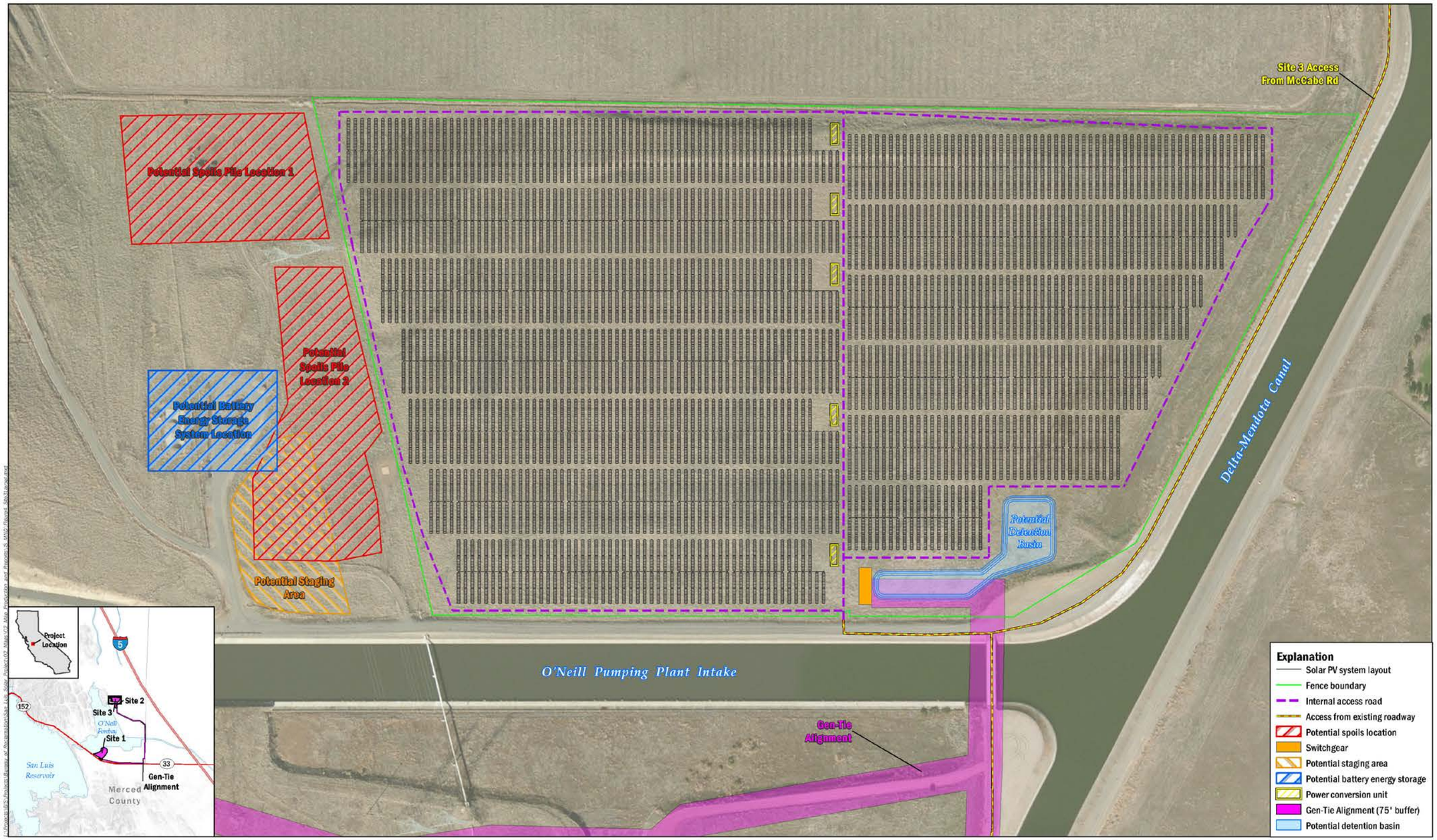

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FIGURE 6
Site 3 Facility Layout

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conversion units, detention basins, and a new substation. Site 2 is anticipated to have 7,440 solar panels with a capacity of approximately 305 watts each, one power conversion unit, and a total power output of 2 MW AC.

As with Site 1, Site 2's medium-voltage underground lines would convey the output of the power conversion unit to a new on-site substation. The substation would step up the voltage from the PV system from 34.5 kV to 70 kV for transmission to the existing O'Neill Substation.

SLDMWA has rights to access Site 2 for operations and maintenance of the O'Neill Pumping-Generating Plant. Site 2 is not currently accessible to the public, and access would remain limited to Project personnel.

Site 3

Site 3, the northernmost solar PV system, would be built on approximately 47 acres of land just north of the canal intake to the O'Neill Pumping-Generating Plant (see Figure 6). Approximately 13.7 acres would be occupied by solar PV panels, while the remaining acreage would be used for roads, spacing between rows to avoid shading from the panels, power conversion units, detention basins, and combining switchgear. Site 3 is anticipated to have 28,080 solar PV panels with a capacity of approximately 305 watts each, five power conversion units, and a total power output of 7.5 MW AC.

Medium-voltage underground lines would be placed approximately 36 inches below ground surface to convey the output of the power conversion units to a combining switchgear, where the energy output from each conversion unit would be bundled. A photograph of a combining switchgear is shown in Figure 7.

Figure 7. Representative View of Combining Switchgear

Photo courtesy of HORUS Renewables

The Site 3 switchgear would be connected via a 34.5 kV overhead line to the substation at Site 2, and a 70 kV overhead line would connect the Site 2 substation to the existing O'Neill Substation.

Site 3 also contains an existing spoils pile of approximately 70,000 cubic yards that SLDMWA uses for operations and maintenance. As part of the Project, the spoils pile would be moved from its current location along the northern side of Site 3 to one or both of two possible locations to the west of Site 3 (shown on Figure 6) for continued SLDMWA use.

SLDMWA has rights to access Site 3 for operations and maintenance of the O'Neill Pumping-Generating Plant. Site 3 is not currently accessible to the public, and access would remain limited to Project personnel.

Gen-tie

Overhead 70 kV gen-tie lines will connect each site to the existing O'Neill Substation. The lines will be suspended from wooden and/or steel poles, similar to telephone poles, that would be approximately 70 feet high and 50 inches in circumference. The distance between the poles would generally be approximately 150 feet. Where spacing between poles must be increased to accommodate terrain and other features, taller poles may need to be used. Approximately 200 poles would be installed over the 6.2-mile corridor. The gen-tie corridor would be up to 75 feet wide to accommodate line swing and provide adequate clearance from trees and structures.

The gen-tie line corridor would begin at the southeastern edge of the Site 1 substation and generally parallel the north side of SR 152 and the west side of SR 33, outside of the California Department of Transportation (Caltrans) right-of-way (see Figure 8). Just south of the Delta-Mendota Canal crossing of SR 33, the gen-tie line would bear northwest and then north, following the southern and then western side of the Delta-Mendota Canal. At Site 2, the gen-tie would connect with the Project substation (which would also serve Site 3) and then bear west, south of the canal connecting to O'Neill Dam, and connect with the existing O'Neill Substation (see Figure 9). The entire gen-tie corridor would be on Federal land.

The proposed gen-tie alignment follows a similar route to a 70 kV transmission line between the existing San Luis and O'Neill Substations proposed as an alternative for the San Luis Transmission Project, which is currently undergoing environmental review separate from the San Luis Solar Project. The Applicant coordinated with the NEPA and California Environmental Quality Act lead agencies for the San Luis Transmission Project (WAPA and SLDMWA, respectively) and Reclamation (a NEPA cooperating agency) on the placement of the 70 kV line to avoid the potential for future conflicts and to allow for joint use of this line, if the San Luis Solar Project and the San Luis Transmission Project are both constructed. The San Luis Solar Project is independent of the San Luis Transmission Project because it would not require the construction or implementation of any of the proposed San Luis Transmission Project transmission lines or other components to connect to existing power transmission facilities.

The gen-tie would be owned and maintained by the Applicant and its long-term ownership partner. Ownership and maintenance may be transferred to WAPA in the future.

Roads

Within each solar PV system site, along the perimeter fences, graded all-weather roads would be constructed to bring equipment and materials from the staging areas to the work areas. The

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FIGURE 8
Gen-Tie Alignment from Site 1 to O'Neill Substation

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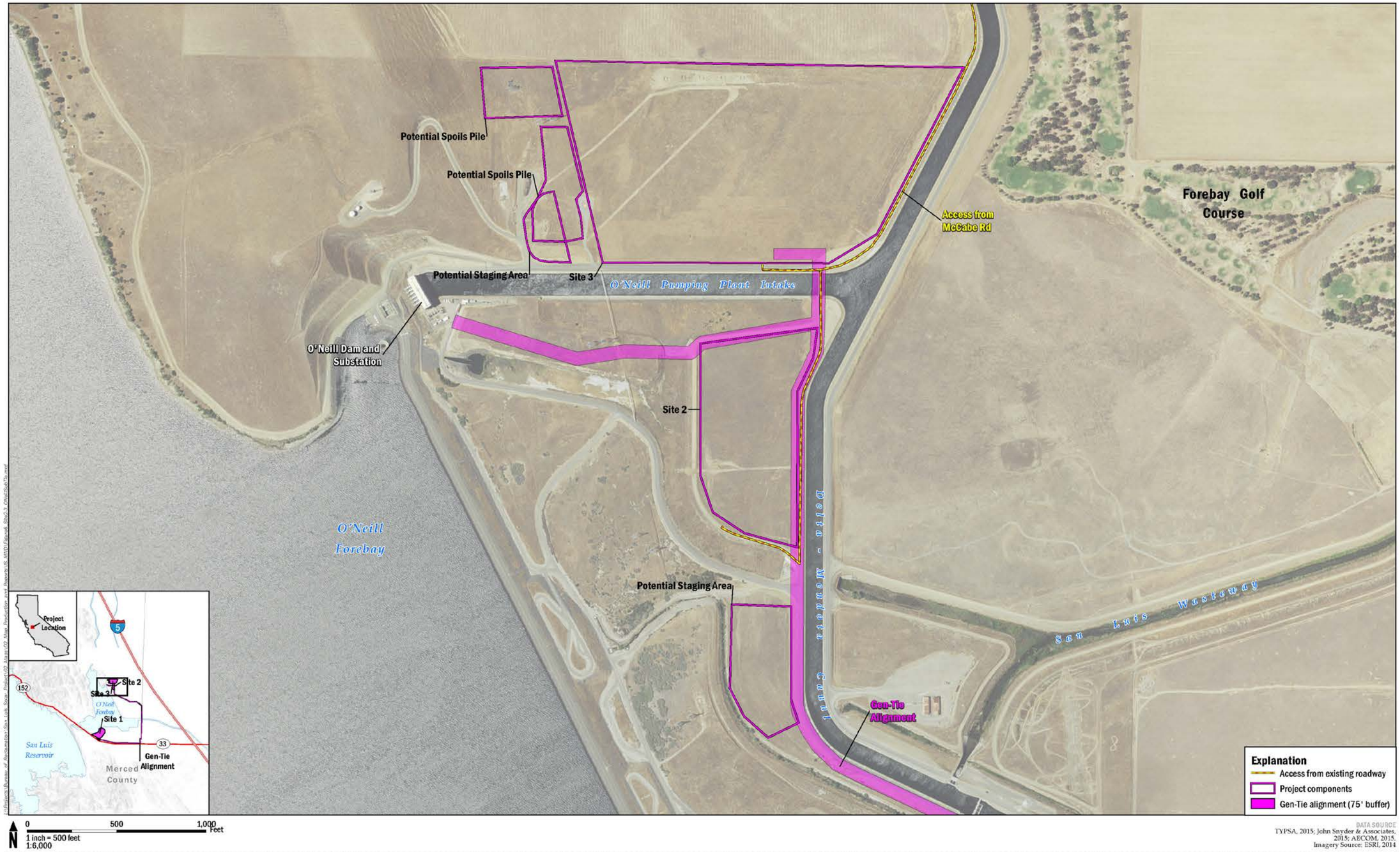

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FIGURE 9
Gen-Tie Alignment from Sites 2 & 3 to O'Neill Substation

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roads would be 20 feet wide and covered with 6 inches of crushed rock. The roads would not be decommissioned after construction, but would be used for long-term Project operation and maintenance.

Signage

One or more signs would be posted to identify Project facilities, including at solar PV system site entry points (e.g., at entry gates for Project personnel) and potentially along SR 152, on Site 1 outside of the Caltrans right-of-way. Specific locations and configurations would be developed during detailed Project design. All signage would comply with Reclamation requirements for placement, size, appearance, content, and construction method.

2.2.1.2 Power Plant and Monitoring Facilities

A Project substation measuring approximately 125 feet long by 60 feet wide and approximately 10 feet high would be constructed at Site 1 (see Figure 4). A second Project substation measuring approximately 160 feet long by 140 feet wide and approximately 10 feet high would be constructed at Site 2 (see Figure 5). Both buildings are likely to be prefabricated and set on concrete slabs on-grade. At the Project substations, the voltage of the solar PV system would be stepped up to 70 kV, which is the voltage of the gen-tie line that would interconnect Site 1 with the O'Neill Substation. The proposed substations would be constructed, owned, operated, and maintained by the Applicant and would be commissioned by WAPA.

At Site 3, the combining switchgear unit would have a footprint of approximately 70 feet long by 40 feet wide and approximately 10 feet high. It would also be set on a concrete slab on-grade.

Sites 1 and 2 would each have a monitoring and control facility (hereafter control building). The control buildings would contain plant security systems and Project monitoring, control, and remote communication equipment. The locations of the control buildings have yet to be determined but would be within the fenced boundaries of Site 1 (Figure 4) and Site 2 (Figure 5). Each control building would likely consist of a 15-foot-wide by 20-foot-long prefabricated building set on a concrete slab on-grade. The buildings would be a maximum height of approximately 12 feet. A photograph of a representative control building is shown in Figure 10.

Figure 10. Representative View of a Control Building

Photo courtesy of HORUS Renewables

2.2.1.3 Energy Storage Facilities

As part of the Project, a battery energy storage system (BESS) would be constructed to provide dispatchable energy under various operating conditions. The ability to store energy would improve the Project's operability and enhance the integration of as-available solar energy into the transmission network by offering additional ramp rate control and more consistent energy flows.

The Project would implement a concentrated BESS, which would place all energy storage components in a centrally located facility. The BESS would be constructed as a modular system, the footprint of which would be up to 0.7 acre. The facility would be located to the west of Site 3 and would not be accessible to the public. Figure 5 shows the potential location.

The primary storage components would consist of self-contained electrochemical battery systems with system control, monitoring, and safety equipment as explained below. Lithium-ion battery technology is anticipated to be used for the BESS.

The battery modules would be contained in individual cabinets that would be placed on a concrete pad surrounded by a concrete berm or geo membrane containment. For the proposed Project, a BESS of 10 to 12 MW is being considered, depending on the energy purchaser's needs and requirements.

Battery Storage Module

Each battery unit would be mechanically independent and contain its own monitoring and control systems. A representative view of a BESS is shown in Figure 11.

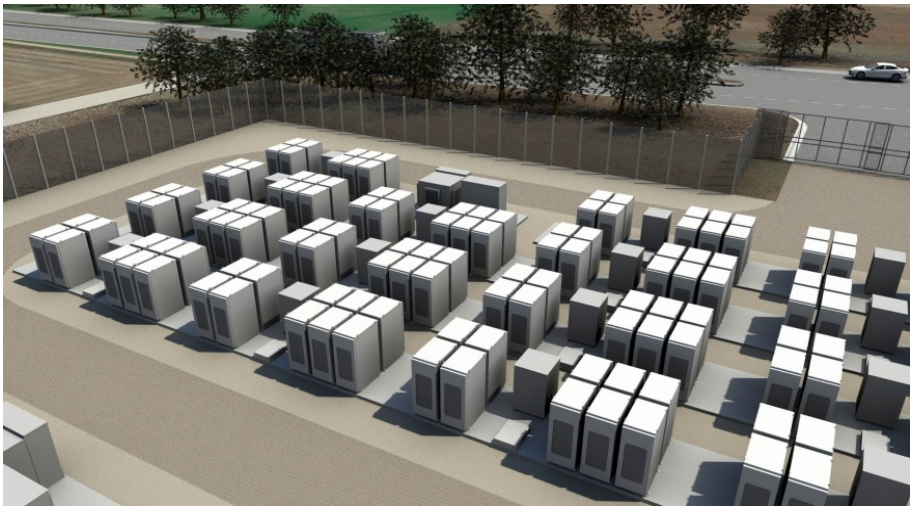


Figure 11. Representative View of a Battery Energy Storage System
Photo courtesy of SolarCity

The battery units would function as follows:

- A power conditioning system would convert the electric power collected by the solar PV systems from one form to another—for example, converting between DC and AC; converting between different voltage levels; or providing specific power qualities

required by the subsystems with which the power conditioning system is interfaced (National Institute of Standards and Technology 2012).
- The battery unit would contain the battery cells harnessed with monitoring equipment and wired to generate the required voltages.
- The control cabinet would contain the computer and monitoring components to operate the battery module and maintain safe operating conditions. This would include the battery management system that coordinates information from the cells, contactors, current sensors, and end-user inputs to continually monitor and adjust the operation of the battery system.

Each individual battery unit would be equipped with air conditioning and fire suppression systems. The air conditioning equipment would maintain safe ambient operating temperatures. The fire suppression equipment would include flame-retardant chemical dispersants.

Safe Handling

While lithium-ion batteries are rechargeable and contain no free lithium metal, they contain lithium ions and highly flammable electrolytes. Lithium-ion batteries are capable of spontaneous ignition due to overheating if not protected. Battery fire risks would be managed through proper planning, risk assessment, storage methods, and response protocols. The safety and prevention protocols and equipment summarized below would be included in the Project design and construction specifications to ensure the storage system can be operated safely. Environmental protection measures and commitments related to BESS safety are described further in Sections 2.2.5, 3.2.2.2, and 3.12.2.2.

The individual battery units each have a fire containment and suppression system that contain the fire event and suppress it through cooling, isolation, and containment. Each unit would automatically release a gaseous fire suppressant agent that would be contained within the unit itself. The system has been designed in accordance with National Fire Protection Association safety standards.

In order to comply with the Occupational Safety and Health Administration's (OSHA) Emergency Action Plan Standard, 29 Code of Federal Regulations (CFR) 1910.38, and to prepare personnel for dealing with emergency situations, an Emergency Action Plan has been developed for the Project and will be amended before and during detailed Project design and construction. This Emergency Action Plan addresses all emergencies that may be reasonably expected to occur at the BESS. The plan includes a designated emergency coordinator who would be responsible for notification of emergency personnel, safely evacuating Project employees, and the proper use of fire extinguishers (if applicable). All personnel working onsite would receive instruction and training on the Emergency Action Plan.

Effective battery standard operating procedures for battery use and storage would include processes that guide shipping and receiving, installation, handling, daily use, storage, and other functions involving the batteries. Proper procedures include keeping batteries from exposure to direct sunlight, high temperature, and high humidity (Battery University 2014).

2.2.1.4 Meteorological Stations

One or more meteorological stations could be installed prior to or during construction in order to track weather patterns. If installed, the stations would be within the boundaries of Sites 1, 2, and/or 3.

The meteorological station(s) would be attached to a Supervisory Control and Data Acquisition system to collect data for analysis and system monitoring. The system involves a network of data loggers and programmable logic controllers at each power conversion unit. These would, in turn, be connected to a Wide Area Network and monitored on-site in the control buildings, as well as in a remote operations center that would provide 24-7 monitoring. The remote operations center would be located in the Applicant's U.S. headquarters.

Figure 12 depicts a typical meteorological station.

Figure 12. Representative View of a Meteorological Station
Photo courtesy of HORUS Renewables

2.2.1.5 Staging Areas

The Project area would include one or more temporary construction staging area (including parking areas and construction offices). Up to five potential staging areas have been identified and total approximately 15.2 acres (Figures 4 through 6). Gravel and/or water would be applied as necessary to reduce dust emissions. Perimeter fences would be installed during site preparation in order to protect ongoing construction and delivered equipment. After the 6 to 9 month construction period, the staging areas would be decommissioned and restored to approximately original site conditions, including revegetation where appropriate.

2.2.1.6 Erosion Control and Storm Water Drainage

The Project design includes several protective erosion and drainage control measures including the following:

- Silt fences along the northern, western, and southwestern boundaries of Site 1, and around the entire boundaries of Sites 2 and 3;
- Stabilized construction entrances at each site;
- Designated vehicle and equipment cleaning/concrete washout areas at each site; and
- Dust control and hydroseeding or other reseeding within each site.

Additional information on grading and compaction techniques is presented in Section 2.2.2.6.

Detention basins are proposed at each site based on the findings of the Preliminary Drainage Report (Aztec and Typsa 2015) and are shown in Figures 4 through 6. The basins have been sized to handle the first 0.5 inch of direct runoff over the entire site. Basins have been placed strategically at low points for each site. Offsite flow patterns would be maintained, and the Project would not affect flow patterns on the surrounding properties. No drainage improvements are proposed for offsite flows.

As required by the California State Water Resources Control Board (SWRCB), the Applicant will prepare and implement a Storm Water Pollution Prevention Plan (SWPPP) as part of obtaining coverage under the Statewide NPDES Construction General Permit Order (2009-0009-DWQ) prior to the commencement of soil disturbance activities. The SWPPP will describe construction best management practices (BMPs) to manage storm water on the site to both protect the site and to minimize downstream erosion and sedimentation.

2.2.1.7 Vegetation Treatment and Weed Management

The Applicant is developing a plan to plant native shade trees at Site 1 between the Project's perimeter fence and the recreational area along the shore of O'Neill Forebay.

Areas between the solar PV panels will be managed (e.g., mowed or weed whacked) to allow annual grassland species to recolonize the sites. Herbicide application will be limited to areas where mowing is not possible, such as around buildings and against poles and other infrastructure. The Applicant will coordinate with Reclamation, DWR, SLDMWA and State Parks on weed eradication.

2.2.1.8 Waste and Hazardous Materials Management

The Project would generate minimal wastes during operation. Limited hazardous materials would be stored or used on site as shown in the tables below. Appropriate spill containment and clean-up kits would be kept on site during construction and maintained during Project operation. The primary chemicals/petroleum products expected to be present in the Project area during construction and operation are listed in Tables 3 and 4, respectively.

Table 3 Chemicals at Project Site during Construction

Product	**Use**
Diesel fuel	Vehicles
Gasoline	Vehicles
Motor oil	Vehicles
Hydraulic fluids and lube oils	Vehicles and equipment
Biodegradable mineral oil	Transformers
Electrolyte for lithium-ion battery cells	BESS
Refrigerant	BESS
Coolant	BESS

Table 4 Chemicals at Project Site during Operation

Product	**Use**
Diesel fuel	Vehicles
Gasoline	Vehicles
Motor oil	Vehicles
Biodegradable mineral oil	Transformers
Electrolyte for lithium-ion battery cells	BESS
Refrigerant	BESS
Coolant	BESS

Solar PV modules and other products used during Project construction and operation are not hazardous and are not subject to California or Federal hazardous material management regulations.

During Project construction, the only wastes produced would be typical construction wastes, such as wood, concrete, and miscellaneous packaging materials. Construction wastes would be disposed of in accordance with local, State, and Federal regulations. Any modules damaged or broken during construction are considered retrograde material and would be returned to the manufacturer, where they would be recycled into new modules or other new products.

Portable toilets would be used during construction, and waste will be regularly pumped out, hauled away, and disposed of by appropriately licensed organizations.

The Project's Waste Management Plan and Hazardous Materials Management Plan address characterization and proper handling of all Project-related waste.

2.2.1.9 Fire Protection

There is limited potential for wildfire at the Project sites. The Project is not in or adjacent to either urbanized areas or wild lands. Vegetation at the solar PV system sites is sparse and would be managed as described in Section 2.2.1.7, so that fire risk from vegetation will be minimized. Project facilities would be designed, constructed, and operated in accordance with applicable fire protection and other environmental and health and safety requirements. The Project roadway network will allow for adequate fire control and emergency vehicle access to facilities, and electrical equipment will only be energized after the necessary inspection and approval to minimize risk of electrical fires during construction.

In addition, a Fire Prevention and Protection Plan has been developed for the Project and will be updated as necessary during detailed design and construction. The plan meets the fire prevention and safety requirements outlined in the California OSHA regulations, which encompass State and Federal codes and standards such as Title 8 of the California Code of Regulations, Sections 3221 (Fire Prevention Plan) and 6151 (Portable Fire Extinguishers).

Measure HAZ-4 in Section 2.2.5 contains additional information about Fire Prevention and Protection Plan implementation.

2.2.1.10 Site Security and Fencing

Sites 1, 2, and 3 and the BESS would be fenced to facilitate Project and equipment security, and surveillance methods such as security cameras, motion detectors, or heat sensors may be installed at locations along the fenced boundaries. Gates would be installed at the roads entering or exiting the sites. Limiting site access will be necessary both to ensure the safety of the public and to protect the equipment from potential theft and vandalism. The site and BESS perimeters will be fenced with an approximately 8-foot-tall chain-link fence. For Site 1, along the recreational area on the shore of O'Neill Forebay, the fence will be equipped with privacy slats in a color that matches or complements the surrounding environment. The perimeter fences will include appropriate features to allow San Joaquin kit fox (*Vulpes macrotis mutica*) (if present) and other wildlife movement in and out of the facility.

Shielded area-specific lighting for security purposes will be limited to the control buildings, Site 1 and 2 substations, and Site 3 combining switchgear. The level and intensity of lighting will be the minimum needed for security and safety reasons. These lights will be down-shielded and turned on either by a local switch as needed, or by motion sensors that will be triggered by movement at a human's height during maintenance or emergency activities. There will be no lights around the site perimeters in order to minimize the Project's visual impact. Sensors on the security fencing will alert security personnel of possible intruders.

2.2.1.11 Electrical Components, New Equipment, and Existing System Upgrades

Substations would be installed at Sites 1 and 2, and combining switchgear would be installed at Site 3, as described in Section 2.2.1.2 and shown in Figures 4 through 6. The substations would step up the voltage from the PV systems from 34.5 kV to 70 kV for transmission via the 70 kV gen-tie line to the existing O'Neill Substation.

The Site 3 switchgear would be connected via a 34.5 kV overhead line to the substation at Site 2, and then another overhead line would connect the Site 2 switchgear substation to the existing O'Neill Substation.

The Project's gen-tie corridor is described in Section 2.2.1.1 and shown in Figures 8 and 9.

Site 3 would be connected to the Site 2 substation by a 34.5 kV line. A 70 kV line from the Site 2 substation would interconnect the power output from all three sites into the O'Neill Substation 34.5/70 kV transformer, approximately 0.4 mile west of Site 2.

2.2.1.12 Interconnection to Electrical Grid

Interconnection to the grid will be at the WAPA-operated 70 kV switchyard at the O'Neill Substation. Two Small Generator Interconnection applications were filed with WAPA on May 11, 2015, and accepted as complete on June 11, 2015. A System Impact Study has been commenced and should be complete by Spring 2016.

2.2.1.13 Spill Prevention and Containment

The Hazardous Materials Management Plan for the Project addresses spill prevention and control measures and characterization and proper handling of all Project-related waste. Best management practices (BMPs) would be employed in the use and storage of all hazardous materials within the Project area, including the use of containment systems in appropriate locations. Appropriately sized and supplied spill containment kits would be maintained on site, and the Applicant's employees or vendors would be trained on spill prevention, response, and containment procedures. In addition, in accordance with the Emergency Planning and Community Right to Know Act, the Applicant would supply the local emergency response agencies with a Hazardous Materials Management Plan and an associated emergency response plan and inventory.

The small quantities of hazardous materials to be stored in the Project area during construction include equipment and facilities maintenance chemicals such as those listed in Table 3. These materials would be stored 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 to different locations around the site as construction activity locations shift. The hazardous materials storage area would not be located immediately adjacent to any drainage. Disposal of excess materials and wastes would be performed in accordance with local, State and Federal regulations, and excess materials/waste will be recycled or reused to the maximum extent practicable.

Additional construction-period BMPs include:

- Keeping materials in their original containers with the original manufacturer's label and resealed when possible;
- Avoiding excessive on-site inventories of chemicals; procure and store only the amounts needed for the job;
- Following manufacturer's recommendation for proper handling and disposal;

- Conducting routine inspections to ensure that all chemicals on site are being stored, used, and disposed of appropriately;
- Performing timely maintenance on vehicles/equipment that are leaking oil or other fluids, and placing drip plans under the leak when the vehicle/equipment is parked prior to the maintenance event;
- Performing fueling of vehicles and equipment in locations that are protected from spillage onto exposed ground surface
- Ensuring that all personnel dealing with hazardous materials are properly trained in the use and disposal of these materials in accordance with local, State and Federal regulations; and
- Maintaining Material Safety Data Sheets available on the site for use during Project construction and operation.

The spill response plan included in the Hazardous Materials Management Plan will be updated prior to Project construction and operation, and personnel would be made aware of the procedures for spill cleanup and the procedures to report a spill. Spill cleanup materials and equipment appropriate to the type and quantity of hazardous materials expected would be located on site and personnel shall be made aware of their location. Key employees and vendors will be trained in conducting spill response activities in accordance with appropriate procedures. Spill response materials will include, but are not limited to, brooms, dust pans, mops, rags, gloves, absorbent pads/pillows/socks, sand/absorbent litter, sawdust, and plastic and metal containers.

2.2.1.14 Health and Safety Program

The Applicant will develop a Health and Safety Plan to ensure it includes all activities and compliance to all local, State and Federal regulatory requirements based on location, scope and hazards. The Project will follow Reclamation Health and Safety Standards and OSHA and California OSHA requirements in construction and operation. For construction activities, all subcontractors are screened to review their safety performance. Safety orientation will be provided to all contractors working on the site to make them aware of all the Project safety hazards and requirements and procedures. Tool box safety meetings will be held daily to discuss site conditions, pre-task plans and any new hazards.

2.2.2 Construction of Facilities

Project construction will begin once all applicable approvals and permits have been obtained. It will take approximately 6 to 9 months from the commencement of the construction process to complete construction of the Project and gen-tie lines. The following sections provide detail about the Applicant's timeline and process for the construction. Once construction is complete, the Project will be in operation for approximately 30 years.

2.2.2.1 Design, Layout, Installation, and Construction Processes

The Applicant has performed preliminary engineering design for the Project. The installation and construction processes for the Project are described in the following subsections.

2.2.2.2 Construction Phasing

Construction of the Project would occur in two basic phases: (1) construction mobilization and (2) construction and installation of the solar PV modules, electrical components, and gen-tie

lines. Construction mobilization would consist of preconstruction surveys; mobilization of personnel and equipment (including construction of access roads, and installation of trailers, laydown, and materials storage areas); and site preparation, including drainage system development. After construction mobilization, construction of the PV systems and gen-tie lines would begin. Construction of Site 1 would take approximately 130 days. Sites 2 and 3 would each take approximately 100 days to construct and could be constructed concurrently with Site 1. Additional information on construction phasing and sequence is provided in Section 2.2.2.6.

2.2.2.3 Access and Transportation System, Component Delivery, Worker Access

Access to Site 1 would be provided from the Medeiros entry road (Donohugh Road West) from SR 33. Truck traffic would approach the site vicinity via SR 33, either from the north or south. From SR 33, trucks would proceed northwest on the entry road to Site 1.

Access to Sites 2 and 3 would be provided from SR 33 via McCabe Road. Construction traffic would head west on McCabe Road and then south on the gated access road on the west side of the Delta-Mendota Canal to the Site 2 and 3 entrances. In accordance with SLDMWA requirements, the security gate will remain closed and locked at all times.

The perimeters of each site would be fenced and gated to limit public access.

Section 3.10 addresses construction-related traffic.

2.2.2.4 Construction Workforce Numbers, Vehicles, Equipment, Timeframes

Typical construction work schedules are expected to be from 7:00 AM to 5:00 PM, Monday through Friday, which complies with Merced County Code Section 18.41.070. Nighttime construction work is not planned; however, some weekend work may be necessary. In the event that construction work takes place outside typical weekday hours, activities would comply with Merced County standards for noise levels.

During construction, the on-site workforce is expected to average approximately 100 employees, with a peak on-site workforce of approximately 150 employees. The construction workforce would be recruited from within Merced County and elsewhere in the surrounding region as much as practicable. Most construction equipment/vehicles would be brought to the Project at the beginning of the construction process, and would remain on-site throughout the duration of the construction activities for which they are needed; they generally would not be driven on public roads while in use for the Project. Project construction traffic would involve construction worker commuting vehicles, plus periodic truck deliveries of materials and supplies, trash removal and other off-site truck shipments, and miscellaneous trips by Project staff (e.g., supervisors).

Peak vehicular traffic volumes would coincide with the peak of construction employment, which is estimated to be approximately 150 workers. At peak construction, a total of approximately 20 one-way truck trips per day will be necessary. Truck traffic during construction is expected to average approximately 5 to 8 truck trips per day. However, construction truck deliveries and shipments typically avoid the peak traffic hours in the morning and afternoon, so it is unlikely that they would represent a substantial increase in traffic volumes during the morning and afternoon peak commuting hours.

2.2.2.5 Surveying and Staking

Surveying includes two main objectives: 1) obtaining detailed topographic information for supporting the storm water modeling and grading design, and 2) construction layout surveying with staking. The Applicant has compiled detailed topographic information for the Project. The final design plans for the Project will be based on the detailed topographic survey of the site.

Road corridors, buried electrical lines, PV system locations, and the locations of other facilities would be located and staked in order to guide construction activities. Pre-construction survey work would consist of staking and flagging the following: 1) construction area boundaries, 2) work areas (permanent and short term), 3) micrograding or disking, 4) access and roads, 5) transmission structure centers, 6) foundation structure, and 7) any offsets or buffer areas for utility corridors or sensitive environmental resources. Staking and flagging would be maintained until final cleanup.

2.2.2.6 Site Preparation, Clearing, Grading, and Compaction

Construction of the Project would be completed in two basic phases: (1) construction mobilization and (2) construction and installation of the solar modules, electrical components, and gen-tie lines. Construction and installation of the solar PV systems and electrical components is discussed in Section 2.2.2.8.

Preconstruction Activities

Preconstruction activities would include installation of fencing, the surveys listed in Section 2.2.5, and seasonal avoidance of nesting birds. Once these activities occur, the Applicant would begin to mobilize for construction. Construction mobilization includes preparing and constructing site access roads, establishing temporary construction trailers, and preparing construction staging areas. The Project would include one or more temporary staging areas as discussed in Section 2.2.1.5. The staging areas would be used throughout the 6 to 9 month Project construction period.

Site Preparation

Once preconstruction activities are complete, site preparation for the Project would begin. The Applicant would use construction grading and compaction techniques that adequately prepare the site for safe and efficient system installation and operation. The discussion below provides preliminary detail relative to the site preparation techniques that may be employed at the Project site. The Applicant would use the results of the field testing to adjust site preparation and construction methods to minimize impacts to vegetation and facilitate site restoration.

Vegetation Treatment/Clearing and Grading

Vegetation would be cleared from the solar PV system sites, access roads, and concrete pad/foundation locations for power conversion units, combining switchgear, control buildings, and substations. Vegetation would also be cleared for construction of the detention basins, including berms.

Vegetation would not be removed from the Project site until the onset of Project construction. Vegetation would be disked under, mulched or composted, and retained on site to assist in

erosion control and limit waste disposal. Where grading is necessary outside of solar PV systems and access roads, native vegetation may be harvested for replanting to augment soil stabilization.

Solar PV system sites would be prepared using conventional farming equipment including tractors with disking equipment and vibratory rollers, with limited use of scrapers to perform micrograding within sections of the solar PV system field. This method improves construction worker safety by creating a fairly level surface and eliminating trip hazards. The site would be contour graded level; the macro level topography and stormwater drainage would remain unchanged, but within each solar PV system high spots would be graded and the soil cut from these limited areas used to fill low spots within the same PV system.

With this approach, rubber-tired farming tractors towing disking equipment would disk the top 5 to 7 inches of soil. A water truck would follow closely alongside the tractor to moisten the soil to keep dust at or below acceptable levels. The tractor may make several passes to fully disk the vegetation into the top soil, preserving the underground root structure, top soil nutrients and seed base. A drum roller would then be used to flatten the surface and return the soil to a compaction level similar to the preconstruction stage. The intent of the roller is to compact the soil under the solar PV system site and even out the surface after the disking is complete.

Lastly, limited use of scrapers for micrograding would be employed only where needed to produce a more level surface than can be produced by disk and roll technique. The ground would be graded to a level topography using micrograding only where necessary. Plant root systems would be left in place to provide soil stability except where grading and trenching are required for placement of solar PV system foundations, underground electric lines, concrete pads, road and access ways, and other facilities. Disturbed areas that are not covered in aggregate or concrete would be hydroseeded or reseeded by other methods with an approved grass mix.

The earthwork amounts anticipated for the Project are shown in Table 5.

Table 5 Estimated Cut and Fill Amounts

	Cubic yards		
Site	**Cut**	**Fill**	**Net**
1	50,570	51,380	930 Fill
2	3,360	5,660	2,000 Fill
3	85,140	10,470	74,670 Cut

Additional minor earthwork would also be needed for trenching for electrical conduits within Sites 1, 2, and 3, which is anticipated to be backfilled and therefore is not included in the totals above.

As part of site preparation, a spoils pile of approximately 70,000 cubic yards would also be moved from its current location along the northern side of Site 3 to one or both of two possible locations to the west of Site 3 (shown on Figure 6). The spoils pile is used by SLDMWA for operations and maintenance purposes.

Slopes would be 3:1 or flatter, unless otherwise noted.

Compaction

The construction process would require moving some heavy equipment across the site, including delivery trucks, pile driving equipment, and cranes. Soil would be compacted to a level that allows this equipment to move across the site. The ground would be compacted to achieve a density of at least 90 percent of the soil's maximum dry density as determined by the modified proctor compaction test (ASTM D 1557). The Applicant is performing field testing to determine if a lower compaction level would meet construction requirements and what levels of compaction are compatible with post-construction revegetation.

Site preparation would also require improvement of approximately 4.8 miles of dirt or aggregate based road to access different areas of the Project. Further detail about the site access road construction is provided in Section 2.2.2.9.

2.2.2.7 Water Use

Throughout the Project construction period, water would be transported to the sites via water trucks and used for dust suppression. Dust suppression would require approximately 16,000 gallons for each of the first 2 months of construction, and up to approximately 800 gallons per month during the remaining 4 to 7 months.

2.2.2.8 Solar PV System Assembly and Construction

The construction and installation phase involves installation of the solar PV modules and all the necessary electrical equipment to make the Project operational. This phase would also include installation of the gen-tie transmission lines and access roads.

PV modules and module framing assemblies would arrive at the construction staging area in containers on tractor-trailers. The tractor-trailers would utilize the access roads to deliver the modules and the framing assemblies to the PV system areas. PV modules and the assemblies would be lifted from the tractor-trailers and placed adjacent to the PV system locations.

Vertical steel support piles spaced approximately 10 feet apart center-to-center would be driven into the ground to an approximate depth of 7 to 10 feet below grade. The module framing assemblies, or racks, would then be attached to the support posts using tilt brackets. The PV modules would be manually secured to the racks and fastened with brackets at the top and bottom of the modules.

Wiring harnesses would be used to electrically connect several rows of racks to a combiner box that would deliver power to the power conversion units. Electrical construction activities are described further in Section 2.2.2.10.

Trenches would be dug for the underground AC and DC cabling, and the foundations for the power conversion unit enclosures and transformers would be prepared. Based on the current design, the trenches would be approximately 3 feet wide and 4 feet deep. In general, each site would have one trench for medium-voltage cables connecting to the power conversion units and switchgear, and eight to twelve trenches for DC cables, depending on the total power installed at each site. Electrical cables would be laid in the trenches and combiner boxes would also be installed. The underground cables would connect the power conversion units to the substations at

Sites 1 and 3 and the combining switchgear at Site 3. The trenched areas would be backfilled filled once the cables are buried, and previous contours restored.

The power conversion units would consist of outdoor inverters and transformers equipment mounted directly on poured or pre-cast concrete pads/foundations. They would be installed at predetermined central locations within each PV system and then connected to incoming lines from the combiner boxes. After the units are installed in a particular area, traffic is expected to be limited to infrequent low-impact traffic in the aisle ways between PV blocks for inspection, maintenance, and repair purposes.

During the final system validation and commissioning process, the Supervisory Control and Data Acquisition and monitoring systems would be brought online, the equipment tested, and operational readiness verified. Once commissioning is complete the Project would be brought online and connected to the grid.

It is expected that separate construction crews would build the gen-tie lines. As described in Section 2.2.1.1, a gen-tie alignment consisting of overhead 70 kV lines suspended on wooden and/or steel poles would be constructed to connect each site to the existing O'Neill Substation. The poles would be approximately 70 feet high and 50 inches in circumference. The distance between the poles would generally be approximately 150 feet. The gen-tie corridor would be up to 75 feet wide to accommodate line swing and provide adequate clearance from trees and structures.

The poles would be set in the ground to a depth of 7 to 10 feet. The poles would be installed with a rubber-tired flatbed truck and truck-mounted drills and cranes that would access each locale via existing roads or by minimally driving cross country. Similar equipment would be used for connecting the lines to the poles. During the final system validation and commissioning process, the Supervisory Control and Data Acquisition and monitoring systems would be brought online, the equipment tested, and operational readiness verified. Once commissioning is complete, the Project would be brought online and connected to the grid.

2.2.2.9 Gravel, Aggregate, and Concrete Needs and Sources

Prior to construction, unpaved site access roads would be stabilized with crushed rock or other road stabilization material. Roads would be 20 feet wide and treated with 6 inches of crushed rock. The stabilization materials would be obtained locally to the extent possible.

2.2.2.10 Electrical Construction Activities

Groups of glass PV modules would be installed onto the racks as described in Section 2.2.2.8. Workers would walk behind each row and plug the wires from each module into a wiring harness that collects all power from each rack.

Electricians would connect all wiring harnesses to combiner boxes. Each combiner box would link the connections from the PV modules. All combiner boxes would be wired via underground DC cables to the power conversion units. Electricians would also connect these wires to the inverters and other electrical equipment inside the power conversion unit.

Certified electricians in the construction workforce would perform appropriate Project electrical construction activities starting with combiner box connections. Utility journeymen may be required to perform or supervise the higher-voltage electrical construction activities for the Project substation and gen-tie line.

2.2.2.11 Aviation Lighting

The nearest airport is Los Banos Municipal Airport, which is approximately 10 miles east-southeast of the Project area.

No Project-related facilities would be above the height regulated by the Federal Aviation Administration. The solar modules mounted on racks are less than approximately 7.5 feet tall, and Project substations and control buildings would not exceed approximately 10 feet tall. Project transmission structures are expected to be less than 70 feet tall and would not require lighting, avoiding potential interference with aviation. There is essentially no potential for light interference from the solar PV systems to local aviation: the PV modules used in the installation are black and absorb over 90 percent of the light received; as a result, glare from reflected sunlight is not an issue. These types of PV modules have been installed at numerous airports, including Denver International Airport and Nellis Air Force Base, and studies have found that the reflection from PV system installations do not cause problems for airplanes.

2.2.2.12 Site Stabilization, Protection, and Reclamation Practices

After Project construction, relatively minimal amounts of operations and maintenance activities would be required during Project operation. The solar PV system sites will be hydroseeded or reseeded by other methods with an approved grass mix. Access roads and aisle ways would need to be maintained to allow passage by maintenance vehicles and personnel, but the Project areas covered by panels will be allowed to passively revegetate.

At the end of the Project's useful life, the Applicant would decommission and completely remove the PV systems and supporting electrical and facility systems. Following facility decommissioning and removal, the area would be reclaimed according to applicable regulations at the time of decommissioning.

2.2.3 Related Facilities and Systems

2.2.3.1 Transmission System Interconnect

The Project will build a 70 kV gen-tie transmission line to interconnect the solar PV systems with the existing O'Neill Substation. The proposed transmission facilities and interconnections are discussed in Sections 2.2.1.1, 2.2.1.11, and 2.2.1.12. Substation and ancillary power facilities are described in Sections 2.2.1.2 and 2.2.1.3.

Negotiations with potential purchasers of the Project's solar energy output are ongoing and expected to be concluded no later than the end of 2015.

The connection of the gen-tie line with the O'Neill Substation will require no demolition of the existing substation facilities, and the changes will be minor and reversible. The specific engineering design will be negotiated between WAPA, Reclamation, and the Applicant. The

Project will comply with Merced County, State of California, and International Building Codes. Additionally, the Project will be designed in conformance with the National Electrical Code.

2.2.3.2 Gas Supply Systems

The Project will not use natural gas for power production.

2.2.3.3 Other Related Systems

For transmission of operational data and to support employees working on-site, the Applicant expects to utilize wireless telecommunications facilities.

2.2.4 Operations and Maintenance

2.2.4.1 Maintenance Needs and Activities

Maintenance of the Project would require regular but occasional visual inspections, equipment servicing, and minor repairs. Project maintenance activities would generally include all-weather road maintenance; vegetation management; scheduled maintenance of inverters, transformers, energy storage equipment, other electrical equipment; and the occasional replacement of faulty modules or other site electrical equipment. The Project's all-weather access roads would be regularly inspected, and any degradation due to weather or wear and tear would be repaired.

Overall, minimal maintenance requirements are anticipated, as the tracking systems would operate independently with little human involvement required. Power electronics would be serviced annually or bi-annually depending on the equipment type. On intermittent occasions, the presence of several workers may be required if major repair or replacement of equipment is necessary. However, due to the nature of the Project, such maintenance activities are anticipated to be infrequent.

2.2.4.2 Operations Workforce and Equipment

After the construction period, the workforce for operations, maintenance, and security purposes is estimated to be three to five part-time workers. Typical work schedules are expected to be during daylight hours only, with the exception of 24-hour remote security and some limited maintenance work required after dark when PV modules are not producing energy.

Only limited deliveries would be necessary for replacement PV modules and equipment during Project operation. Daily vehicle trips during Project operation are expected to consist of one employee vehicle and one delivery vehicle (both roundtrips).

2.2.4.3 Water Use

No water would be needed for electrical power generation.

The solar PV panels would be washed with softened and de-ionized water, typically twice per year. Panel washing activities would require one gallon per panel per year. Assuming the proposed Project would include 108,000 solar PV panels, the panel washing activities would require up to 120,000 gallons of water per year. This quantity might increase if Reclamation conducts Safety of Dams work on B.F. Sisk (San Luis) Dam (San Luis Dam), as the increased truck traffic might increase dust generation. Wash water would be supplied by contractors from an off-site location by trucks.

During Project initiation and operation, water for landscaping establishment and maintenance at Site 1 would be acquired and trucked in by an outside provider.

The ground surface below the solar PV panels would be pervious, allowing any residual water from panel washing and erosion control activities to be absorbed into the topsoil before percolating into the deeper subsurface soils.

During Project construction, construction workers would use temporary, portable restroom facilities. During Project operations, no full-time personnel would be on-site, and as such, no permanent or temporary restroom facilities are proposed.

2.2.5 Environmental Commitments

The Applicant shall implement the following environmental protection measures to reduce environmental consequences associated with the Proposed Action (Table 6). Environmental consequences for resource areas assume the measures specified would be fully implemented. Copies of all reports and monitoring shall be submitted to Reclamation.

Table 6 Environmental Protection Measures and Commitments

Resource	Protection Measure
Water Resources	**WQ-1:** Each battery container will contain a fire suppression system that is designed to contain any fire within the container itself. The fire protection system will use the "suppression by cooling, isolation and containment" strategy for fire containment. The fire suppression system will include a gaseous fire suppressant agent and an automatic fire extinguishing system designed according to National Fire Protection Association safety standards, further preventing any spill that would impact the surface streams. The BESS will be placed on a concrete pad that will be surrounded by a concrete berm or geo membrane containment to provide secondary containment for the system. The volume provided by the secondary containment will be sufficient to contain any leaks or spills from individual or multiple battery units. The secondary containment will hold the fire suppression liquid once released within the containment area, thus preventing it from being released into subsurface soil or surface water or groundwater. The fire suppression liquid will then be tested and disposed in accordance with the Project's Hazardous Materials Management Plan and will not be released into subsurface or surface streams. The BESS will be inspected daily in person or by video feed, and any detected leaks from the battery will be cleaned up locally and the battery replaced or repaired. In case of a storm event during a battery leak, it is estimated that the impacted rain water will remain within the secondary containment area and not overflow into surface water or groundwater, even during a significant rain event. All storm water collected in the secondary containment area will be inspected and removed.
	WQ-2: As part of implementation of the Project's Fire Prevention and Protection Plan, the Applicant will meet with Cal Fire and/or the Merced County Fire Department at the Project area to discuss the specific characteristics of the BESS and details of the fire suppression system, and arrange for emergency access to the three solar PV system sites in the event of a fire. The location of the BESS, the types of batteries installed, and details regarding the fire suppression system installed will be made available to fire personnel as soon as they are confirmed. Annual meetings and briefings with fire personnel will take place during the length of the Project's operational life. Procedures and requirements from these meetings will be updated in the Fire Prevention and Protection Plan.

Resource	Protection Measure
Biological Resources	**BIO-1:** A qualified biologist would conduct pre-construction protocol level surveys for San Joaquin kit fox no fewer than 14 days and no more than 30 days prior to the onset of any ground disturbing activity (USFWS 2011). The Applicant would implement the *U.S. Fish And Wildlife Service Standardized Recommendations For Protection Of The Endangered San Joaquin Kit Fox Prior To Or During Ground Disturbance* (USFWS 2011). In addition to the Standardized Recommendations, the Applicant will also design the fencing around the perimeter of the solar PV system sites to allow passage by San Joaquin kit fox and their prey species, following the recommendations of Constable et al. 2009.
	BIO-2: Pre-construction surveys for blunt-nosed leopard lizard (*Gambelia sila*) will be completed prior to initiation of ground disturbing activities (CDFG 2004).
	BIO-3: A qualified biologist shall survey all burrows within 500 feet of the Project site for signs of burrowing owl (*Athene cunicularia*) occupation and no more than 14 days prior to the start of ground-disturbing activities, and observe the survey standards from the *Staff Report on Burrowing Owl Mitigation* (CDFW 2012).
	BIO-4: If construction is proposed between February 1 and August 31, a qualified wildlife biologist shall conduct pre-construction surveys for Swainson's hawk (*Buteo swainsonii*) and other raptor nests no more than 10 days before ground disturbance following the *Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley* (Swainson's Hawk Technical Advisory Committee 2000). If new, active nests are found and located within a 0.5 mile of proposed heavy equipment operations or construction activities, the Applicant shall consult with the CDFW to develop the appropriate course of action, based on the guidance provided in the *Staff Report Regarding Mitigation for Impacts to Swainson's Hawks in the Central Valley of California* (CDFW 1994) and *Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley* (Swainson's Hawk Technical Advisory Committee 2000) to reduce potential impacts on nesting Swainson's hawks and other raptors and to determine under what circumstances equipment operation and construction activities can occur.
	BIO-5: The Applicant shall construct the transmission facilities, poles and lines in accordance with the provisions set forth in the *Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006* (APLIC 2006), to diminish avian electrocutions as a result of the Project. Details of design components shall be indicated on the construction plans and measures to comply with the guidelines shall be included in a separate attachment.
	BIO-6: Construction activities should be scheduled to avoid the loggerhead shrike (*Lanius ludovicianus*), grasshopper sparrow (*Ammodramus savannarum*), and tricolored blackbird (*Agelaius tricolor*) nesting season, if feasible. The nesting season for these species in the Project area is typically between from April 1 through August 31. If activities are scheduled to take place outside the nesting season, all impacts to nesting loggerhead shrikes, grasshopper sparrows, and tricolored blackbirds would likely be avoided. Construction generally occurs during the dry season in the spring and summer months (during the nesting season) to avoid inclement weather. If construction is planned during the nesting season for these species (between April 1 and August 31), the Applicant should implement Measure BIO-7 as described below.
	BIO-7: If it is not possible to schedule Project activities between September 1 and March 31, then pre-construction surveys for nesting loggerhead shrikes, grasshopper sparrows, and tricolored blackbirds shall be conducted by a qualified biologist to ensure that no nests would be disturbed during Project implementation. These surveys shall be conducted no more than seven days prior to the initiation of Project construction activities. During this survey, the biologist shall inspect suitable potential nesting habitats (i.e., trees and shrubs) in and immediately adjacent to the activity area for nests. If an active nest is found sufficiently close to work areas to be disturbed by these activities, the biologist shall determine the extent of a construction-free buffer zone to be established around the nest (typically 50–100 feet), to ensure that no loggerhead shrike, grasshopper sparrow or tricolored blackbird nests would be disturbed during Project implementation. The buffer zone shall be clearly delineated, demarked, or fenced to avoid any construction activity taking place near any nest areas.

Resource	Protection Measure
Biological Resources, continued	**BIO-8:** A USFWS-approved biologist or a trained on-site biological monitor would oversee the work areas for the duration of the Project. a. The biological monitor will ensure Project compliance with wildlife protective measures. b. The biological monitor will be able to identify blunt-nosed leopard lizard and San Joaquin kit fox and their burrows. c. If at any time blunt-nosed leopard lizard or San Joaquin kit fox occupancy is identified in the Proposed Action Area, the biological monitor will immediately notify the Applicant. The Applicant will halt localized work activities with potential to affect the species, and the Applicant or the biological monitor will contact the USFWS and Reclamation. These work activities would not resume until after directed by Reclamation.
	BIO-9: The USFWS-approved biologist will conduct employee education training for employees working on earthmoving and/or construction activities. Personnel will be required to attend the presentation which will describe blunt-nosed leopard lizard and San Joaquin kit fox, avoidance, minimization, and conservation measures, legal protection of the animal, and other related issues. All attendees will sign an attendance sheet along with their printed name, company or agency, email address, and telephone number. This will be kept by the biological monitor.
Cultural Resources	**CUL-1:** In the unlikely event that unanticipated buried archaeological deposits are encountered during construction, work in the immediate vicinity of the discovery must cease until the find can be evaluated by Reclamation and managed pursuant to the requirements of 36 CFR 800.13 and other applicable Federal laws and regulations. If human remains are inadvertently discovered, Reclamation will comply fully with Native American Graves Protection and Repatriation Act of 1990 as outlined at 43 CFR Part 10, and other Federal laws and regulations as applicable.
Recreation	**REC-1:** Water would be used for dust suppression throughout Project construction (Section 2.2.2.7). As the main road through Medeiros is unpaved, dust suppression would minimize airborne dust from all traffic on the road, including visitor vehicles. This would provide a temporary benefit for campers and day use visitors along the main road. Signage to warn visiting motorists of the temporary increase in construction traffic will be posted, and construction vehicles will not exceed 25 mph.
	REC-2: Typical construction work schedules are expected to be from approximately 7:00 AM to 5:00 PM, Monday through Friday (Section 2.2.2.4). In the event that construction work takes place outside of typical weekday hours, activities would comply with Merced County standards for noise levels.
	REC-3: Site 1 perimeter fencing (Section 2.2.1.10) would be constructed to screen views of construction activities from visitors.
Traffic and Circulation	**TR-1:** To avoid vehicle conflicts, the construction contracts should include the requirement that drivers cannot pass on, or have two vehicles share, the McCabe Road bridge.
Hazardous Waste and Materials	**HAZ-1:** A Hazardous Materials Business Plan will be prepared and implemented as required by State law and updated annually. The plan requires detailed reporting of the storage of hazardous materials and will be filed with the Merced County, Department of Public Health, Division of Environmental Health or the California Environmental Reporting System.
	HAZ-2: The Project's Spill Prevention and Response Plan and Emergency Action Plan will be implemented to address specific hazardous materials associated with construction and operation and how they are handled and stored.
	HAZ-3: Inadvertent spills or releases will be reported to the Merced County Unified Program Agency and to the California Department of Toxic Substances Control, depending on circumstances involved. These requirements and any other applicable reporting will be detailed in the Spill Prevention and Response Plan.
	HAZ-4: The Applicant will implement, or as a contract specification, require its contractors to implement, the Project's Fire Prevention and Protection Plan. The plan will be updated as necessary during detailed design and construction and throughout the life of the Project. The plan includes the following measures.

Resource	Protection Measure
Hazardous Waste and Materials, continued	- Entrance gates, emergency accesses, and perimeter and maintenance roads will have the required width to allow firefighters and their equipment to access each site and move around easily. - Internal combustion engines, stationary and mobile, will be equipped with spark arresters. Spark arresters shall be in good working order. - Contractor will keep all construction sites and staging areas free of grass, brush, and other flammable materials. - Personnel will be trained in the practices of the plan relevant to their duties. Construction and maintenance personnel shall be trained and equipped to extinguish small fires. - Work crews shall have fire-extinguishing equipment on hand, as well as means of communicating with Cal Fire and/or the Merced County Fire Department in the event of an emergency. - Smoking will be prohibited while operating equipment and shall be limited to paved or graveled areas or areas cleared of all vegetation. Smoking will be prohibited within 30 feet of any combustible material storage area (including fuels, gases, and solvents).
Noise	**NOI-1:** All construction equipment powered by gasoline or diesel engines will have sound control devices that are at least as effective as those originally provided by the manufacturer. All equipment will be operated and maintained to minimize noise generation.
	NOI-2: At Site 1, noise reduction muffling equipment will be required on all construction equipment that operates within 150 feet of the designated campsites. This limitation will be included in all contractor work specifications.
	NOI-3: Fixed construction equipment, including compressors and generators, will be located as far as feasibly possible from visitor uses at Site 1.
	NOI-4: The Applicant will coordinate with State Parks to develop signs and other public information to advise visitors of potential temporary construction-related noise at Medeiros and alternative camping and day use options in the SRA.

See Section 3 for a discussion of the potentially affected environment and the environmental consequences involved with the Proposed Action and the No Action Alternative.

2.3 Other Alternatives Considered but Not Carried Forward

As described in Section 1.2, Reclamation issued a Request for Interest in June 2011 for a lease arrangement to construct a renewable resource generation project on Federal lands in the vicinity of the San Luis Project to "curb the dependence on foreign oil, reduce use of fossil fuels, and promote new industries" (Reclamation 2011). The Request for Interest and related materials identified conceptual areas for solar facilities at San Luis Reservoir SRA that were considered during the Project development phase. They included the Basalt Quarry area on the southeast side of San Luis Reservoir, areas to south of State Parks office and maintenance facilities along Gonzaga Road, and the eastern side of Medeiros Use Area. The eastern side of Medeiros Use Area was carried forward as Site 1 of the proposed Project. The other areas were not carried forward for reasons that included planned use as a borrow areas for future reinforcement of San Luis Dam, which impounds San Luis Reservoir; and the need for extensive grading and ground disturbance and the resulting potential environmental effects.

Potential locations outside of Federal lands in and adjacent to the San Luis Reservoir SRA were not considered as Project alternatives. Other solar projects in Merced County are proposed or under way, but they would not satisfy the initiative directed by Interior agencies to provide

renewable energy generation on Federal lands and would not help Reclamation to offset the increases in energy costs described in Section 1.2.

2.4 Permits and Approvals Needed

The following permits, reviews, and approvals would be required for project construction.

Agency	Permit or Approval	Status
U.S. Fish and Wildlife Service (USFWS)	Section 7 consultation for threatened and endangered species.	Consultation initiated in November 2015.
State Historic Preservation Officer (SHPO)	Completion of consultation under Section 106 of the National Historic Preservation Act	Consultation in progress.
Central Valley Regional Water Quality Control Board (Regional Board)	Construction General Permit coverage	SWPPP and permit registration documents in progress.
Western Power Administration	Interconnection agreements	Applications on May 11, 2015, and accepted as complete on June 11, 2015
Reclamation	Land Use Authorization	In progress.

2.5 Financial and Technical Capability of Applicant

The Applicant's Assignee, a wholly owned subsidiary of Otras Producciones de Energía Fotovoltaica, S.L. (OPDE), is the development entity for the Project. Based in Navarra, Spain, OPDE specializes in the development, funding, construction, operation, and maintenance of photovoltaic installations. OPDE has constructed over 200 MW of solar facilities in Spain, Italy, and the United Kingdom, including more than 50 MW in assets of its own as a power generation company and 110 MW of solar PV installations from third parties. The Applicant is a U.S.-based corporation with an office in California.

The final design, engineering, construction, and operation of the Project would be performed by a tier-1 U.S. construction company with an extensive track record in building and operating solar PV projects throughout the United States. The Applicant and its long-term ownership partner have raised several billion dollars in financing including tax equity from U.S.-based institutional investors to fund and operate assets.

Section 3 Affected Environment and Environmental Consequences

This section identifies the potentially affected environment and the environmental consequences involved with the Proposed Action and the No Action Alternative, in addition to environmental trends and conditions that currently exist. Whether the Proposed Action may significantly affect the quality of the human environment is determined by considering the context and intensity of the action, and its effects to existing natural and social resources (40 CFR 1508.27).

3.1 Resources Eliminated from Further Analysis

Reclamation analyzed the affected environment and determined that the Proposed Action would not have the potential to cause direct, indirect, or cumulative adverse effects to the resources listed in Table 7.

Table 7 Resources Eliminated from Further Analysis

Resource	Reason Eliminated
Agricultural and Forest Resources	The Project would not affect any agricultural land or forest resources because none are present in the Project area.
Global Climate Change	No aspect of the Project would affect climate change-related reservoir level fluctuations or groundwater level fluctuations. Climate change as it relates to GHG emissions is discussed in Section 3.7.
Socioeconomics	The Project would not adversely affect population, employment, or housing. The Project would not induce substantial population growth in the area or displace any people or housing. The Project could result in a short-term increase in local employment during the 6 to 9 month construction period, but the number of new jobs generated would not be substantial and would not exceed the projected job growth in the area.
Environmental Justice	The Proposed Action would not cause dislocation, changes in employment, or increase flood, drought, or disease; nor would it disproportionately impact economically disadvantaged or minority populations.
Indian Trust Assets	The Proposed Action would not impact Indian Trust Assets as there are none in the Proposed Action area. The nearest Indian Trust Asset is the Chicken Ranch Rancheria approximately 70 miles northeast of the Project area (Rivera 2010 in Reclamation and State Parks 2013).
Indian Sacred Sites	No sacred sites have been identified within the Project area.

3.2 Water Resources

This section describes existing hydrologic, floodplain, and water quality conditions and evaluates potential effects from Project construction and operations.

3.2.1 Affected Environment

3.2.1.1 Hydrology

The Project area is in the Panoche–San Luis Reservoir watershed, part of the San Joaquin River Basin, which drains into San Luis Creek. Since completion of San Luis Dam, runoff from San Luis Creek has been captured in San Luis Reservoir and diverted for State Water Project (SWP) and Central Valley Project (CVP) purposes (Reclamation and State Parks 2013). The Panoche–San Luis Reservoir watershed encompasses approximately 1,213 square miles (776,781 acres).

Surface Water and Drainage

Surface water in the immediate Project area consists of O'Neill Forebay and the Delta-Mendota Canal. O'Neill Forebay has a capacity of 56,400 acre feet and is used primarily for water supply. Water from the SWP (conveyed through the California Aqueduct) and CVP (pumped from the Delta-Mendota Canal via the O'Neill Pumping-Generating Plant) mix in the O'Neill Forebay. During the fall and winter months, water is pumped from O'Neill Forebay into San Luis Reservoir.

Average total annual precipitation for the Project area is 10.36 inches, and the highest rainfall month is January (2.06 inches average; Western Regional Climate Center 2015).

The three solar PV system sites that comprise the majority of the Project footprint are undeveloped, previously cleared of vegetation, and leveled following the use of the areas for the original base material to develop San Luis Reservoir and O'Neill Forebay. This is evident from the steep slopes cut from the surrounding terrain and the flat remaining contours at the three sites. The sites have revegetated primarily with low grass. SLDMWA uses a portion of Site 3 to stockpile excess spoils. Storm water generated on-site and off-site sheet flows[2] to the low ends of the sites. Existing drainage patterns in the Project area are as follows.

- **Site 1.** Site 1 generally slopes from the southeast to northwest and currently drains directly to O'Neill Forebay. Off-site drainage from approximately 25 acres of Medeiros Use Area to the east of Site 1 also currently drains through the proposed Site 1 location to O'Neill Forebay. Based on aerial mapping and the topographic survey, there are no locations of concentrated flows, streams, or any other drainage conveyances in this area.
- **Site 2.** Most of Site 2 drains from the north to south as sheet flow. There is a depressed area in the southeastern corner of the site, where an existing overflow pipe drains storm water from Site 2 to the Delta-Mendota Canal. The northern one-third of Site 2 drains to the northwestern corner of the site. At this location, the maintenance road for the O'Neill

[2] Water that "sheet flows" spreads thinly over a broad, relatively smooth surface instead of concentrating in channels.

Dam intake channel is not on a raised berm but instead is flush with the adjacent part of Site 2, which allows the storm water to flow directly into the intake channel. There is no evidence of off-site flows affecting Site 2.

- **Site 3.** Site 3 and the adjacent field west of the site both drain from west to east toward the Delta-Mendota Canal, then south through an existing north-south ditch along the canal berm to the east, and then to the southeastern corner of the site. Field observations and topographic mapping indicate there is currently no outfall for Site 3. West of the Site 3 boundary is an overflow pipe that drains directly to the canal (Aztec and Typsa 2015).

Groundwater

Groundwater is recharged in the Project area by percolation of runoff into underground aquifers. Groundwater supports many of the springs throughout the area and supplies 93 percent of the public water supply in the Panoche–San Luis Reservoir watershed (Reclamation and State Parks 2013). Groundwater at Site 1 ranges from between 14.5 feet to 28 feet below the surface (Reclamation 2012). No data is available for groundwater depth in approximately the western half of Medeiros Use Area, where Site 1 is located. For the rest of the Project area, depth to groundwater is generally mapped as 20 feet to 50 feet below ground surface; however, these are typical groundwater conditions and do not account for several feet of seasonal fluctuation due to precipitation, irrigation, and drainage (Merced County 2012a).

3.2.1.2 Floodplain

No designated flood zones existing within the Project vicinity, and the Federal Emergency Management Agency has mapped the Project area as Zone D, an area of undetermined but possible flood hazard. Flood potential in O'Neill Forebay is extremely low because water is pumped into it (Reclamation and State Parks 2013).

3.2.1.3 Water Quality

The Central Valley Regional Water Quality Control Board (RWQCB) defines beneficial uses for all surface and groundwater within the study area. Beneficial uses are protected or enhanced through water quality objectives, which are defined as the limits or levels of water quality constituents or characteristics that are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area. The *Water Quality Control Plan for the California Regional Water Quality Control Board, Central Valley Region* (Basin Plan) identifies existing beneficial uses for both O'Neill Forebay and the Delta-Mendota Canal as municipal and domestic supply, agricultural supply, recreation, and warm freshwater habitat (Central Valley RWQCB 2011).

In addition to water quality objectives, the Basin Plan defines total maximum daily load (TMDL) requirements to protect water quality from nonpoint source pollution. Section 303(d) of the Clean Water Act requires identification of waterbodies that do not meet, or are not expected to meet, water quality standards. These waterbodies are included in the "303(d) list," and the development of a TMDL is required. O'Neill Forebay is included on the 303(d) list for mercury; however, a TMDL has not been completed (SWRCB 2012).

Contamination can also affect groundwater. Sensitivity of an area to groundwater contamination is a function of both depth to groundwater and soil permeability. The Medeiros Use Area, which contains Site 1, and most of the gen-tie corridor has been mapped as having medium sensitivity

to groundwater contamination. The area that contains Sites 2 and 3 has been mapped as having low sensitivity to groundwater contamination (Merced County 2012a).

3.2.2 Environmental Consequences

3.2.2.1 No Action

The No Action Alternative would have no impacts on surface water or groundwater because there would be no excavation, grading, use of heavy equipment or chemicals, or dewatering or groundwater use. No impervious surfaces would be added, and no additional stormwater or wastewater would be generated. The risk of inadvertent spills from operations or maintenance that could affect water quality would be minimized by continued implementation of the Spill Prevention, Control, and Countermeasure Plan described in the RMP/GP (Reclamation and State Parks 2013). The No Action Alternative would not contribute cumulative effects to water resources.

3.2.2.2 Proposed Action

Construction

Construction of the solar PV system sites and temporary construction use of access roads and staging areas would take place immediately adjacent to O'Neill Forebay (for Site 1) and the Delta-Mendota Canal (for Sites 2 and 3 and the northern extent of the gen-tie line). Construction, trenching, grading, and stockpiling activities would, if not properly addressed, temporarily result in bare soil that could enter these waterbodies.

The Applicant would prepare and implement a SWPPP before any soil disturbance begins, as part of obtaining coverage under the Statewide National Pollutant Discharge Elimination System Construction General Permit Order (2009-0009-DWQ). The SWPPP will include construction BMPs to minimize downstream erosion and sedimentation.

The Project design includes silt fences, stabilized construction entrances, and designated vehicle and equipment cleaning/concrete washout areas at each site to minimize drainage impacts during construction (Section 2.2.1.6). The Project's spill prevention and response plan (included in the Hazardous Materials Management Plan), BMPs for handling hazardous materials, and BMPs related to vehicles and equipment (Section 2.2.1.13) would also minimize impacts to water resources, including during gen-tie construction. No Project construction activities would require dewatering (the maximum depth of disturbance is expected to be 7 to 10 feet) of groundwater use.

The preparation and implementation of an approved SWPPP and implementation of Project design measures and BMPs would avoid and/or minimize major adverse surface water quality effects to O'Neill Forebay and the Delta-Mendota Canal as well as groundwater effects during Project construction; however, minor adverse effects could remain.

Operation

Surface Water and Drainage

Most Project components would retain the existing pervious ground surfaces. The ground surface beneath the solar PV panels would remain unpaved and allow for infiltration of storm water as

well as panel washing water (Section 2.2.2.7). Disturbed areas that are not covered in aggregate or concrete would be hydroseeded or reseeded by other methods with an approved grass mix. Site perimeter roads would be covered with gravel, aggregate, or other road stabilization material (Section 2.2.2.9), which would also allow for infiltration. The existing ground surface within the gen-tie route and 75-foot easement would remain pervious except for minor ground displacement from the poles themselves.

The Project would involve construction of concrete pads for the power conversion units, Site 1 and 2 substations, Site 3 combining switchgear, and BESS facility, which would introduce impervious surfaces. The portion of the Project area that would be covered with impervious surfaces would constitute a small fraction of the total area (up to approximately 4 percent at Site 2, and less for Sites 1 and 3). The difference between pre-retention versus post-retention volumes would be negligible.

To minimize effects to surface water quantity and drainage, the Project includes detention basins at each solar PV system site (see Figures 4 through 6). The basins have been sized to handle the first 0.5 inch of direct runoff over the entire site, in accordance with the methodology and procedures outlined in the *Stormwater Best Management Practice Handbook* (California Stormwater Quality Association 2003). Basins would be placed strategically at low points for each site. Off-site flow patterns would be maintained, and the proposed Project would not affect flow patterns on the surrounding properties. No drainage improvements are proposed for off-site flows.

Runoff in excess of the first-flush volume would overtop the basins and discharge to the historical outfall for each site. Site 1 excess runoff would continue to drain to O'Neill Forebay, as storm water runoff does now. The southern portion of Site 2 would overflow to the outlet pipe located at the southeastern corner of the site and continue to the O'Neill Dam intake channel. The northern one-third of Site 2 would overflow directly to the intake channel, as storm water does now. As Site 3 does not have an existing outfall, a float will be installed in the detention basin to monitor the water levels. Once a predetermined water level is reached, a pump will be activated to discharge additional runoff through a pipe to the O'Neill Dam intake channel. No storm water runoff would be directed to the Delta-Mendota Canal; rather, it would be conveyed to the O'Neill Dam intake channel. The BESS would have a separate runoff collection system to contain all runoff and prevent it from entering any surface waters as well as groundwater or soils.

As a result of these design measures, effects on surface water and drainage from Project operation would be minor.

Groundwater

Project operation would not require dewatering or groundwater use. As the Project would not substantially change the amount of pervious surface in the Project area, no adverse effects to groundwater depth or recharge are anticipated.

Floodplain

The Project sites are not located within a 100-year floodplain.

Water Quality

Chemicals used during Project operation would consist of diesel fuel, gasoline, and motor oil from vehicles; biodegradable mineral oil in Project transformers; and battery cell electrolyte, coolant, and refrigerant associated with the BESS. The risk of releases from Project vehicles or transformers that could affect surface water or groundwater quality would be minimized through development and implementation of the Project's Hazardous Materials Management Plan (Section 2.2.1.8), which includes a spill prevention and response plan (Section 2.2.1.13). In addition, the Project includes detention basins that would allow for storm water infiltration and percolation, as discussed under "Surface Water and Drainage." Potential adverse effects to water quality from Project operation would be minor.

Battery leaks or a battery fire at the Project's BESS could theoretically result in the release of flammable electrolytes, coolant, or refrigerant, which could affect surface water and/or groundwater quality. As described in Section 2.2.1.3, the BESS would be constructed on a concrete pad that would be surrounded by a concrete berm or geo membrane containment that would provide secondary containment in the event of a release of chemicals from one or more battery units. The Project's Emergency Action Plan and Fire Prevention and Protection Plan would provide for emergency training and response of Project personnel in the event of a release.

Potential adverse effects to water quality from the BESS would be further minimized through implementation of Measures WQ-1 and WQ-2, listed in Section 2.2.5. With implementation of these measures, the potential for adverse water quality impacts from BESS operation would be minor.

3.2.2.3 Cumulative Impacts

Effects to water resources from Project construction and operation would be minor. Other past, present, and reasonably foreseeable future agricultural, development, infrastructure, and energy development projects may result in similar effects to water resources and floodplains, including soil disturbance, increased erosion and sedimentation, and accidental discharge of hazardous materials; effects to groundwater quality and levels, existing drainage patterns, water conveyance capacity of floodplains. The San Luis Transmission Project EIS/EIR (WAPA and SLDMWA 2015; construction estimated for 2018 to 2021) reported negligible or minor effects to water resources and floodplains through ground disturbance associated with construction and O&M activities, including operation of heavy equipment, grading and vegetation clearing for access roads, site leveling, augering of transmission tower foundations, and other infrastructure excavations. The San Luis Transmission Project sponsor agencies and the sponsors of the other past, present, and reasonably foreseeable future projects in the area must demonstrate, through compliance with applicable water quality regulations, that the projects would not have major adverse impacts on water resources. The proposed San Luis Solar Project includes design measures and avoidance/minimization measures that would reduce potential effects to water resources to minor levels. Combined, the projects would not result in cumulatively considerable effects to water resources.

3.3 Land Use

3.3.1 Affected Environment

The Project area is in the planning boundaries of the San Luis Reservoir SRA RMP/GP. The RMP/GP (Reclamation and State Parks 2013) is intended to provide coordinated direction for recreation and resource management of the plan area lands while continuing to serve the primary purpose of water storage and distribution and power generation (Reclamation and State Parks 2013).

The entire Medeiros Use Area, including Site 1, is designated in the RMP/GP as a Frontcountry Zone, and Sites 2 and 3 are designated as an Administration and Operations Zone. The gen-tie corridor would cross Frontcountry, Backcountry, and Administration and Operations zones, the purposes of which are described further below.

- The Frontcounty Zone is intended to provide visitor information, SRA orientation, and the most active visitor uses within and around the existing developed portions of each zone.
- The Administration and Operations Zone is intended to keep the SRA's administrative, operational, and maintenance activities clustered together and to provide for the separation of staff work areas from public use areas.
- The Backcountry Zone is intended to keep a large portion of the SRA in a wild and primitive state while allowing limited visitor access and enjoyment.

Under the RMP/GP, grazing is allowed unless it results in conflicts with visitor or other uses (Reclamation and State Parks 2013). Cattle grazing formerly occurred at the Medeiros Use Area, which contains Site 1; however, the grazing lease expired and has not been renewed. As Sites 2 and 3 are in a designated Administration and Operations zone, no grazing is allowed there.

The O'Neill Forebay Wildlife Area is just southeast of Sites 2 and 3. The O'Neill Forebay Wildlife Area is on Reclamation land but is not part of the SRA (Reclamation and State Parks 2013). Other wildlife areas outside of the SRA are the Lower Cottonwood Wildlife Area (located north of Site 1 and west of Sites 2 and 3 along the northern edge of the San Luis Reservoir); the Upper Cottonwood Wildlife Area and San Luis Wildlife Area (both more than 6 miles west of all three sites); and the Volta Wilderness Area, North Grasslands Wilderness Area, and Los Banos Wilderness Area (all located within approximately 10 miles east of the Project area).

3.3.2 Environmental Consequences

3.3.2.1 No Action

Under the No Action Alternative, no changes to existing or planned land uses in the Project area or contribution to cumulative effects would occur.

3.3.2.2 Proposed Action

The Project would be compatible with the existing water and land management zone designations. The water management zones for O'Neill Forebay acknowledge the presence and visibility of built environment structures and human activity in the recreation setting. Although

portions of Site 1 may be visible from the O'Neill Forebay (but see Sections 2.2.1.7 and 2.2.1.10), he Project would not be visible from San Luis Reservoir or other water bodies and therefore would not affect other zone designations.

The Project would be constructed and operated on Reclamation land and would not change the existing land management zone designations. None of the zones identified in the Project footprint preclude renewable energy projects, and RMP/GP Goal OPS-RE2 allows for "consideration and development of renewable energy projects within the Plan Area."

The Project would not affect the land use designations of any properties outside of Federal lands in the Project area. No adverse land use effects would occur.

The effects of the Project on existing and proposed recreation uses described in the RMP/GP are discussed in Section 3.9.

3.3.2.3 Cumulative Impacts

As the Project would not conflict with existing management zone designations from the RMP/GP or land use designations outside of Federal lands, it would not contribute to cumulative impacts to land use.

3.4 Biological Resources

This section addresses potential Project effects on biological resources including vegetation, wetlands, and wildlife in the Project area.

3.4.1 Affected Environment

3.4.1.1 Baseline Conditions

The three solar PV system sites would be located in disturbed areas that were previously cleared of vegetation and leveled for the development of San Luis Reservoir, O'Neill Forebay, and ancillary support, access, and conveyance structures. The gen-tie alignment and staging areas have also been previously cleared of vegetation during the construction of the existing electric transmission towers/lines, the development of SR 152 and SR 33, or the construction of the water conveyance system. The three solar PV system sites have been disked, and the gen-tie corridor has been tilled.

Current human disturbances in the Project area include moderate levels of vegetation trampling/damage from vehicles and recreationists, erosion from trail pioneering, and littering associated primarily with recreational activities at O'Neill Forebay. Several existing utility corridors (overhead power transmission lines and gas pipelines), O'Neill Substation, numerous concrete lined and unlined canals for water conveyance, and associated access roads exist in the Project area.

The Project area is located outside the boundaries of any Area of Critical Environmental Concern, Designated Wildlife Management Area, Bureau of Land Management wilderness area, or critical habitat unit designated by the USFWS. The closest USFWS critical habitat units are for California red-legged frog (approximately 5 miles west of the Project area), California tiger

salamander (approximately 6 miles southwest of the Project area), and vernal pool species (approximately 14 miles to the northeast of the Project area).

Surveys of the Project area were completed on February 28, March 7, April 9, May 15, May 30, June 4, June 13-14, September 25, and November 17, 2014; and January 21 and March 23, 2015, by ESR, Inc. These surveys were conducted to identify vegetation communities, soil types, and potential habitat that may support special-status[3] species; assess the presence of special-status species; and evaluate drainage patterns and migratory corridors. The collected information was corroborated with species database search results from the USFWS (2015), CDFW (2015a), and California Native Plant Society (2015). The species list for the proposed Project is included in Appendix A.

No special-status plant species with potential to occur were observed in the Project area, nor does the Project area support suitable habitat for these species (ESR 2015).

The Project area does not contain any wetland habitat, including vernal pools and complexes, bed and banks, seasonal or perennial drainages, or swale features.

3.4.1.2 Special-Status Species

The following special-status species were identified as having potential habitat in the Project area (Appendix A) (ESR 2015):

- Blunt-nosed leopard lizard
- San Joaquin kit fox
- American badger (*Taxidea taxus*)
- Burrowing owl
- Tricolored blackbird
- Loggerhead shrike
- Grasshopper sparrow
- Cackling (=Aleutian Canada) goose (*Branta hutchinsii leucopareia*)
- Northern harrier
- Migratory birds

Blunt-Nosed Leopard Lizard

The blunt-nosed leopard lizard is a Federal and State listed endangered species and a State fully protected species. The species inhabits semi-arid grasslands, alkali flats, low foothills, canyon floors, large washes, and arroyos, usually on sandy, gravelly, or loamy substrate, sometimes on hardpan (Hammerson 2007). It is common where there are abundant rodent burrows, and rare or absent in dense vegetation or tall grass. In 1931, a blunt nosed-leopard lizard was reported near SR 152 at the western boundary of the present OHV Park (CDFW 2015a), which is the only area that contains remnants of the requisite habitat for this species. The species has not been recorded again within the Project vicinity. No sign of the blunt-nosed leopard lizard or suitable habitat for

[3] "Special-status" species are selected for protection because they are rare and/or subject to population and habitat declines. Special-status is a general term for species that are provided varying levels of regulatory protection. The highest level of protection is given to threatened and endangered species; these are species that are formally listed or proposed for listing as endangered or threatened under the Federal Endangered Species Act.

the species was found during multiple habitat surveys in 2014–2015. The species is not expected to occur within the Project area.

San Joaquin Kit Fox

The San Joaquin kit fox is Federally listed as endangered and State listed as threatened. The species inhabits grasslands and scrublands, many of which have been extensively modified (USFWS 2010). Types of modified habitats include those with oil exploration and extraction equipment and wind turbines, and 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 San Joaquin kit fox. Dens are scarce in areas with shallow soils, similar to the Project location, because of the proximity to bedrock, high water tables, or impenetrable hardpan layers (O'Farrell and Gilbertson 1979, O'Farrell et al. 1980, McCue et al. 1981, Morrell 1972).

Researchers suggest that there is a kit fox population south of SR 152 and west of Interstate 5 in western Merced County but because survey detection rates were low, they concluded that it is a relatively low to moderate density population when compared to areas identified as supporting core populations (Constable et al. 2009). The nearest core population for the species, as defined in the *USFWS Recovery Plan for Upland Species of the San Joaquin Valley, California* (1998), is the Ciervo-Panoche Natural Area, approximately 35 miles from the Project area.

Wildlife movement through the solar PV system sites and adjacent area is limited due to the presence of several barriers including SR 152, SR 33, O'Neill Forebay, the SR 152 bridge across O'Neill Forebay, and the McCabe Road bridge over the Delta-Mendota Canal. The California Aqueduct and O'Neill Forebay separate Site 1 from Sites 2 and 3. The California Essential Habitat Connectivity project developed by Caltrans and CDFW determined that there is moderate permeability for wildlife movement Sites 1 through 3 (Spencer et al. 2010). Maintaining potential movement corridors for the San Joaquin kit fox, particularly south-to-north movements in the Santa Nella area of western Merced County, is one of the recovery planning objectives for this species (USFWS 1998).

A 1975 California Natural Diversity Database record indicates that an individual was observed at Site 1. The species has not been recorded again in the Project area. In 1986, a listed observation was approximately 0.3 mile east of Site 3 (CDFW 2015a); however, this record is on the eastern side of the Delta-Mendota Canal and the species would have to travel a circuitous route of about 2.5 miles or more to reach the northern boundary of Site 3. As part of Project area surveys in 2014–2015, burrows were assessed for evidence of San Joaquin kit fox use such as dirt mounding, scat, prey remains, and matted vegetation. No evidence of kit fox use was observed.

Despite the presence of several existing movement barriers and lack of recent documented occurrences, there is a low potential for San Joaquin kit fox to use the marginal habitat in the action area for movement, denning, foraging, or sheltering.

American Badger

The American badger, a State species of special concern, is a fossorial mammal that inhabits open grasslands and generally treeless regions. The species burrows in friable soils in habitats with drier open shrubland, open forests, grasslands, savannah, desert, and herbaceous habitats

(CDFG 2005). Badgers typically occupy home ranges of between 2 acres in winter to 850 acres in summer, and excavate burrows for dens, escape, and predation (foraging). Badgers are carnivorous and feed on mammals such as ground squirrels (*Spermophilus* ssp.), pocket gophers (*Thamnomys* ssp.), and jackrabbits (*Lepus* spp.), as well as reptiles, insects, amphibians, and carrion. The species has not been observed within the Project area. The closest known occurrence was in 2006 along the western edge of O'Neill Forebay (CDFW 2015a). However, the American badger could potentially use the Project area for foraging and dispersal.

Burrowing Owl

Burrowing owls, a State species of special concern and bird protected under the Migratory Bird Treaty Act (MBTA), are often found in dry, open areas with low vegetation where fossorial mammals (i.e., ground squirrels) congregate such as grasslands, deserts, farmlands, rangelands, golf courses, and vacant lots in urban areas (Burrowing Owl Conservation Network 2013). The species has never been observed within the Project area. The last known occurrence in the Project vicinity was in 2003, approximately 0.5 mile south of SR 152 (CDFW 2015a). During the field surveys, no sign of the species was found in the Project area or within a 150-foot buffer. The species is not expected to occur within the Project area.

Other Birds Protected under MBTA or Bald and Golden Eagle Protection Act

The tricolored blackbird was a State species of special concern until it was emergency listed in December 2014 as threatened. The emergency listing had a 6-month duration and has since expired, but the species status remains under review with CDFW. The tricolored blackbird's basic requirements for breeding sites are open accessible water, a secure substrate in which to place their nests, and suitable nearby foraging areas that provide adequate food sources (CDFW 2015a). If any one of these required elements is missing, the species will not select that location for breeding and will move to another location that is suitable. Due to the highly degraded nature of the Project area, this species is not expected to occur.

The loggerhead shrike, grasshopper sparrow, cackling (=Aleutian Canada) goose, and northern harrier—all State species of special concern—and other migratory birds protected under the MBTA use grasslands and shrubs for nesting and foraging habitat (CDFW 2015a). These species could potentially use the solar PV system sites for nesting, dispersal, and foraging (CDFW 2015b).

Some of the raptor species that use non-native annual grassland habitat, trees, and shrubs in the O'Neill Forebay area include red-tailed hawk (*Buteo jamaicensis*), Swainson's hawk, white-tailed kite (*Elanus leucurus*), bald eagle (*Haliaeetus leucocephalus*), golden eagle (*Aquila chrysaetos*), burrowing owl, northern harrier (*Circus cyaneus*) (ESR 2015), and songbirds. A red-tailed hawk nest was observed at the Forebay Golf Course (0.5 mile east of Site 2) in 2011. However, after several site visits in 2014 and 2015, the nest was found to be abandoned by the red-tailed hawks and taken over by American crows (*Corvus brachyrhynchos*) (CDFW 2015a). Other observed raptor nests include red-tailed hawk and great horned owl (*Bubo virginianas*) nests on the northern and eastern edges of the O'Neill Forebay Wildlife Area, directly adjacent to the gen-tie alignment buffer. The nests have been used annually for more than 10 years (CDFW 2015b).

3.4.2 Environmental Consequences

3.4.2.1 No Action

Under the No Action Alternative, Sites 1, 2, and 3 and other Project-related facilities would not be developed, and the existing biological resources would continue to exist with no change. Project area would continue in its existing ruderal/grassland state with moderate levels of vehicle and recreation activities nearby and ongoing recreation and resource management of the plan area. Species would experience no additional direct or indirect effects beyond the existing conditions. The No Action Alternative would not contribute cumulative effects to biological resources.

3.4.2.2 Proposed Action

Construction, operation and maintenance of the Project have the potential to affect existing biological resources, either through direct or indirect impacts to special-status species or associated habitat. The following sections discuss these impacts on the biological resources.

Construction

Historically, the proposed solar PV system sites were disked and leveled for base material for development of San Luis Reservoir and O'Neill Forebay. At Site 1, recreation use has further disturbed the non-native grassland. Field surveys indicated that most small mammal burrows at Site 1 were shallow (1 to 3 feet deep) due to underlying parent material, wall or roof collapse, or side cast filling. No burrows were observed at Sites 2 and 3. As a result, there is a low potential for special-status wildlife species to use the marginal habitat in the Project area.

Permanent direct effects to disked, tilled, or otherwise managed vegetation would result from construction of site access roads; posts to support fences and gates; steel support piles that would support the solar PV racks; concrete pads/foundations for power conversion units, substations, and the battery energy storage system; and gen-tie poles. Minor temporary direct effects to vegetation would result from vehicle and equipment movement, installation of supports/footings (for racks, fences, etc.), and trenching for electrical connections. Although construction activities would temporarily disturb the marginal habitat, this impact is considered minimal due to the current disturbed nature of the solar PV system sites. Short-term increases in noise, light, and human presence may cause behavioral modifications such as changes in foraging and dispersal patterns. These changes would be temporary and would not prevent the species from using adjacent areas for similar activities. With the implementation of Measures BIO-1, BIO-2, BIO-3, BIO-8, and BIO-9 in Section 2.2.5, effects to blunt-nosed leopard lizard, San Joaquin kit fox, and burrowing owls from Project construction would be minor. The same measures would avoid or minimize effects to American badger, if present in the Project area.

Several special-status bird species have potential to forage in the Project area. In the event a bird should nest within the Project sites, individuals of these species (especially eggs or young in nests) could be killed or injured as a result of construction activities. Construction activities may cause an increase in localized noise, movement of equipment, or human presence near active nests. This could result in the abandonment of nests, and possibly the loss of eggs or young as a result. Increases in human activity may cause birds to temporarily avoid the Project sites and use adjacent areas. However, with implementation of Measures BIO-4 through BIO-7 in Section 2.2.5, construction-

related effects to special-status bird species would be avoided; therefore, there would be no take of raptors or birds protected under the MBTA or Bald and Golden Eagle Protection Act.

Operation

Direct Effects

No permanent direct effects are anticipated from operations and maintenance. As described in Section 2.2.2.6, during construction, plant root systems would be left in place to the extent possible, and after construction, disturbed areas that are not covered in aggregate or concrete would be hydroseeded or reseeded by other methods with an approved grass mix.

For security purposes, fences will be installed around the perimeter of each site (Section 2.2.1.10). All fencing will leave a 4 to 8 inch opening between the fence mesh and the ground to allow San Joaquin kit fox and their prey and other wildlife to move in and out of the facility (Measure BIO-1 in Section 2.2.5). The cables/lines associated with the gen-tie would be aerial and would not hinder species movement. As a result, the Project would not hinder small size wildlife movement through the solar PV system sites and adjacent areas.

Shielded area-specific lighting would be installed at the control buildings, Site 1 and 2 substations, and Site 3 combining switchgear (Section 2.2.1.10). The lighting would be directed downward to reduce the illuminated area and would be the minimum needed for security and safety. The localized increase in lighting would be limited in area and would not prevent nocturnal animals, such as the San Joaquin kit fox, from moving through the solar PV system sites and adjacent areas.

Indirect Effects

Shade Effect

Potential impacts from the “shade effect” caused by solar PV panels were evaluated based on the composition of the non-native annual grassland and how these potential impacts may affect wildlife. Studies have shown that the shade effect can enhance the production of herbaceous vegetation (Frost and McDougald 1989). This may cause a change in the vegetation composition of an area from small to large seeded grasses and legume species, and suppress native perennial grasses (Dyer and Rice 1999). Although additional shading from solar PV panels could result in an increase in wild oats, ripgut grass, and clovers and a decrease in mustard, bindweed, and soft brome, major changes in the overall composition of the existing non-native annual grassland are not anticipated. The change in vegetation composition would not prevent wildlife from using the area. The restored non-native grassland under arrays would still support suitable foraging and dispersing habitat for birds and other wildlife. Therefore, no potential effects on special-status wildlife habitat from the change in vegetation are expected to occur.

Microclimatic Changes

Solar panels absorb more heat during the day than grassland, giving rise to concerns about “heat islands,” a phenomenon whereby a developed area is significantly warmer than the surrounding rural area. The amount of heat retained by the panels is related to the mass of the material. Solar panels are thin and lightweight and dissipate heat more quickly than the ground surface. While

the panels can reach operating temperatures of 120 degrees Fahrenheit during the day, the panels are able to cool to air temperature shortly after the sun sets. Therefore, the minor increase in absorption combined with an increased rate of dissipation is expected to produce no net gain in heat. Effects to special-status wildlife habitat from microclimatic changes would be minor.

Bird Strikes

Large-scale solar facilities have been studied to assess their potential to increase bird deaths. The primarily causes of bird deaths among all types of solar facilities are collision with solar panels, collision with heliostats, or exposure to elevated concentrations of solar flux (reflected sunlight) close to solar towers. The proposed Project does not include heliostats. The Project would consist of a solar PV panel system that would not expose birds to solar flux because it does not include solar towers or concentrating mirrors. The remaining potential causes of bird mortality would be blunt-force trauma due to collision with the panels and predation of traumatized birds.

The U.S. Department of Agriculture and Mississippi Department of Wildlife conducted a three-year study on bird use of solar PV installations at U.S. airports to assess the implications for aviation safety (DeVault et al. 2014). The study was conducted at several airports that recently installed solar PV systems on their properties. The agencies studied bird use of solar PV system areas and airport grasslands in three states. The study found that solar PV systems did not increase bird hazards to aviation at airports, including where the systems were placed in previous grassland areas.

According to Upton (2014), certain avian species appear to collide with large solar power arrays due to the "lake effect," in which birds can mistake a reflective solar facility for a water body. However, PV panels generate electricity most efficiently when they absorb as much sunlight and reflect as little sunlight as possible. Solar radiation through a glazing material can be transmitted, reflected, or absorbed. When light strikes glass, some of the light is reflected from the surface, and some is refracted and passes through the surface. Solar PV systems by design do not produce as much glare and reflectance as standard window glass. Light that is not refracted through the glass surface to the PV cells below is reflected from the panel surface or absorbed into the glass itself (Merced County Planning and Community Development Department 2012). The Project design includes the use of anti-reflective glass, which is less reflective than standard residential and commercial glass. As a result, the Project's solar PV panels would contribute minimally to potential lake effects and resulting bird mortality. The presence of San Luis Reservoir, O'Neill Forebay, canals, ditches, and other water conveyance systems in the Project vicinity are also expected to reduce the potential for lake effect impacts from the solar PV panels.

Federally Listed Species Determination

The Project may affect blunt-nosed leopard lizard and San Joaquin kit fox. Consultation with USFWS was initiated in November 2015.

3.4.2.3 Cumulative Impacts

Effects to special-status wildlife species from Project construction and operation would be minor. Other nearby projects in the same geographical area also have, or had, the potential to affect special-status wildlife species, such as the Villages of Laguna San Luis Community Plan (Merced County Planning and Community Development Department 2008), Santa Nella

Community Specific Plan (Santa Nella 2000), Quinto Solar PV Project (Merced County Planning and Community Development Department 2012; to be completed in 2015), Wright Solar Park (Merced County Community and Economic Development Department 2014; construction estimated for 2015 to 2016), and San Luis Transmission Project (WAPA and SLDMWA 2015; construction estimated for 2018 to 2021). As part of the biological permitting processes for those projects, the sponsor agencies must demonstrate, through mitigation and other measures, that the projects would not have major adverse impacts on San Joaquin kit fox and other special-status species. The proposed San Luis Solar Project includes design measures and avoidance and minimization measures that would reduce potential effects to special-status species to minor levels. Combined, the projects would not result in cumulatively considerable effects to San Joaquin kit fox or other special-status species.

3.5 Cultural Resources

This section addresses potential impacts on cultural resources from the proposed Project. Cultural and historical resources include a broad range of objects, places, structures, and districts created or influenced by human use or occupation or recognized in past or current cultural practice. Cultural and historical resources may include traditional resources, sacred sites, or traditional use areas that are important to a community's practices, beliefs, and cultural identity. Cultural resources may have archaeological, architectural, or traditional cultural significance. Architectural resources include standing buildings, bridges, dams, and other structures of historic significance.

The Project is being undertaken entirely on Federal lands administered by Reclamation and as such is subject to compliance with Federal environmental and cultural resources laws. Section 101 of NEPA makes it Federal policy to "preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity and variety of individual choice." Section 106 of the National Historic Preservation Act of 1966 (NHPA) is the principle guidance for managing the effects of project work on cultural resources. The following Federal laws and regulations pertain to this Project.

National Historic Preservation Act

The National Historic Preservation Act (NHPA) of 1966, as amended (54 USC 300101 et seq.) is the primary Federal legislation that mandates the Federal government's responsibility to consider the effects of its undertakings on historic properties. The historic preservation review process required by 54 USC 306108, commonly known as Section 106 of the NHPA, is outlined in the regulations issued at 36 CFR Part 800. These regulations, as well as the Reclamation Manual Directives and Standards (LND 02-01), describe how Reclamation will address any effects to historic properties. Historic properties are defined as those cultural resources listed, or eligible for listing, on the National Register of Historic Places (NRHP). The criteria for NRHP eligibility are outlined at 36 CFR Part 60.4.

Compliance with the Section 106 process outlined in 36 CFR Part 800 involves a series of steps that are designed to identify interested parties, define the area of potential effects (APE), conduct cultural resources inventories, determine if historic properties are present within the APE, and assess effects on historic properties. Federally recognized Indian tribes must be invited to

participate in the Section 106 process. Federal agencies are required to consult with such tribes to determine if historic properties of religious or cultural significance are present within the APE. Non-federally recognized Native American tribes and other groups or individuals may also have concerns with historic properties in the APE and may participate as consulting parties in the Section 106 process. In the event that historic properties will be adversely affected by a Federal undertaking, continued consultation with the State Historic Preservation Officer and other Section 106 consulting parties is required to resolve those effects through agreed upon avoidance or mitigation measures.

Federal agencies are required to consult with the State Historic Preservation Officer pursuant to 36 CFR Part 800. The State Historic Preservation Officer's concurrence is required to ensure that historic properties are taken into consideration at all levels of Project planning and development.

National Register of Historic Places

The NRHP is a national list of cultural properties that exhibit qualities of historical significance in the context of our national heritage. The list is maintained for Interior by the National Park Service. The California Office of Historic Preservation administers NRHP listings at the state level by reviewing nominations and forwarding recommendations for NRHP inclusion to the National Park Service and the Keeper of the Register. Listing on the NRHP affords special considerations to listed cultural properties for Federal tax incentives, grants, and loans.

The criteria used to evaluate the significance of cultural resources for inclusion in the NRHP is defined in 36 CFR 60.4. The quality of significance in American history, architecture, archaeology, and culture is present in districts, sites, buildings, structures, and objects of state and local importance that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

a. that are associated with events that have made a significant contribution to the broad patterns of our history; or
b. that are associated with the lives of persons significant in our past; or
c. that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
d. that have yielded, or may be likely to yield, information important to prehistory or history.

Sites listed or eligible for listing on the NRHP are considered to be "historic properties." Sites younger than 50 years, unless of exceptional importance, are not eligible for listing in the NRHP.

Other Federal Regulations

The inadvertent discovery of human remains, funerary objects, sacred objects, or objects of cultural patrimony on Federal land are subject to the provisions set forth by the Native American Graves Protection and Repatriation Act of 1990 and the associated regulations at 43 CFR Part 10. In the event of any post-review discoveries during the construction or operation of the

Project, the procedures outlined at 36 CFR 800.13 and in other applicable Federal laws and regulations (e.g., the Native American Graves Protection and Repatriation Act) will be followed.

3.5.1 Affected Environment

3.5.1.1 Prehistory

Prehistoric and historic patterns of land use in the Project vicinity have been documented by more than 30 studies over the past 50 years (Moratto 1984;Wulzen 2008). During the 1960s, in anticipation of the construction of the San Luis Reservoir, numerous Native American sites were recorded. The more substantial sites became the focus of intensive subsurface salvage excavations (Riddell and Olsen 1965; Prichard 1968; Olsen and Payen 1969, 1983). Olsen and Payen (1969) proposed a chronological sequence of Native American occupation for the San Luis Dam vicinity that covers the past 5000 years. The sequence in the San Joaquin Valley has since been refined and expanded to include occupation as early as 12,000 years before present (BP) (Moratto 1984; Bethard and Basgall 2000). Each cultural period in the sequence is associated with technologically and typologically distinct artifacts that represent cultural adaptation to changing environmental, demographic, and social conditions: Paleo-Indian (ca. 12,000-7500 BP), Positas Complex (ca. 5300-4600 BP), Pacheco Complex (ca. 4600 BP –1000 BP), Gonzaga Complex (ca. 1000 BP-500 BP), and Panoche Complex (ca. 500 BP-150 BP).

3.5.1.2 Ethnographic Setting

Archaeological evidence suggests that Miwok, Ohlone, and Yokuts people visited the San Luis area in prehistoric times (Wulzen 2008). At the time of European contact, the Project area lay within the territory assigned to the Nopchinchi subdivision of the Northern Valley Yokuts (Wallace 1978:462; Berthard and Basgall 2000). The Nopchinchi spoke a language within the Yokutsan Language Family, a subdivision of the California Penutian Stock that occupied all of the Central Valley and the adjacent uplands (Berthard and Basgall 2000:14).

The Nopchinchi subsistence activities focused on hunting a variety of animals and gathering and processing acorns. The Nopchinchi occupied small seasonal camps adjacent to resources as they became available throughout the year, and established larger settlements along perennial stream courses. Their houses were circular tule-covered structures and more elaborate semi-subterranean pit houses. They wove baskets of a wide variety of shapes and sizes for a myriad of economic and ornamental uses and decorated them in distinctive Yokuts patterns. They used stone mortars, both portable and bedrock, to process acorns and other food stuffs. They created shell ornaments from marine shells obtained through trade. They traded with their neighbors to the east to acquire obsidian for making projectile points and ornaments (Wulzen 2008).

3.5.1.3 Historic Setting

The first documented European expedition into the area occurred when Gabriel Moraga and Father Pedro Munoz passed through the area in 1805 (Wulzen 2008). They named the area after Saint Luis de Gonzaga, whose feast day was occurring when they camped in the vicinity of Pacheco Pass. In 1843, the Mexican Governor granted the 48,000-acre Rancho San Luis Gonzaga Land Grant to Jose Meija and Juan Perez Pacheco. Pacheco leased the rancho to his son-in-law Mariano Malarin to raise cattle to supply meat to San Francisco and miners in the Sierra Nevada foothills (Wulzen 2008).

During the Gold Rush of 1849, the Project area saw a dramatic increase in the number of travelers and became a favorite haunt for bandits and outlaws including Joaquin Murieta. A toll road through Pacheco Pass, roughly following the route of SR 152, was established in 1857 by Andrew Firebaugh and was used regularly by the Butterfield Overland Mail stage. An inn and stables was built at the Pacheco's Rancho Gonzaga and it became a regular stop for the stage. The adobe farm house erected by Juan Pacheco in 1846 at the eastern foot of the pass survived until the middle of the 20th century when it was removed in anticipation of the construction of San Luis Reservoir (Wulzen 2008).

The turn of the 20th century saw the expansion of agriculture throughout California and a need for new sources of water for irrigation. The general topography of the Central Valley and the distribution of rainfall across the geography played a significant role in the large-scale dam projects that began in the 1930s (ICF 2013). In 1933, the legislature passed the Central Valley Project Improvement Act, which set in motion the events leading to the construction of the San Luis Dam. The dam construction project was an important component of the Central Valley Project. Groundbreaking was held August 1960 and was attended by President Kennedy. Actual construction began in 1963. The O'Neill and San Luis dams were completed in 1967 (ICF 2013).

3.5.1.4 Area of Potential Effects

For Federal undertakings, the study area for cultural resources investigations is referred to as the Area of Potential Effects (APE). The APE represents the maximum extent (both horizontal and vertical) of Project-related activities for the undertaking. The APE includes all areas that could be permanently or temporarily affected by the proposed Project, including for construction, staging, and laydown. The APE for cultural resources is the footprint of the proposed Project, including the three solar PV system sites, access roads, gen-tie routes, staging areas, BESS facility, and potential Site 3 spoils pile relocation areas.

Many types of cultural resources occur as subsurface deposits or features that have been buried as a result of natural geological processes (Moratto 1984:38). Such cultural resources are often not detectable by surface observation. To take into account potential effects to subsurface cultural resources, a vertical APE was determined by the depth of project activities such as grading and excavation. For the San Luis Solar Project, the range of depth for anticipated Project activities is 0 to 10 feet below ground surface.

Project activities may indirectly affect cultural resources by introducing noise, visual changes, and other off-site impacts to the environment. Potential indirect effects were considered for all architectural built-environment resources immediately adjacent to the APE. A buffer area of 0.5 mile around the APE was examined for the Project's potential to effect vistas that could be important to the integrity of certain types of cultural resources. The 0.5-mile buffer took into account the potential visibility of the gen-tie poles and line (which could be up to 70 feet tall) and other Project features where not blocked by topography, vegetation, or existing manmade features.

3.5.1.5 Records and Archival Review

A records search for the APE and a 0.5-mile buffer was performed at the Central California Information Center of the California Historical Resource Information System at California State University, Turlock. Additional sources consulted at the Central California Information Center included the National Register of Historic Places, the California Register of Historical

Resources, California Historical Landmarks, Points of Historical Interest, Historic Property Data File, and California Inventory of Historic Resources. Historical documents were obtained from online archives such as the David Rumsey Map Collection; California Department of Water Resources; California State Engineer Bulletins; Google E-Books; and the National Map: Historic Topographic Map Collection.

The records review showed that 14 cultural resources, including historic sites and Native American prehistoric sites, have been recorded in or within 0.5 mile of the APE.

3.5.1.6 Field Survey

In March, April, and July 2015, Johnston and Associates conducted a historic property survey of the Project area's APE. The field survey identified no archaeological artifacts, deposits, or sites that qualify as historic properties pursuant to 36 CFR 800.

The survey identified the following three architectural built-environment resources within the Project's APE:

- O'Neill Pumping-Generating Plant (P-24-2008), substation (P-24-2009) and associated features (intake canal, bridge, and secondary spillway);
- Delta-Mendota Canal (P-24-1703); and
- San Luis Canal (P-24-1931).

The San Luis Canal was previously found eligible for listing in the NRHP under Criteria A, C, and G. The O'Neill Pumping-Generating Plant, substation, and associated features and the Delta-Mendota Canal are recommended as eligible for listing in the NRHP under Criterion A.

3.5.1.7 Native American Consultation

Reclamation contacted the Native American Heritage Commission (NAHC) on February 26, 2015, to request a search of the Sacred Lands File and a Native American Contacts List specific to the current Project APE. Through correspondence dated March 5, 2015, Ms. Sarah Johnston of Johnston and Associates, the cultural resources consultant working on behalf of the Applicant, also requested this same information from the NAHC. In both cases, the NAHC responded that no sacred lands were identified in the Project APE.

In its role as lead Federal agency for NHPA Section 106 compliance, Reclamation sent letters dated March 17, 2015, to the organizations and individuals identified by the NAHC as potentially having concerns with cultural resources in the Project area. No responses from any of the organizations or individuals identified on the NAHC contact list have been received to date.

In addition, Reclamation sent a letter dated March 17, 2015, to the Santa Rosa Rancheria Tachi-Yokut Tribe, a federally recognized Indian tribe that was not included on the NAHC contacts list but is known to have knowledge of and concerns with cultural resources in the Project area. Representatives from the Santa Rosa Rancheria Tachi-Yokut Tribe contacted Reclamation by phone in mid-April, indicating that the tribe had concerns about the Project and would like to schedule a visit to the proposed activity areas. Reclamation hosted a field review of the Project on July 16, 2015. In attendance were Mr. Lalo Franco, the Santa Rosa Tachi-Yokut Tribe Cultural Director; Reclamation natural and cultural resources specialists; and Ms. Johnston.

Reclamation hosted a second field review of the Project on October 16, 2015, with representatives from the Santa Rosa Tachi-Yokut Tribe, Picayune Rancheria of the Chukchansi Indians, Table Mountain Rancheria, and Tule River Indian Tribe in attendance.

During that meeting, Mr. Franco indicated that a primary concern, shared with other Indian tribes, is that construction workers receive adequate training in cultural resources awareness prior to the start of any Project construction. Reclamation is supportive of the idea of cultural resources awareness training and is working with the Project proponent to facilitate such training for this undertaking. If other tribal concerns are subsequently raised, Reclamation will work to address them through the NHPA Section 106 process.

3.5.2 Environmental Consequences

3.5.2.1 No Action

The No Action Alternative would not affect historic properties or tribal interests or contribute to cumulative effects on cultural resources.

3.5.2.2 Proposed Action

Direct and indirect effects to the three historic properties within the APE were assessed. The only direct effect from the Project would be to the O'Neill Substation where a switch connecting the gen-tie line would be added. The new connection would be such a small intrusion on the property that it would have no consequence to the substation's overall structural and design integrity. The visual effect on the property as a whole would be temporary and reversible. Therefore, the Project would have no adverse effect on this historic property.

The construction of the solar PV systems and the gen-tie line that would cross over the San Luis Canal and the O'Neill Pumping-Generating Plant intake canal would have minor, temporary, and reversible indirect effects to the visual setting. No Native American sites within 0.5 mile of the Project's APE have clear, unobstructed views of the Project area; therefore, no indirect effects would occur. Pursuant to 36 CFR 800.5(b), no historic properties would be adversely affected, directly or indirectly, by any of the Project-related activities. Reclamation is consulting with the SHPO on a Section 106 finding of No Adverse Effect for the Project, pursuant to 36 CFR 800.5(b). Upon SHPO concurrence with this finding, Reclamation's responsibilities under Section 106 of the NHPA will be fulfilled. Reclamation will not issue the Land Use Authorization for the Project prior to completion of the Section 106 process.

Although the entire Project area has been affected by almost 50 years of intensive dam-related development and recreational use, there remains a small potential for buried archaeological deposits to exist within the Project's APE. Measure CUL-1 in Section 2.2.5 would minimize potential adverse effects from inadvertent discoveries of buried resources.

3.5.2.3 Cumulative Impacts

The Project would involve excavation and could affect undiscovered cultural resources. Any unanticipated discoveries during construction or operation would be addressed through applicable Federal processes (e.g., 36 CFR Part 800, 43 CFR Part 10). As the Project would not adversely affect archaeological or built-environment resources, it would not contribute to cumulative impacts on those resources.

3.6 Topography, Geology, and Soils

This section identifies existing topographic, geologic, and soil conditions in the Project area and analyzes the Project's potential to affect those resources.

3.6.1 Affected Environment

3.6.1.1 Topography

San Luis Reservoir is bordered to the west by the eastern foothills of the Diablo Range, which are marked by minor drainages. These drainages spread out to form several relatively flat valleys opening eastward into the San Joaquin Valley. The San Luis Flat is one such valley, formed in part by the fanning of San Luis and Cottonwood creeks. The inundation of the San Luis Flat created San Luis Reservoir.

The Project area and the majority of the area surrounding O'Neill Forebay is relatively flat, and grades can range between 0 percent and 20 percent (Reclamation and State Parks 2013).

3.6.1.2 Geology

Dibblee (1975) and Herd (1979) mapped the specific surface geologic units in the San Luis Dam and O'Neill Forebay areas for the USGS. Dibblee mapped the southern portion of the Project area as principally Quaternary Alluvium bordered on the west and north by sandstone and conglomerate hills and outcrops of the Panoche Formation.

Herd mapped the occurrence and stratigraphic relationships of the local geologic units around O'Neill Forebay (from oldest to youngest) as the Great Valley Sequence, the Laguna Seca Formation, the Tulare Formation, and Older Alluvium formations. The map shows that most of the alluvial deposits within the Project area are Pleistocene and at least 40,000 years old (Herd 1979:4). Herd also delineated one small area of more recent Holocene stream gravel immediately south of the O'Neill Pumping-Generating Plant.

According to the California Geological Survey, an area containing serpentine and ultramafic rock (rock with naturally occurring asbestos) lies approximately 2.5 miles north-northwest of the Project, near the Stanislaus County line (California Geological Survey 2000).

3.6.1.3 Soils

Several locations in the Project area are composed of modern artificial fill or were used as modern quarry sites for dam construction. Herd identified Site 1 as a quarry site. Sites 2 and 3 coincide with areas of modern artificial fill in a deeply excavated (20–50 feet deep) landscape (Herd 1979:5).

Other than the modern artificial fill and quarry areas, three soil types occur in the Project area (in order of predominance): Danualous-Bapos-Los Banos, Apollo-O'Neil (correct spelling), and Woo-Stanislaus (NRCS 1991, Merced County General Plan 2012). Danulos-Bapos-Los Banos are very deep, nearly level to strongly sloping, well-drained soils on terraces. This soil type constitutes about 98 percent of the Project area.

At the O'Neill Pumping-Generating Plant, a small lobe of Apollo-O'Neil soils extends from the west and north of the forebay. Apollo-O'Neil soils are deep to moderately deep, gently sloping to

steep, well-drained soils that have high organic matter. On the northeastern edge of the Project area are the very deep Woo-Stanislaus soils associated with alluvial fans at the rim of the San Joaquin Valley. Xerofluvents—extremely gravelly soils (284) are mapped at the southern end of the Project area on the flats above the San Luis Dam. A small area of Mallic Xerofluvents (220) is mapped at the north end of the Project area, south of the O'Neill Pumping-Generating Plant (USDA 2015). Xerofluvents are shallow, poorly developed highly variable soils that are occasionally flooded.

3.6.1.4 Erosion Hazards

The NRCS and California Geological Survey have surveyed and classified the erosion hazard for soils through the United States. The ratings indicate the hazard of soil loss in off-road and off-trail areas after disturbance activities that expose the soil surface. The ratings are based on slope and soil erosion factor "K."

Mapping for the RMP/GP indicates that the erosion hazard for the entire Project area is classified as slight (Reclamation and State Parks 2013). A rating of "slight" indicates that erosion is unlikely under ordinary climatic conditions.

3.6.1.5 Seismicity

San Luis Reservoir is in a seismically active area and is close to three geologic faults. The Ortigalita fault passes under the reservoir, and the Calaveras and San Andreas faults are 23 and 28 miles away, respectively. These faults and their segments can cause earthquakes at or near the reservoir. From May 1984 to December 1999, three earthquakes with magnitudes between 3.0 and 4.0 occurred within 10 miles of the reservoir. The epicenter of one of the earthquakes was in the reservoir itself; another was in O'Neill Forebay (Reclamation and State Parks 2013; California Department of Conservation 2003). Seismic hazard investigations performed for San Luis Dam and other dams nearby estimated that the Ortigalita fault has the potential to produce an earthquake of about magnitude 6.75 (Reclamation no date).

The Los Banos Valley and Cottonwood Arm sections of the Ortigalita fault, which are a minimum of 2 miles east of the Project area, have been designated as Alquist-Priolo fault zones. Alquist-Priolo fault zones designate areas of existing surface fault rupture hazards. Under the Alquist-Priolo Earthquake Fault Zoning Act, buildings used for human occupancy cannot be constructed on active faults or within Alquist-Priolo fault zones.

The California Geological Survey maintains data expressing probabilistic shaking due to seismic hazards. Ground motions are expressed as a fraction of the acceleration due to gravity, or g. Within the Plan Area, the California Geological Survey has projected that ground shaking would be between 30 and 40 percent of acceleration due to gravity (Reclamation and State Parks 2013; California Department of Conservation 2003).

3.6.2 Environmental Consequences

3.6.2.1 No Action

The risk for people or structures to be affected from seismic ground shaking would be the same with No Action as with the Project. Otherwise, the No Action Alternative would not involve

construction of any new facilities, and no other topographic, geologic, or soil effects would occur. The No Action Alternative would not contribute cumulative effects to these resources.

3.6.2.2 Proposed Action

Project construction has the potential to cause short-term minor adverse effects from earthmoving and vegetation removal. The construction contractor would implement a SWPPP, which would minimize any potential soil erosion during construction. The Project includes design features and BMPs to reduce soil erosion, such as wetting of disturbed soils to prevent dust (Section 2.2.2.7) and use of silt fencing, dust control, and hydroseeding or other reseeding (Section 2.2.1.6).

The Project is outside of any Alquist-Priolo fault zones or areas mapped as having asbestos-containing rocks. However, the potential exists for people or Project structures to be exposed to adverse effects from seismic ground shaking. The Project will comply with applicable building codes from Merced County and the State as well as the International Building Code (Section 2.2.3.1). A geotechnical study will be prepared as part of the detailed engineering stage, and the Project will be constructed in accordance with the findings of the study. Therefore, no major long-term adverse effects from seismic hazard would occur, but minor effects could remain.

Project operation would not affect topography, geology, or soils. Project operations would not involve excavation or grading, and ongoing maintenance would be addressed by the SWPPP (Section 2.2.1.6).

3.6.2.3 Cumulative Impacts

As the Project would not affect topography, geology, or soils, it would not contribute to cumulative impacts to those resources.

3.7 Air Quality

Section 176 (C) of the Clean Air Act (42 U.S.C. 7506 (C)) requires any entity of the federal government that engages in, supports, or in any way provides financial support for, licenses or permits, or approves any activity to demonstrate that the action conforms to the applicable State Implementation Plan required under Section 110 (a) of the Federal Clean Air Act (42 U.S.C. 7401 [a]) before the action is otherwise approved. In this context, conformity means that such federal actions must be consistent with State Implementation Plan's purpose of eliminating or reducing the severity and number of violations of the National Ambient Air Quality Standards and achieving expeditious attainment of those standards. Each federal agency must determine that any action that is proposed by the agency and that is subject to the regulations implementing the conformity requirements would, in fact, conform to the applicable State Implementation Plan before the action is taken.

On November 30, 1993, the United States Environmental Protection Agency (EPA) promulgated final general conformity regulations at 40 CFR 93 Subpart B for all federal activities except those covered under transportation conformity. The general conformity regulations apply to a proposed federal action in a non-attainment or maintenance area if the total of direct and indirect emissions of the relevant criteria pollutants and precursor pollutant caused by the Proposed

Action equal or exceed certain *de minimis* amounts thus requiring the federal agency to make a determination of general conformity.

3.7.1 Affected Environment

The Project area is located in the San Joaquin Valley Air Basin under the jurisdiction of the San Joaquin Valley Air Pollution Control District (SJVAPCD). The pollutants of greatest concern in the San Joaquin Valley are carbon monoxide, ozone, ozone precursors such as reactive organic gases (ROG) or volatile organic compounds (VOC), inhalable particulate matter between 2.5 and 10 microns in diameter (PM_{10}) and particulate matter less than 2.5 microns in diameter ($PM_{2.5}$). The San Joaquin Valley Air Basin has reached Federal and State attainment status for carbon monoxide, nitrogen dioxide, and sulfur dioxide. Although Federal attainment status has been reached for PM_{10} the State standard has not been met and both are in non-attainment for ozone and $PM_{2.5}$ (San Joaquin Valley Air Pollution Control District 2014). There are no established standards for nitrogen oxides (NO_x); however, they do contribute to nitrogen dioxide standards and ozone precursors (San Joaquin Valley Air Pollution Control District 2014).

3.7.1.1 Conformity

A conformity analysis determines whether a Federal action meets the requirements of the General Conformity Rule. It requires the responsible Federal agency to evaluate the nature of the project and associated air pollutant emissions, to calculate emissions as a result of the project, and to perform a formal conformity determination if *de minimis* thresholds are exceeded. The EPA has classified Merced County as an extreme nonattainment area for ozone, a moderate nonattainment area for $PM_{2.5}$, and a maintenance area for PM_{10} (EPA 2015; SJVAPCD 2015). Based on these designations, the *de minimis* thresholds for the area are 10 tons per year of NO_x (an ozone precursor), 10 tons per year of VOC (an ozone precursor), 100 tons per year of $PM_{2.5}$, and 100 tons per year of PM_{10} (EPA 2014b).

3.7.1.2 Greenhouse Gases

The EPA has established and implemented many rules and programs to address emissions of greenhouse gases (GHGs). The EPA has issued the Final Mandatory Reporting of Greenhouse Gases Rule. The rule requires large sources that emit 25,000 metric tons or more per year of GHG emissions to report GHG emissions in the U.S., collect accurate and timely emissions data to inform future policy decisions, and submit annual GHG reports to the EPA.

In December 2009, the EPA Administrator signed two findings regarding GHGs under Section 202(a) of the Clean Air Act:

- **Endangerment Finding:** The Administrator finds that the current and projected concentrations of six key GHGs (CO_2, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride) in the atmosphere threaten the public health and welfare of current and future generations; and
- **Cause or Contribute Finding:** The Administrator finds that the combined emissions of these well-mixed GHGs from new motor vehicle engines contribute to the GHG pollution, which threatens public health and welfare.

These findings individually do not impose any requirements on industry or other entities. However, this action is a prerequisite to finalizing the EPA's proposed GHG standards for light-

duty vehicles, which were jointly proposed by the EPA and the Department of Transportation's National Highway Safety Administration in 2009. Executive Order 13514, *Federal Leadership in Environmental, Energy, and Economic Performance* directs Federal agencies to reduce GHG emissions and address climate change in NEPA analysis. It expands upon the energy reduction and environmental performance requirements of Executive Order 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*. The new Executive Order establishes GHG emission reductions as an overarching, integrating performance metric for all Federal agencies and requires a deliberative planning process.

The Council on Environmental Quality (CEQ) provided draft guidance in 2010 for determining meaningful GHG decision making analysis. The 2010 draft guidance states that if the proposed project would be reasonably anticipated to cause direct emissions of 25,000 metric tons or more CO_2 equivalents[4] (CO_2e) of GHG emissions on an annual basis, agencies should consider this an indicator that a quantitative and qualitative assessment may be meaningful to decision makers and the public. For long-term actions that have annual direct emissions of less than 25,000 metric tons of CO_2e, CEQ encourages Federal agencies to consider whether the action's long-term emissions should receive similar analysis. CEQ does not propose this as an indicator of a threshold of significant effects, but rather as an indicator of a minimum level of GHG emissions that may warrant some description in the appropriate NEPA analysis for agency actions involving direct emissions of GHGs (CEQ 2010).

In 2014, CEQ released a revised draft of this guidance, which supersedes the 2010 draft guidance (CEQ 2014). The 2014 draft guidance applies to all proposed Federal agency actions, but does not create new or additional regulatory requirements. The 2014 draft guidance continues to recommend to agencies to consider 25,000 metric tons of CO_2e emissions on an annual basis as a reference point below which a quantitative analysis of greenhouse gas is not recommended unless easily accomplished with available tools and data.

3.7.2 Environmental Consequences

3.7.2.1 No Action

Under the No Action Alternative, the Project would not be constructed and would not result in short-term or long-term emissions. The No Action Alternative would not affect air quality or contribute cumulatively to air quality impacts.

[4] CO_2e is a measurement used to account for the fact that different GHGs have different potential to retain infrared radiation in the atmosphere and contribute to the greenhouse effect. This potential, known as the Global Warming Potential (GWP) of a GHG, is dependent on the lifetime, or persistence, of the gas molecule in the atmosphere. For example, 1 metric ton of methane has the same contribution to the greenhouse effect as approximately 25 metric tons of carbon dioxide, so its GWP is 25 (IPCC 2007). Therefore, methane is a much more potent GHG than carbon dioxide. Expressing emissions in CO_2e takes the contributions of all GHG emissions to the greenhouse effect and converts them to a single unit equivalent to the effect that would occur if only carbon dioxide were being emitted. The GWP for nitrous oxide is 298, making it an even more potent GHG than methane (IPCC 2007).

3.7.2.2 Proposed Action

Construction

Temporary and minor increases in air pollutant and GHG emissions would occur from the use of construction equipment and vehicles (i.e., combustible emissions) and the disturbance of soils (i.e., fugitive dust) during site grading and installation of solar PV panels, fencing, conduits, gen-ties, and other Project components. The following paragraphs describe the air calculation methodologies used to estimate Project-related air emissions.

Criteria air pollutant emissions, fugitive dust emissions, and GHG emissions were calculated using the California Emissions Estimator Model (CalEEMod) version 2013.2.2 from the California Air Pollution Control Officers Association (CAPCOA). CalEEMod utilizes widely accepted models for emission estimates and default data from sources such as EPA AP-42 emission factors, California Air Resources Board vehicle emission models, and studies from California agencies such as the California Energy Commission (CAPCOA 2013). Project specific construction activity data, including equipment lists, activity schedules, and vehicle trip activity, were used as input data to the CalEEMod model. Detailed CalEEMod model output is included in Appendix B.

Estimated emissions from the Project are presented in Table 8. As shown in the table, construction emissions would not exceed the *de minimis* thresholds, and a formal conformity determination is not required. Construction emissions from the proposed Project would not violate National Ambient Air Quality Standards or conflict with the state implementation plans, and impacts on air quality would not be substantial.

Table 8 Total Construction Emissions

Criteria Pollutant Emissions		
Pollutant	**Construction Emissions (tons/year)**	**Threshold (tons/year)**
VOC	0.44	10
NO_x	4.62	10
CO	2.66	NA
SO_2	0.01	NA
PM_{10}	0.26	100
$PM_{2.5}$	0.20	100
Greenhouse Gas Emissions		
Pollutant	**Construction Emissions (metric tons/year)**	**Threshold (metric tons/year)**
GHG (CO_2e)	561.7	25,000

Notes:
See Appendix B for full emission model output.
All criteria pollutant emissions and thresholds are presented in tons per year. GHG (CO_2e) emissions and thresholds are presented in metric tons per year.
NA = Not applicable. The Project area is in attainment for CO and SO_2; therefore, there are no *de minimis* thresholds for these pollutants. CO and SO_2 emissions are presented for informational purposes.

Operation

Operational emissions are those that occur after the solar PV panels have been installed and would include employee commuter vehicles traveling to the Project site for maintenance activities. Criteria air pollutant emissions, fugitive dust emissions, and GHG emissions were

calculated with CalEEMod using the methodologies described above for "Construction Activities." Detailed CalEEMod model output is included in Appendix B.

Estimated emissions from the proposed Project are presented in Table 9. As shown in the table, operational emissions would not exceed the *de minimis* thresholds, and a formal conformity determination is not required. Operational emissions from the proposed Project would not violate National Ambient Air Quality Standards or conflict with the state implementation plans, and impacts on air quality would not be substantial.

Table 9 Total Operational Emissions

Criteria Pollutant Emissions		
Pollutant	**Operational Emissions (tons/year)**	**Threshold (tons/year)**
VOC	0.003	10
NO_x	0.002	10
CO	0.024	NA
SO_2	<0.001	NA
PM_{10}	<0.001	100
$PM_{2.5}$	<0.001	100
Greenhouse Gas Emissions		
Pollutant	**Operational Emissions (metric tons/year)**	**Threshold (metric tons/year)**
GHG (CO_2e)	0.226	25,000

Notes:
See Appendix B for full emission model output.
All criteria pollutant emissions and thresholds are presented in tons per year. GHG (CO_2e) emissions and thresholds are presented in metric tons per year.
NA = Not applicable. The Project area is in attainment for CO and SO_2; therefore, there are no *de minimis* thresholds for these pollutants. CO and SO_2 emissions are presented for informational purposes.

In addition, the Project would also provide long-term operational benefits to local air quality and GHG emissions. The use of solar PV panels for electricity generation would displace the amount of electricity that may otherwise be generated by fossil fuel combustion, thus reducing GHG emissions.

3.7.2.3 Cumulative Impacts

The Project would temporarily contribute to cumulative air quality emissions in San Joaquin Valley Air Pollution Control District; however, the Project would provide long-term operational benefits to local air quality and GHG emissions. The Proposed Action's contribution to this cumulative impact is therefore considered beneficial.

3.8 Visual and Aesthetics

3.8.1 Affected Environment

The regional landscape surrounding the Project area is generally composed of flat to gently sloping grassland and agricultural land. The natural landscape is semi-arid to arid with few natural lakes or perennial streams. Vegetation is primarily low-growing grasses that are green to tan and brown tones depending upon the season. San Luis Reservoir, O'Neill Forebay, and the Delta-Mendota Canal are prominent water features in the otherwise dry landscape. The San Luis Dam is also a dominant visual feature in the landscape, particularly for views directed southwest

from the Project area. The earthen dam is 300 feet high and over 3.5 miles long and appears as a smooth, grey, solid horizontal feature. Panoramic views are common due to the expansive nature of the landscape, particularly to the east, where the topography is flatter than to the west. The foothills of the Diablo Range are present to the west of San Luis Reservoir, which add rugged topographic features to the background. Human development includes highways, homes, commercial buildings, fences, transmission structures, substations, and infrastructure associated with the dams and reservoir.

Outside of the SRA, the landscape is primarily rural, with dispersed development such as homes, barns, accessory buildings, and roads. The unincorporated community of Santa Nella is located approximately 1.5 miles east of O'Neill Forebay and has commercial and residential land uses primarily clustered near the SR 33/I-5 interchange (see Figure 13). A nine-hole golf course, the Forebay Golf Course, is located just east of Sites 2 and 3.

Two designated scenic highways are in the Project vicinity: SR 152 and I-5. SR 152, which is directly adjacent to the proposed Project, is a designated State scenic highway for the 14-mile segment between its interchange with I-5 to the east and the Santa Clara County line to the west. I-5 is a designated State scenic highway for a 15-mile segment between the I-5/SR 152 interchange and the Stanislaus County line to the north, where I-5 parallels the Delta-Mendota Canal and the California Aqueduct. I-5 passes the Project area approximately 2 miles east of O'Neill Forebay.

3.8.1.1 Viewers

Viewers that could be affected by the Project include roadway travelers, recreationists, and residents. Individuals traveling on SR 152, SR 33, and I-5 could have views of the Project, as well as recreationists primarily at the SRA and the Forebay Golf Course. The RMP/GP identifies four SRA recreation locations around or near O'Neill Forebay (Reclamation and State Parks 2013):

- San Luis Creek Use Area – Located along the southwest shore of O'Neill Forebay. Primary activities include fishing, windsurfing, swimming, boating, camping, day use, and group activities.
- Medeiros Use Area – Located along the southern shore of the O'Neill Forebay. Primary activities include fishing windsurfing, camping, and day use.
- Off-Highway Vehicle Use Area – Located south of SR 152. Primary activities are OHV use.
- O'Neill Forebay Wildlife Area – Located along a portion of the O'Neill Forebay. Primary activities include hunting, hiking, and nature study.

The remaining SRA recreation locations (Basalt Use Area, Dinosaur Point Use Area, and Los Banos Creek Use Area, and the waterbodies of San Luis Reservoir and Los Banos Creek Reservoir) would not have views of the Project.

Residential viewers are primarily in Santa Nella, located northeast of O'Neill Forebay. A small residential area also exists just southeast of the SR 33/SR 152 intersection.

3.8.1.2 Key Observation Points

This visual resource analysis is focused on the primary public areas where concentrations of potential viewers (roadway travelers, recreationists, and residents) could experience impacts to visual resources: on SR 152, within the SRA, and in the community of Santa Nella. Seven key observation points (KOPs) were established to represent typical landscape features within these three identified viewing areas and identify existing visual resource conditions to provide a baseline for assessing potential impacts. KOPs are primarily focused around the southern half of O'Neill Forebay. This is because the majority of public use facilities that would have views of the Project are located in this area.

The KOPs used for this analysis are described below and shown on Figure 13.

SR 152 Corridor

KOP 1: Eastbound SR 152

KOP 1 is located just west of where SR 152 crosses O'Neill Forebay, along the shoreline directly adjacent to the bridge crossing (Figure 13).[5] Existing views from KOP 1 are directed southeast, representing views for motorists traveling eastbound on SR 152 as shown in Figure 14. Existing views to the southeast are primarily dominated by O'Neill Forebay in the foreground and middleground, which appears flat, smooth, reflective, and expansive. Existing transmission structures are a dominant aspect of the landscape in the foreground and middleground and are substantially taller than their surroundings. Views from KOP 1 to the south also include rolling agricultural terrain to the south and west of O'Neill Forebay as well as SR 152 itself. Vegetation is primarily low-lying grasses and appears green to tan or brown, depending on the season. Buildings, trees, and utility structures are scattered and clumped throughout the area. SR 152 appears as a curvilinear, grey smooth surface traversing the landscape. Since SR 152 is a designated State scenic highway in this area, it is assumed that viewers traveling on this roadway would be sensitive to changes in landscape character within the viewshed of SR 152.

KOP 6: Westbound SR 152

KOP 6 is located just southwest of the SR 33/SR 152 interchange (Figure 13). Figure 15 shows the existing view from KOP 6 looking northwest toward the proposed location of Site 1 and the gen-tie alignment. Views from KOP 5 represent motorists traveling westbound on SR 152, potentially as well as individuals living in the small residential development southeast of the interchange. The landscape at KOP 5 is characterized by flat grassland in the foreground and rolling hills in the middleground and background. O'Neill Forebay is visible but is not dominant, and is largely screened by trees along the shoreline. Manmade development is a dominant aspect of views to the west-southwest from KOP 5. The natural landscape is bisected by SR 152, which appears as a large, dark, smooth, linear feature traversing the landscape, and large transmission structures that draw visual attention due to their large height and overall scale compared to their surroundings. Other existing manmade features include fencing, roadway lighting, signs, and residential and commercial development.

[5] KOP 1 was the closest location to SR 152 with an unobstructed view of the project area that could be safely accessed outside of the Caltrans right-of-way.

San Luis Reservoir SRA

KOP 2: San Luis Creek Use Area Shoreline

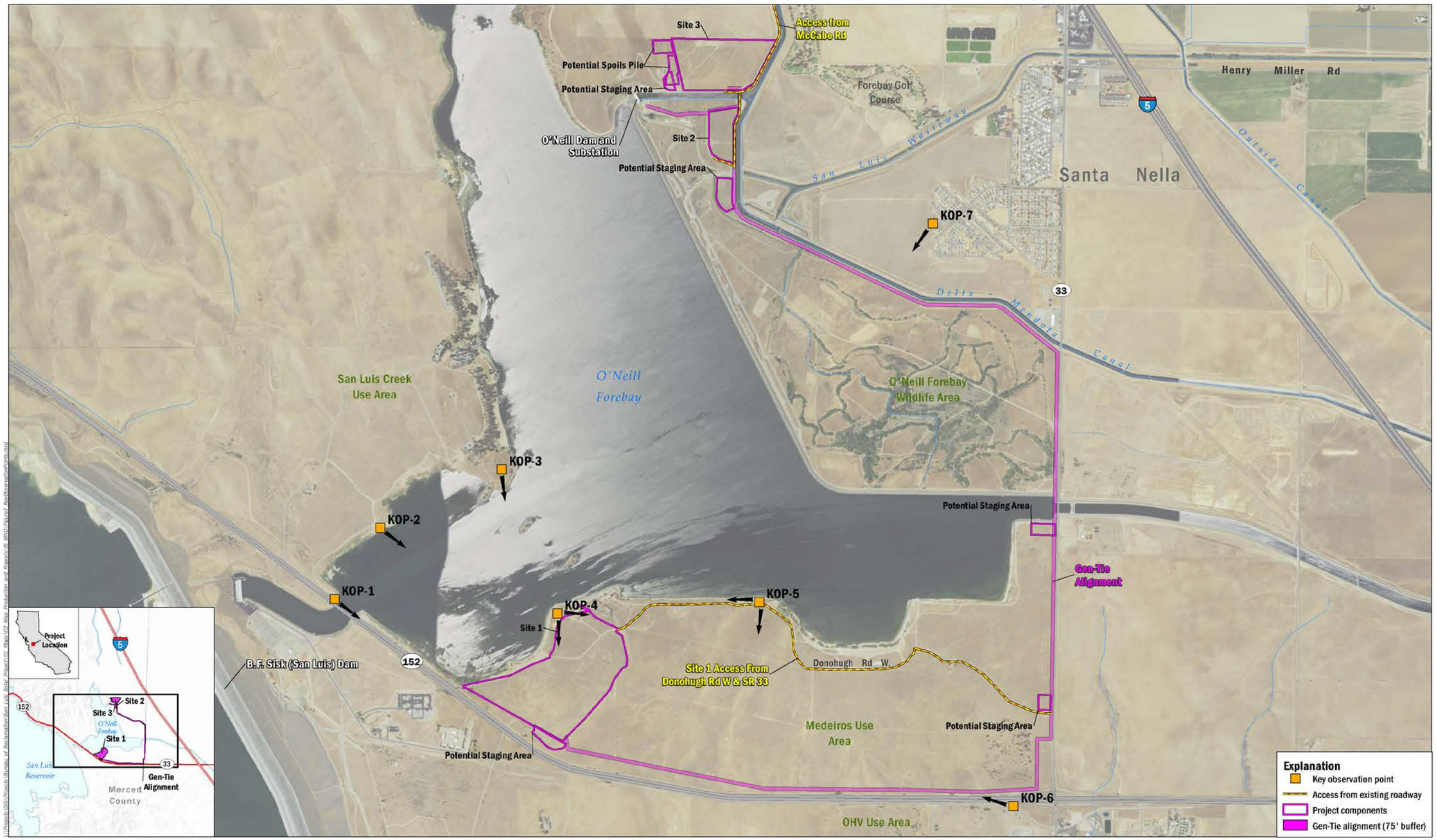
KOP 2 is located within the San Luis Creek Use Area along the southwest shore of O'Neill Forebay (Figure 13). There is no formal recreational development at KOP 2, and viewers would primarily be individuals fishing from shore. Views are primarily directed to the southeast toward the proposed Site 1 across O'Neill Forebay as shown in Figure 16. The smooth, glassy, reflective surface of O'Neill Forebay dominates the view. Flat to rolling topography on the southern shore adds height and variation to the landscape. Dark green trees and shrubs on the shoreline contrast with the light-colored short grasses that cover the hills in the background. Utility structures are present and appear tall and thin, and disrupt the smooth expansive natural landscape. On clear days the water surface appears bright blue, contrasting with the duller colors of the surroundings.

KOP 3: San Luis Creek Use Area Viewpoint

KOP 3 is located on a walking path on an elevated area within the San Luis Creek Use Area overlooking O'Neill Forebay (Figure 13). KOP 3 affords expansive views of O'Neill Forebay to the south, east, and northeast. Figure 17 shows existing views directed south toward proposed Site 1, and Figure 18 shows existing views directed northeast toward proposed Sites 2 and 3. Views from KOP 3 represent individuals at the San Luis Creek Use Area for a variety of activities including walking, picnicking, camping, and traveling to and from the area by vehicle. O'Neill Forebay, the existing transmission towers, and San Luis Dam are dominant aspects of the view. O'Neill Forebay appears large, wide, and flat, with a smooth to choppy texture depending on wind conditions. The existing transmission towers appear tall, brown, linear, and sequential. San Luis Dam appears as a long, solid, grey, smooth line along the horizon. The hills behind the southern shoreline appear as moderately tall mounded landforms with colors ranging from green to tan or brown, depending on the season. The eastern/northeastern shoreline is less visible from KOP 3 and appears as a low, thin brown and green line along the horizon.

KOP 4 and 5: Medeiros Use Area

KOP 4 and KOP 5 are located in the Medeiros Use Area along the southern shore of the O'Neill Forebay (Figure 13). KOP 4 is located on the western side of the Medeiros Use Area. KOP 5 is located approximately 1 mile east of KOP 4. Views experienced from KOP 4 and 5 include the flat to rolling surrounding grasslands, O'Neill Forebay to the north, existing dirt roads, and scattered shade ramadas associated with camping and day use. Viewers include individuals participating in on-shore activities including camping, fishing, and picnicking and off-shore activities such as swimming, windsurfing, and fishing. Views to the northwest are dominated by O'Neill Forebay in the foreground backdropped by rolling hills that appear gentle, soft, and green to tan or brown depending on the season, as shown in Figure 19. Figure 20 shows existing views to the southeast of flat grasslands with rolling hills in the background. Existing transmission structures traverse O'Neill Forebay to the west and the grasslands to the south of KOP 5. The structures are highly visible and introduce linear, vertical, sequential features to the landscape.



San Luis Solar Project
Bureau of Reclamation

FIGURE 13
Key Observation Points

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Community of Santa Nella

KOP 7: Santa Nella

KOP 7 is located near the southwestern corner of Santa Nella, northeast of O'Neill Forebay and Sites 2 and 3. Figure 21 shows existing views to the west from KOP 7. Existing views from KOP 7 toward the proposed locations of Site 2 and 3 and the gen-tie alignment include flat grassland in the foreground, San Luis Dam in the middleground, and rolling hills to more rugged foothills in the background. A band of trees creates a visual barrier between this area of Santa Nella and O'Neill Forebay. Manmade development including fences, utility poles, transmission towers, and the dam are visible and attract attention to the south, west, and north. Viewers primarily consist of residents of this Santa Nella development.

Figure 14. Key Observation Point 1
Existing view looking southeast from KOP 1 (SR 152 eastbound), toward proposed Site 1 location

Figure 15. Key Observation Point 6

Existing view looking northwest from KOP 6 (SR 152 westbound), toward proposed Site 1 location

Figure 16. Key Observation Point 2

Existing view looking south from KOP 2 (San Luis Creek Use Area), toward proposed Site 1 location

Figure 17. Key Observation Point 3 (South)

Existing view looking south from KOP 3 (San Luis Creek Use Area), toward proposed Site 1 location

Figure 18. Key Observation Point 3 (Northeast)

Existing view looking northeast from KOP 3 (San Luis Creek Use Area), toward proposed location of Sites 2 and 3

Figure 19. Key Observation Point 5 (Northwest)

Existing view looking northwest from KOP 5 (Medeiros Use Area); also represents view northwest for KOP 4

Figure 20. Key Observation Point 5 (Southeast)

Existing view looking southeast from KOP 5 (Medeiros Use Area), toward proposed location of Site 1

Figure 21. Key Observation Point 7

Existing view looking west from KOP 7 (Santa Nella), toward closest location of proposed gen-tie alignment to Sites 2 and 3

3.8.2 Environmental Consequences

Potential impacts to visual resources that could result from proposed Project construction and operation were assessed based on potential change in landscape character experienced from identified viewing areas of recreationists, residents, and roadway travelers. Impacts were assessed based on the magnitude and duration of anticipated impacts as well as the context of the affected resource. This assessment was implemented at KOPs representing typical landscape features, common or sensitive view areas, significant viewpoints, and important landmark features. Metrics are summarized below:

- The magnitude of impacts to visual resources was measured by the level of visual contrast created by the proposed Project. Visual contrast was assessed using the following definitions for level of visual contrast (BLM 1986):
  - *None* – The element contrast is not visible or perceived.
  - *Weak* – The element contrast can be seen but does not attract attention.
  - *Moderate* – The element contrast begins to attract attention and begins to dominate the characteristic landscape.
  - *Strong* – The element contrast demands attention, would not be overlooked, and is dominant in the landscape.

- The duration of impacts was measured by the anticipated temporal extent of impacts (i.e., temporary, long-term, or permanent). For the proposed Project, impacts to visual resources are considered long-term, extending for the life of the Project.
- The context of the impact was measured by the estimated sensitivity of viewers, applicable legislative protection of visual resources, and the potential for impacts to alter the human experience of the landscape.

To support the visual resource impact analysis, and disclose expected visibility of Project components from various vantage points, photographic simulations were prepared for a subset of five KOPs (KOPs 1, 2, 4, 6, and 7). Simulations were produced by rendering Project components using three-dimensional (3D) computer models, and superimposing these images onto photographs taken at KOPs. Model parameters account for environmental factors such as viewing angle and light conditions, thereby resulting in an accurate virtual representation of the appearance of the proposed Project. Results from the six photosimulations were used to predict potential visual impacts at all seven KOPs included in this analysis as well as the surrounding landscape as a whole. Visual simulations are presented in Figures 22 through 33. The existing and simulated view photographs for each KOP are intended to be viewed in pairs (that is, Figures 22 and 23 are the existing and proposed views of KOP 1, respectively; and so on for Figures 24 through 33).

3.8.2.1 No Action

Under the No Action Alternative, the proposed solar facilities would not be constructed in the Project area. There would be no effects to visual resources under the No Action Alternative, and no contribution to cumulative effects.

3.8.2.2 Proposed Action

Construction

Construction of the solar PV system sites and temporary construction use of access roads and staging areas would take place immediately adjacent to O'Neill Forebay, SR 152, and SR 33 (for Site 1 and the gen-tie alignment) and the Delta-Mendota Canal (for Sites 2 and 3 and the northern extent of the gen-tie alignment). Large construction equipment, staging areas, and increased activity and movement in and around the sites, gen-tie alignment, and construction access roads could all temporarily reduce the quality of the visual setting and experience for viewers recreating, traveling, and residing near the Project area.

Operation

Operation of the San Luis Solar Project could affect visual resources by introducing visual contrast and subsequently changing the landscape character within the Project vicinity. Potential impacts are described for each viewing area below.

SR 152 Corridor

KOP 1: Eastbound SR 152

KOP 1 is located approximately 0.6 mile to the northwest of Site 1 at its closest point. KOP 1 represents views of travelers heading eastbound on SR 152 (Figure 22). After Project construction, views to the southeast from KOP 1 would be similar to those experienced under

existing conditions. The solar PV system at Site 1 would appear as a dark-colored thin line situated between the O'Neill Forebay and the grassy uplands. The smooth surface and light color of the solar PV system would introduce a weak level of contrast between the soft textured green to tan or brown colored grassland (Figure 23). Where Site 1 faces O'Neill Forebay, the perimeter fence would be equipped with colored privacy slats, and trees would be planted along the outside of the fenceline. The fence and trees would screen the solar PV system from view, helping it to blend in with its surroundings.

With the screening provided by the fence and trees, coupled with the distance (0.6 mile) from KOP 1, the thin line created by the solar PV system at Site 1 would be visible but would not attract attention or substantially stand out, and O'Neill Forebay would continue to dominate views from KOP 1. The proposed gen-tie poles and lines would be slightly more visible but would be in the context of the existing utility lines in this area. At this distance, they would appear as thin, brown, vertical, sequential lines. The proposed gen-tie poles would appear subordinate to the existing transmission structures in the area, since they would be substantially smaller (in height and width) than the existing transmission structures. The proposed Project would increase the quantity of overhead utilities south of O'Neill Forebay, and the distribution of those utilities would appear denser. Due to the visual prominence of the existing transmission structures and limited visibility of the Site 1 solar PV system from KOP 1, the change in landscape character as viewed from KOP 1 would be low.

KOP 6: Westbound SR 152

KOP 6 is located approximately 1.6 miles southeast of Site 1 at its closest point; the associated gen-tie would be parallel to SR 152 and less than 0.1 mile to the north. Views experienced from KOP 6 primarily represent those from motorists traveling westbound on SR 152 (Figure 24). A small residential development is southeast of the SR 33/SR 152 interchange, and some residents may have views toward the proposed Project site and gen-tie alignment. Therefore, views from this KOP could be transient or stationary. From this distance, the solar PV system at Site 1 would be visible only as a thin, dark horizontal line near the base of the foothills in the middleground (Figure 25). The horizontal line formed by the solar PV system would be in the visual context of lines created by the flat agricultural lands and SR 152 in the foreground, and the dark color would be in the context of the color of the surface of SR 152 and shadows created by the hillsides during afternoon hours. The solar PV system would be visible but would not attract attention, and therefore introduces a weak level of visual contrast.

The gen-tie poles would run parallel to westbound SR 152 and appear as tall, dark, sequential vertical lines. Although the poles would be close (less than 0.1 mile), they would not dominate the landscape because of the numerous existing transmission and utility structures in the viewshed that appear similar in terms of line, color, form, and texture (except the existing transmission towers are much larger). The proposed gen-tie poles and lines would increase the quantity of overhead utilities in the viewshed and the visual prevalence of human development. Additionally, the gen-tie poles would disrupt otherwise unobstructed views of O'Neill Forebay to the north and the Diablo Foothills to the west. The proposed gen-tie alignment would introduce a moderate level of visual contrast.

As noted in Section 2.2.1.1, one or more signs would be posted to identify Project facilities, including at solar PV system entry gates for Project personnel and potentially along SR 152, on Federal land adjacent to Site 1 outside of the Caltrans right-of-way. Specific locations and configurations would be developed during detailed Project design and would comply with Reclamation requirements for placement, size, appearance, content, and construction method.

A Project sign along SR 152 could be visible to westbound and eastbound motorists as they pass by. The sign would be consistent with other signage for the SRA. The sign could slightly increase the visual prevalence of human development. However, due to the existing development in the form of transmission and utility features and other signage in the area, the sign would introduce a weak to moderate level of visual contrast and would be a visible but not dominant aspect of the landscape.

The proposed Project would result in a low to moderate level of change to the landscape character as viewed from KOP 6.

Impact Summary – SR 152 Corridor

The proposed Project would have a minor effect to the existing visual setting within the SR 152 corridor. The proposed gen-tie alignment would run parallel to SR 152 between the southern tip of Site 1 and just west of the SR 33/SR 152 interchange. As indicated by the simulation for KOP 6 in Figure 25, the proposed gen-tie would be visible and apparent, but would not dominate the landscape due to numerous existing transmission structures in the viewshed.

Site 1 and the Project sign along SR 152 would be intermittently visible to travelers on SR 152 due to changes in topography, viewing angle, and other obstructions (trees, utility poles, etc.) screening the solar PV system from view. Additionally, the San Luis Dam would be visible in many locations on SR 152 westbound. Where visible, the dam would continue to dominate the landscape due to its large, solid, grey form. The proposed Project would result in a low change in landscape character to the SR 152 corridor in the Project vicinity due to the amount of human development that exists. Although SR 152 is a designated State scenic highway, visual sensitivity is expected to be moderate in this segment due to the abundance of existing transmission structures within the viewshed. The proposed Project would have a moderately low effect to visual resources within the SR 152 corridor.

The residential area to the southeast of the SR 33/SR 152 interchange is expected to have (at most) obstructed views of the gen-tie alignment along SR 33 and SR 152, and no views of the solar PV systems due to topography. The Project would have minor or no effects on this residential area.

Travelers on I-5 could have distant views of the gen-tie alignment. These views would be consistent with existing transmission structures, overhead utilities, and other manmade features in the viewshed. The Project would have a minor effect to visual resources within the I-5 corridor.

Existing Conditions

Photograph is intended to be viewed approximately 11" from a viewer's eyes when printed on an 11x17 paper. The scale on the side of the image is intended to be 7" tall on screen or on paper.

Viewpoint Location Map Source: esri 2015

Legend

- Viewpoint Location
- Project Footprint

Photograph Information

Time of photograph:	12:38 PM
Date of photograph:	7-19-15
Weather condition:	Cloudy
Viewing direction:	South
Latitude:	37.068579482 N
Longitude:	121.070150585 W
Focal Length:	35mm

Existing Conditions from Key Observation Point 1

San Luis Solar
Merced County, California
August 2015

Figure 22

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Simulation

Photograph is intended to be viewed approximately 11" from a viewer's eyes when printed on an 11x17 paper. The scale on the side of the image is intended to be 7" tall on screen or on paper.

Viewpoint Location Map Source: esri 2015

Legend

- Viewpoint Location
- Project Footprint

Photograph Information

Time of photograph:	12:38 PM
Date of photograph:	7-19-15
Weather condition:	Cloudy
Viewing direction:	South
Latitude:	37.068579482 N
Longitude:	121.070150585 W
Focal Length:	35mm

Photographic Simulation from Key Observation Point 1

San Luis Solar
Merced County, California
August 2015

Figure 23

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Existing Conditions

Photograph is intended to be viewed approximately 11" from a viewer's eyes when printed on an 11x17 paper. The scale on the side of the image is intended to be 7" tall on screen or on paper.

Viewpoint Location Map Source: esri 2015

Legend

- Viewpoint Location
- Project Footprint

Photograph Information

Time of photograph:	1:25 PM
Date of photograph:	7-19-15
Weather condition:	Cloudy
Viewing direction:	North
Latitude:	37.056438465 N
Longitude:	121.019373754 W
Focal Length:	35mm

Existing Conditions from Key Observation Point 6

San Luis Solar
Merced County, California
August 2015

Figure 24

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Simulation

Photograph is intended to be viewed approximately 11" from a viewer's eyes when printed on an 11x17 paper. The scale on the side of the image is intended to be 7" tall on screen or on paper.

Viewpoint Location Map Source: esri 2015

Legend

- Viewpoint Location
- Project Footprint

Photograph Information

Time of photograph:	1:25 PM
Date of photograph:	7-19-15
Weather condition:	Cloudy
Viewing direction:	North
Latitude:	37.056438465 N
Longitude:	121.019373754 W
Focal Length:	35mm

Photographic Simulation from Key Observation Point 6

San Luis Solar
Merced County, California
August 2015

Figure 25

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Existing Conditions

Photograph is intended to be viewed approximately 11" from a viewer's eyes when printed on an 11x17 paper. The scale on the side of the image is intended to be 7" tall on screen or on paper.

Viewpoint Location Map Source: esri 2015

Legend

- Viewpoint Location
- Project Footprint

Photograph Information

Time of photograph:	1:01 PM
Date of photograph:	7-19-15
Weather condition:	Cloudy
Viewing direction:	Southeast
Latitude:	37.072859998 N
Longitude:	121.066766108 W
Focal Length:	35mm

Existing Conditions from Key Observation Point 2

San Luis Solar
Merced County, California
August 2015

Figure 26

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Simulation

Photograph is intended to be viewed approximately 11" from a viewer's eyes when printed on an 11x17 paper. The scale on the side of the image is intended to be 7" tall on screen or on paper.

Viewpoint Location Map

Source: esri 2015

Legend

- Viewpoint Location
- Project Footprint

Photograph Information

Time of photograph:	1:01 PM
Date of photograph:	7-19-15
Weather condition:	Cloudy
Viewing direction:	Southeast
Latitude:	37.072859998 N
Longitude:	121.066766108 W
Focal Length:	35mm

Photographic Simulation from Key Observation Point 2

San Luis Solar
Merced County, California
August 2015

Figure 27

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Viewpoint Location Map Source: esri 2015

Legend

Viewpoint Location

Project Footprint

Photograph Information

Time of photograph:	1:25 PM
Date of photograph:	9-18-15
Weather condition:	Clear
Viewing direction:	East
Latitude:	37° 4'3.64"N
Longitude:	121° 3'11.60"W
Focal Length:	18mm

Existing Conditions from Key Observation Point 4 East

San Luis Solar
Merced County, California
November 2015

Figure 28

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Viewpoint Location Map Source: esri 2015

Legend

Viewpoint Location

Project Footprint

Photograph Information

Time of photograph:	1:25 PM
Date of photograph:	9-18-15
Weather condition:	Clear
Viewing direction:	East
Latitude:	37° 4'3.64"N
Longitude:	121° 3'11.60"W
Focal Length:	18mm

Photographic Simulation from Key Observation Point 4 East

San Luis Solar
Merced County, California
November 2015

Figure 29

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Viewpoint Location Map Source: esri 2015

Legend

- Viewpoint Location
- Project Footprint

Photograph Information

Time of photograph:	1:30 PM
Date of photograph:	9-18-15
Weather condition:	Clear
Viewing direction:	South
Latitude:	37.067250781 N
Longitude:	121.053518338 W
Focal Length:	35mm

Existing Conditions from Key Observation Point 4 South

San Luis Solar
Merced County, California
November 2015

Figure 30

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Viewpoint Location Map Source: esri 2015

Legend

Viewpoint Location

Project Footprint

Photograph Information

Time of photograph:	1:30 PM
Date of photograph:	9-8-15
Weather condition:	Clear
Viewing direction:	South
Latitude:	37.067250781 N
Longitude:	121.053518338 W
Focal Length:	35mm

Photographic Simulation from Key Observation Point 4 South

San Luis Solar
Merced County, California
November 2015

Figure 31

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Existing Conditions

Photograph is intended to be viewed approximately 11" from a viewer's eyes when printed on an 11x17 paper. The scale on the side of the image is intended to be 7" tall on screen or on paper.

Viewpoint Location Map Source: esri 2015

Legend

- Viewpoint Location
- Project Footprint

Photograph Information

Time of photograph:	1:40 PM
Date of photograph:	7-19-15
Weather condition:	Cloudy
Viewing direction:	West
Latitude:	37.091250520 N
Longitude:	121.025623739 W
Focal Length:	35mm

Existing Conditions from Key Observation Point 7

San Luis Solar
Merced County, California
August 2015

Figure 32

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Simulation

Photograph is intended to be viewed approximately 11" from a viewer's eyes when printed on an 11x17 paper. The scale on the side of the image is intended to be 7" tall on screen or on paper.

Viewpoint Location Map Source: esri 2015

Legend

- Viewpoint Location
- Project Footprint

Photograph Information

Time of photograph:	1:40 PM
Date of photograph:	7-19-15
Weather condition:	Cloudy
Viewing direction:	West
Latitude:	37.091250520 N
Longitude:	121.025623739 W
Focal Length:	35mm

Photographic Simulation from Key Observation Point 7

San Luis Solar
Merced County, California
August 2015

Figure 33

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San Luis Reservoir SRA

KOP 2: San Luis Creek Use Area Shoreline

KOP 2 is located approximately 1 mile to the northwest of Site 1 at its closest point. Views from KOP 2 represent individuals fishing on the southwest shoreline of O'Neill Forebay (Figure 26). These viewers would be stationary and views would be of prolonged duration, potentially looking in the direction of Site 1 for up to an hour or more. From KOP 2, views of Site 1 would be more direct than from KOP 1, and therefore the solar PV system would be more visible. The solar PV system at Site 1 would appear as a thick, dark line situated between O'Neill Forebay and the grassy uplands (Figure 27). The Site 1 fence and trees would screen some of the solar PV system from view. Although the fence and trees would provide some screening, the smooth surface and bold, dark color of the solar PV panels may attract viewer attention due to the extent of the solar PV system that would be visible.

Site 1 would introduce a moderate level of contrast between the soft-textured green to tan or brown colored grassland and begin to attract attention away from O'Neill Forebay. The gen-tie poles would also be visible, and appear as thin, brown, vertical structures in the middleground. At this distance, the gen-tie poles would be difficult to discern from other existing transmission structures. The proposed gen-tie alignment would introduce weak to no visual contrast to the existing landscape. Overall, the proposed solar PV system and gen-tie associated with Site 1 would result in a moderate change to landscape character as viewed from KOP 2.

KOP 3: San Luis Creek Use Area Viewpoint

KOP 3 is approximately 1 mile to the north of Site 1 at its closest point and approximately 2 miles to the southwest of Site 2 and 3. Viewers at KOP 3 could include sightseers, motorists, or hikers, and therefore views could be both transient and stationary.

Views from KOP 3 to the southwest would include Site 1 and the associated gen-tie alignment. Views would be similar to those experienced from KOP 2 due to similarities in distance and viewing angle, although more of the solar PV system at Site 1 could be visible, since KOP 3 is at a slightly higher elevation than KOP 2. As shown in Photograph 4, the existing transmission lines that cross O'Neill Forebay would screen some of the solar PV system from view. Additionally, San Luis Dam would also be visible and continue to dominate views toward the southwest. The solar PV system at Site 1 would appear as a thick, smooth, dark line situated between the O'Neill Forebay and the grassy uplands. The smooth surface and dark color of the solar PV panels would attract viewer attention due to the extent of the solar PV system that would be visible; the solar PV system from Site 1 would introduce a moderate level of contrast between the soft textured green to tan or brown colored grassland. The gen-tie poles would appear consistent with the form and shape of the taller existing transmission structures in the same area. The gen-tie alignment would introduce a low level of visual contrast to the existing landscape. Overall the proposed solar PV system and gen-tie associated with Site 1 would result in a low to moderate change to landscape character as viewed from KOP 3.

Site 2 and 3 are not expected to be noticeably visible from KOP 3. As shown in Figure 18, the shoreline near Site 2 and 3 is barely visible, and berms to the west of Sites 2 and 3 screen the

lower-elevation, flat land where the sites would be located. The proposed gen-tie associated with Site 2 and 3 might be visible from KOP 3. Based on simulations produced for KOP 1, where the gen-tie alignment would be closer, the gen-tie associated with Sites 2 and 3 is expected to blend with the landscape at this distance and not attract attention.

KOP 4 and KOP 5: Medeiros Use Area

KOP 4 and 5 are located within the Medeiros Use Area along the southern shore of O'Neill Forebay. KOP 4 is located immediately northwest of, and adjacent to, Site 1. Figure 28 shows the view toward the east, and Figure 30 shows the view toward the south-southeast. KOP 5 is located farther east of KOP 4, approximately 1 mile east of Site 1 and approximately 0.8 mile north of the gen-tie alignment at its closest point. Viewers at both KOP 4 and 5 would include individuals engaging in day use and camping activities, and would primarily be stationary and of prolonged duration.

The fence and ornamental vegetation of Site 1 would be in the immediate foreground of KOP 4 to the east and south and would dominate views to the east and south from the day use and camping areas near KOP 4 (Figures 29 and 31). The fence would appear as a tall, tan, linear mesh surface. Ornamental shrubs would be planted in a somewhat sequential pattern along the fence, and ornamental trees would be planted in small groupings between existing campsites and the fence. The solar PV panels beyond the fenceline would be screened by the fence and ornamental trees except where they would be visible in the distance due to topography (Figure 31). The fence and vegetation would all introduce dark colors and sequential, ordered patterns to the landscape as viewed to the east and south from KOP 4. Due to the proximity of Site 1 to KOP 4, the proposed Project would introduce strong contrast to the landscape and a high level of visual change for views to the east and south. The substation and control building, if visible, would introduce little additional visual contrast to views from KOP 4, since the solar PV system, fence, and trees in the immediate foreground would attract attention.

Site 1 would dominate east and south-facing views from day use and camping areas within the Medeiros Use Area from KOP 4 east for approximately 0.5 miles. In this area, Site 1 would dominate foreground views to the south for viewers directly north of the site, and views to the east (and potentially to the northeast and southeast, depending on viewer location) for viewers directly west of the site. Traveling farther east toward KOP 5, changes in topography would begin to screen views of Site 1 from some locations within the Medeiros Use Area. Views of Site 1 from KOP 5 would be obstructed because the site is in a former borrow pit, and the ground level between KOP 5 and Site 1 is higher in elevation than the ground level of Site 1 (Figure 20). The solar PV panels and fenceline would not be visible due to the elevation difference. From KOP 5, views of Site 1 components beyond the fenceline would likely be limited to the substation and control building, which would be approximately 10 feet in height. These structures would appear as smooth, light colored, rectangular shapes and would contrast with the soft, flat to rolling natural terrain.

The Site 1 solar PV system, substation, and control building would result in strong to weak visual contrast to the Medeiros Use Area, depending on the location of the viewers. Visual impacts would be more apparent in the western portions of the Medeiros Use Area due to

proximity and topography. From the day use and camping areas directly to the north and east of Site 1, foreground views toward O'Neill Forebay would not change.

Gen-tie poles and lines associated with Site 1 would be visible and run directly south of KOP 4 and 5 along SR 152. The gen-tie poles would appear as thin, brown, vertical structures in the foreground and middleground. The gen-tie poles and lines would appear consistent with the form and shape of the taller existing transmission structures in the same area. However, the number and density of transmission structures visible from the Medeiros Use Area in general would increase such that human development would have a more dominant presence in the viewshed. The proposed gen-tie alignment would introduce a weak level of visual contrast. However, the combination of all components of Site 1 would result in a strong contrast against the existing terrain and in a high level of change to landscape character near the western end of the Medeiros Use Area.

Impact Summary – San Luis Reservoir SRA

Changes to landscape character within the SRA would primarily be associated with Site 1 and the associated gen-tie alignment. This is because topography would screen much of Site 2 and 3 from view, particularly from the most heavily used areas of the SRA. The Basalt, Dinosaur Point, and Los Banos Creek use areas and the waterbodies of San Luis Reservoir and Los Banos Creek Reservoir would not have views of any Project facilities. The proposed facilities at Site 1 would primarily affect views from the southern portion of the San Luis Creek Use Area (near KOP 2 and 3) and the Medeiros Use Area (near KOP 4 and 5). Visual impacts would be highest near the day use and camping areas near the western side of the Medeiros Use Area, where the solar PV system, fence, and screening vegetation would be immediately to the east and south.

Views from the O'Neill Forebay Wildlife Area could also be affected. However, trees within the wildlife area would limit visibility of proposed Project components, particularly the solar PV systems and perimeter fence, due to their relatively short stature. The tops of the gen-tie poles could be visible in some areas, but views would be intermittent due to screening from vegetation. The gen-tie alignment would also be visible from the OHV Use Area to the south of SR 152.

At the Forebay Golf Course, golfers could have screened views of the gen-tie alignment, but berms along both sides of the Delta-Mendota Canal and trees along the perimeter of the golf course would limit or block views of Sites 2 and 3.

As discussed previously, transmission towers are a common component of the existing landscape and the gen-tie poles are considerably smaller in height and width than existing towers. The gen-tie alignment would introduce weak to moderate levels of visual contrast. The proposed Project would result in low to moderate, long-term changes to landscape character within the parts of the SRA adjacent to O'Neill Forebay, but would result in strong contrast and a high level of change to landscape character in the western portion of the Medeiros Use Area. Visual sensitivity within the SRA is assumed to be moderate to high since activities are centered on outdoor recreation. Overall, the proposed Project would have a moderate impact on visual resources within and viewed from the SRA.

Community of Santa Nella

KOP 7: Santa Nella

KOP 7 is located approximately 0.9 mile southeast of the solar PV system at Site 2 and 0.3 mile east of the associated gen-tie at its closest point. Views include flat grassland in the foreground, trees and San Luis Dam in the middleground, and rolling hills to more rugged foothills in the background (Figure 32). Berms along both sides of the Delta-Mendota Canal would block views of Sites 2 and 3 from this location. However, as indicated in the photosimulation for KOP 7 in Figure 33, the gen-tie alignment would be clearly visible in the middleground and would appear as thin, vertical, sequential lines. Other human development exists in the viewshed that appears similar in terms of line, color, form, and texture. Although existing transmission lines are farther from KOP 7 and the community of Santa Nella, they are taller, wider, and more visually prominent than the proposed gen-tie alignment. The gen-tie alignment would be closer to KOP 7 and the community of Santa Nella and would increase the amount of overhead utilities in the viewshed such that human development would have a more dominant presence. The gen-tie alignment would be visible but would not attract attention, and therefore would introduce a weak level of visual contrast. The proposed Project would result in a low level of change to the landscape character as viewed from KOP 7.

The proposed gen-tie alignment could affect visual resources viewed from more distant locations in Santa Nella. The impact would be less than that shown in Figure 25, since KOP 7 is located at the western edge of the community. Within Santa Nella, trees, homes, and commercial buildings would screen the gen-tie alignment from view such that visibility would be limited or blocked. Viewers within the community of Santa Nella are primarily residents and are assumed to have a high level of visual sensitivity. However, due to the weak visual contrast and low level of change to the landscape, the proposed Project would have a minor effect to visual resources as viewed from Santa Nella.

Operational Impact Summary

Operation of the proposed Project would affect visual resources and result in long-term changes to the landscape character in the Project vicinity. Generally, the gen-tie poles and lines would be more visible than the solar PV systems with the exception of the western portion of the Medeiros Use Area where the solar PV system and fence would dominate the landscape due to immediate proximity. This is primarily due to the short stature of the solar panels, allowing small fluctuations in topography to screen the solar PV systems from many viewing locations.

A study published by the Argonne National Laboratory analyzed visibility of 500 kV and 230 kV transmission towers and found that 230 kV H-frame transmission towers were not noticeable to casual observers at distances greater than 3.5 miles (Sullivan et al. 2013). As shown in the simulations, the proposed gen-tie is difficult to discern from other surrounding similar objects at approximately 2 miles. Since visibility can vary based on environmental and atmospheric conditions, it is assumed that the proposed 70 kV gen-tie poles would be visible to casual viewers at distances no greater than 3.5 miles. However, this considered a conservative assumption since the 70 kV gen-tie poles would be substantially smaller than 230 kV towers and less visually prominent.

Due to the existing number of transmission structures within the Project vicinity, the new gen-tie alignment would not result in a substantial change to the landscape. The most noticeable change to the landscape would be the increased density of overhead utilities and their overall presence in the landscape. Viewers in the vicinity of the Project are assumed to have moderate to high visual sensitivity. The landscape around San Luis Reservoir and O'Neill Forebay is considered important due to the recreational opportunities and values of the area; however, it is not unique due to the amount of human development and relative abundance of other recreation areas in the region. In general, Project effects to visual resources would be minor to moderate, with the exception of the western portion of the Medeiros Use Area, where effects to visual resources would be major. Along O'Neill Forebay, the Site 1 fence would be equipped with privacy slats in a color that matches or complements the surrounding environment (Section 2.2.1.10), and native shade trees would be planted to screen views of Site 1 and the fence from the adjacent campsites (Section 2.2.1.7). These Project components would help to enhance the visual setting and partially offset the visual resource impact at the western portion of the Medeiros Use Area.

3.8.2.3 Cumulative Impacts

Past, present, and future projects that have the potential to contribute to cumulative effects to visual resources include residential development, solar energy projects, and expansion of commercial developments. These projects, including the proposed Project, would all generally contribute to the visual interruption of open space in the Project vicinity.

Parts of the Quinto Project are directly adjacent to, and north of, the San Luis Creek Use Area of the SRA. The environmental document for the Quinto Project identified visual impacts to the San Luis Creek Use Area and mitigation measures to reduce impacts to visitors (Merced County Planning and Community Development Department 2012). While it is unlikely that both the Quinto and San Luis solar PV systems would be visible simultaneously, they would both contribute to the visual interruption of open space around O'Neill Forebay, which would decrease the intactness and natural appearance of the nearby landscape.

The proposed Wright Solar Park would be approximately 5 miles southeast of the San Luis Solar Project and would not be visible from the proposed Project area. However, it would also contribute to the visual interruption of open space in the regional vicinity.

3.9 Recreation

3.9.1 Affected Environment

The Project area is part of the San Luis Reservoir SRA. Reclamation owns the lands and waters in the SRA. State Parks has managed the SRA for recreation under a joint management agreement with Reclamation since 1969. Popular activities at the SRA include fishing, boating, personal watercraft use, windsurfing, picnicking, camping, hiking, biking, and nature study. The SRA contains approximately 200 designated individual campsites, two group campsites that accommodate a total of 90 people, and approximately 350 primitive campsites that are not marked or designated and do not have amenities such as picnic tables or fire rings.

In the Project area, boating and other water-based recreation is allowed on O'Neill Forebay. Land-based recreation takes place at the Medeiros Use Area, which includes the proposed

locations of Site 1 and part of the gen-tie alignment (Figure 4), and the O'Neill Forebay Wildlife Area, which is bordered by the gen-tie alignment (Figure 6). The predominant recreation uses at Medeiros are fishing, windsurfing, camping, and day use. Recreation uses generally follow the shoreline of O'Neill Forebay. Visitor uses at the O'Neill Forebay Wildlife Area include hunting, hiking, and nature study (Reclamation and State Parks 2013).

The Medeiros Use Area contains 50 designated campsites with shade ramadas, picnic tables, and barbecues; the 350 primitive campsites mentioned above; four vault toilets; and approximately 300 informal, unpaved parking spaces along existing roads. The designated campsites are along the shoreline of O'Neill Forebay, allowing easy access to water-based recreation and unobstructed views of the Forebay. Camping is available on a first-come, first-served basis (State Parks 2015).

Medeiros has potable water from four portable water tanks (water is trucked in) and chemical toilets. There is a boat launch that once provided access to O'Neill Forebay, but it has been closed since 2001; shallow water and siltation in the area prevents year-round launching (Reclamation and State Parks 2013). Windsurfers and sailboarders use the western shore of Medeiros as a launch area. Medeiros also serves as an overflow area for visitors when other campgrounds in the SRA are full, which can occur on weekends and holidays between Easter and Labor Day each year.

The RMP/GP allows for a moderate level of recreation development at Medeiros over the 25-year plan horizon, including the addition of up to 100 tent/RV sites and 100 primitive campsites, the consideration of enhancements to allow for reopening or relocating the boat launch, and the addition of a parking lot and restrooms near the boat launch. As with all recreation development in the RMP/GP, the addition of camping and other recreation enhancements at Medeiros would be implemented based on sufficient public demand, sufficient staffing and funding to manage the new or modified uses in accordance with the RMP/GP, and potential for increased public benefits and use (Reclamation and State Parks 2013).

Locations of the additional tent/RV sites and primitive campsites are not identified in the RMP/GP. At present, all designated campsites are between the main road through Medeiros and the shoreline. It is assumed that the 100 tent/RV sites would also be located generally along the shoreline, to take advantage of the proximity to water recreation and views.

The main recreation access to Medeiros is via an entry road (Donohugh Road West) off of SR 33. The entry road is paved until just after the State Parks entry gate; the rest is unpaved. A secondary unpaved access road connects to SR 152 in the far southwestern corner of Medeiros; however, a locked gate typically restricts access to the road.

The O'Neill Forebay Wildlife Area is on the northeast side of O'Neill Forebay, across from Medeiros. The area is accessed from SR 33.

Sites 2 and 3 are not accessible for recreation. However, the Forebay Golf Course, a public nine-hole course, is just east of Site 3 and approximately 0.3 mile east of Site 2. The golf course is separated from Sites 2 and 3 by the Delta-Mendota Canal.

3.9.2 Environmental Consequences

3.9.2.1 No Action

The No Action Alternative would not affect current or future recreation at the Medeiros Use Area, elsewhere in the SRA, or the Forebay Golf Course, or contribute to cumulative effects.

3.9.2.2 Proposed Action

The Project would construct a solar PV system within approximately 108 acres in the Medeiros Use Area (Site 1; see Figure 4). Site 1 would be entirely fenced and surrounded by a perimeter road inside the fenceline. A short segment (about 700 feet) of the main entry road from SR 33 would be realigned around the northern tip of Site 1. Site 1 would be immediately west and south of designated campsites along the southern shore of O'Neill Forebay. In accordance with the recreation management agreement (No. 14-06-200-4353A) between Reclamation and State Parks, a setback/buffer from 50 feet up to 200 feet is being considered between recreation areas and the western edge of Site 1 so that State Parks may have an opportunity to implement certain recreational improvements as identified in the San Luis Reservoir State Recreation Area RMP/GP and Environmental Impact Statement / Environmental Impact Report (Reclamation and State Parks 2013).

Construction

Construction of Site 1 would have temporary impacts to visitors in the Medeiros Use Area. As described in Section 2.2.2.3, construction traffic would enter Medeiros from SR 33 via the main entry road. The main entry road is a dirt road except for a short paved segment adjacent to SR 33, and would be improved with a compacted gravel surface for construction access to Site 1. The same road provides access to the designated campsites. During construction, which is expected to last approximately 130 days at Site 1, an average of 5 to 8 truck trips per day is expected, with a total of approximately 20 one-way truck trips per day during the peak construction period. Vegetation clearing and grading, installation of steel support piles, and trenching would be required at Site 1. Other activities would include construction of the Site 1 fencing and perimeter road; and creation of a temporary construction staging area, office facilities, and parking. The existing access road from SR 152 would not be used for construction access.

Approximately 700 feet of the main entry road would be realigned around the northern tip of Site 1, slightly closer to approximately four campsites than the existing road. The road would continue to provide access to recreation uses along the western shoreline of O'Neill Forebay. Construction traffic would enter Site 1 through a gate on the northeastern side of Site 1 and would not use the realigned road segment for daily construction access.

Campers and day-use visitors would be exposed to the sights and sounds of construction-related traffic, personnel, and activities. Although construction impacts would be temporary, some visitors may experience a high level of disruption, primarily due to noise, that could reduce the quality of their recreational experience during hours when construction activities are taking place. Visitors on the water in O'Neill Forebay could also be exposed to construction disturbance, although impacts would decrease with distance from the activity. Construction noise is addressed in Section 3.13.

The Project would include Measures REC-1, REC-2, and REC-3 in Section 2.2.5 to avoid or minimize construction-related effects to recreation.

The Project is expected to require relocation of two outhouses and a water tank at Medeiros. These facilities would be displaced by the northernmost set of solar PV panels in Site 1, shown in Figure 4. The Applicant will relocate these facilities in coordination with State Parks to minimize visitor inconvenience; therefore, no long-term adverse effects would occur.

The proposed gen-tie route that would connect Site 1 with the O'Neill Substation would parallel SR 152 and SR 33 (Figure 8). Construction of the gen-tie route has the potential to result in minor, short-term delays or limits to access into Medeiros and the O'Neill Forebay Wildlife Area from SR 33 while 70 kV lines are strung between poles. These effects could be minimized by stringing the 70 kV line at these access points during the week rather than on weekends, when recreation demand tends to be greater.

Construction of Sites 2 and 3 would not affect recreation in the SRA because no recreational facilities are near the sites. Visitors to the Forebay Golf Course (Figure 9) could have short-term exposure to the sights and sounds of construction-related traffic, personnel, and activities, depending on their proximity to the Project. Existing trees along the perimeter of the golf course, knolls in various locations of the golf course, and berms on each side of the Delta-Mendota Canal (which separates the golf course from Sites 2 and 3) would at least partly screen golf course visitors from construction-related disturbance.

Operation

Direct Effects

Once constructed, Site 1 and its perimeter fence would be adjacent to approximately 18 campsites on the western side of Medeiros (across the access road from them). Assuming the Site 1 fence would follow the east side of the access road as shown in Figure 2, the distance between the shade ramadas at these campsites and the Site 1 fence would range from approximately 25 feet to 170 feet, depending on the campsite. The proximity of Site 1 to the 18 campsites could adversely affect visitors' perceived recreational value of the campsites and day use opportunities in that area.

The fence would be equipped with privacy slats in a color that matches or complements the surrounding environment (see Section 2.2.1.10), and the Applicant will plant native shade trees along the fence in locations needed to screen views of Site 1 and the fence from the adjacent campsites (Section 2.2.1.7). As existing trees are limited to the shoreline in this area, the addition of shade trees would help to enhance the setting and partially offset the potential perceived loss of recreational value. The implementation of the privacy fencing and addition of shade trees would minimize effects to adjacent campsites, although residual impacts would remain.

Simulations for lighting impacts to overnight campers were not performed. The intensity of the lighting for security purposes would be at the minimum lumens required. Down-shield lighting that is turned on via motion sensor and/or as needed would preclude overnight campers from being exposed to such lighting. Lighting would only be provided at the one (1) substation and one (1) control building at Site 1(see Section 2.2.1.10). The substation is located in a corner of

Site 1 closest to SR 152 and over 1 mile away from existing overnight camping sites (Figure 4). Any potential camp sites developed in the future would be roughly 2,000 feet away from the substation. In addition, the 8 feet fencing and privacy slats would further reduce glare from the downshield lighting. Overnight campers at the existing camp sites are more likely to see headlights from passing vehicles on SR 152 than from the security lighting.

The 350 primitive campsites at Medeiros are not marked or designated and do not have amenities such as picnic tables or fire rings. As the primitive campsites do have not fixed locations, visitors have the option of selecting campsites in Medeiros that are at a distance from Site 1 if they choose to do so.

The main entry road would be realigned around the northern tip of Site 1, slightly closer to approximately four campsites than the existing main entry road. Traffic related to Site 1 operation (estimated at one employee vehicle and one delivery vehicle roundtrip per day; see Section 2.2.4.2) would use an entry gate on the northeastern side of Site 1, away from these campsites, and would not disrupt nearby recreation.

The gen-tie alignment that would connect Site 1 with the O'Neill Substation would generally parallel SR 152 and SR 33 (Figure 8). No recreation uses typically occur in those areas, so no long-term effects are anticipated. However, maintenance of the gen-tie route has the potential to result in minor, short-term delays or limits to access into Medeiros and the O'Neill Forebay Wildlife Area from SR 33, if the 70 kV line needs to be serviced or replaced. These effects will be very infrequent and will be avoided or minimized by conducting maintenance activities near these access points during the week rather than on weekends.

As Sites 2 and 3 are not accessible for recreation, the proposed Project would not affect recreation there. Project operation would not affect visitors to the Forebay Golf Course.

Indirect Effects

The presence of Site 1 and its perimeter fence would limit the space available to accommodate more than a small number of additional designated campsites and/or RV sites along the western side of Medeiros. To the east of Site 1, adequate space appears to be available along the shoreline and access road to accommodate additional tent/RV sites. In addition, a large amount of open land would remain available to accommodate primitive campsites. Although the Project would limit the addition of campsites along the western side of Medeiros, it would not preclude the addition of up to 100 tent/RV sites and 100 primitive campsites elsewhere in Medeiros, if warranted in the future.

The existing boat launch is near the northeast side of Medeiros, well over a mile from Site 1. The proposed Project would not affect the future reopening of the boat launch or the addition of a parking lot and restroom nearby. An alternative location for the boat launch is not identified in the RMP/GP, and the Project would not preclude its future relocation.

3.9.2.3 Cumulative Impacts

Residential Development

As discussed in the RMP/GP, several other proposed developments—the Santa Nella Community Specific Plan, Villages of Laguna San Luis Community Plan, and Fox Hills Community Specific Plan—can be expected to increase visitation to existing recreational facilities, including San Luis Reservoir SRA. Together, full buildout of these developments would add approximately 70,000 people to the local population. Each community plan includes recreational facilities to minimize cumulatively considerable impacts to recreation; however, residual cumulative impacts could remain (Reclamation and State Parks 2013).

The additional camping capacity provided for in the RMP/GP would help accommodate the anticipated recreation demand from these developments. In addition to the 100 tent/RV sites and 100 primitive campsites proposed for the Medeiros Use Area, the RMP/GP would also allow for development of more than 150 individual campsites, group camp facilities that would together accommodate 150 people, and a minimum of 15 cabins or yurts outside of Medeiros, in other parts of the SRA. The proposed San Luis Solar Project would remove approximately 108 acres from Medeiros Use Area. Site 1 would be located on the east side of the access road along the western shoreline of O'Neill Forebay, in an area that could accommodate additional camping facilities with views of the forebay. The rest of Medeiros would remain available for development of additional tent/RV sites and primitive campsites, and the Project would not affect the development of additional camping capacity in other parts of the SRA as allowed for in the RMP/GP. The proposed Project would not combine with the effects of nearby residential development to result in cumulatively considerable impacts to recreation capacity.

San Luis Transmission Project

The proposed San Luis Transmission Project would construct a 70 kV transmission corridor within the SRA. Two corridor alternatives have been identified. One alternative would cross through Medeiros Use Area and border the O'Neill Forebay Wildlife Area and Off-Highway Vehicle (OHV) Use Area. The other alternative would cross through the San Luis Creek Use Area, on the northwest side of O'Neill Forebay. The installation of the 70 kV corridor has the potential to temporarily decrease recreation access to these areas of the SRA. Operation and maintenance of the 70 kV corridor could also require short-term, periodic restrictions on recreation access to these areas (WAPA and SLDMWA 2015). As the estimated construction schedule for the San Luis Transmission Project is 2018 through 2022, these effects would not begin to occur until after construction of the San Luis Solar Project. No major adverse cumulative impacts are anticipated.

Other Reclamation Projects

B.F. Sisk (San Luis) Dam Safety of Dams Project

San Luis Dam is a 3.5-mile-long, 300-foot-tall compacted earthfill embankment that impounds the San Luis Reservoir. The dam, which is owned by Reclamation and operated by DWR, was completed in 1967. The dam and San Luis Reservoir are located in an area with high potential for severe earthquake forces from active faults, primarily Ortigalita Fault, which passes directly under the reservoir. In the early 1980s and mid 2000s, Reclamation conducted investigations of

the dam's seismic safety and determined that the risk posed to the downstream public does not meet the Public Protection Guidelines. A Corrective Action Study was initiated in 2006 to investigate and determine a course of action to mitigate risk. Potential alternatives included berms in six locations for the downstream side of the dam, a dam raise of approximately 15 feet, and a restriction on reservoir capacity. Nine borrow sites, all on Reclamation land, were identified as possible material sources for dam modification (Reclamation and State Parks 2013).

The Medeiros Use Area has been identified as a primary source of fill material for the Corrective Action Project. Potential recreation effects identified in scoping for the Corrective Action Project include emergency vehicle access; impact to a sailboard area on the west side of Medeiros; potential closure of the fishing area on the southeast side of SR 152 bridge; potential interference of daily operations of parks (i.e. loss of revenue); potential construction related noise, dust, and traffic issues; and safety (Reclamation no date).

Any alternative that involves borrow or staging at Medeiros Use Area would likely have some or all of the effects listed above for the Corrective Action Project. Selection of Site 1 of the San Luis Solar Project was coordinated with Reclamation Safety of Dams personnel to only include areas already used for borrow of material for the existing dam, so no displacement of San Luis Solar Project facilities are anticipated.

Future Solar Projects at San Luis Reservoir SRA

As stated in the RMP/GP, Reclamation has identified approximately 1,200 acres of Federal lands in the SRA as potentially viable for renewable energy development, consistent with the Secretary of the Interior's Order 3285A1 (Reclamation and State Parks 2013). The potential for future renewable energy projects to contribute cumulatively to impacts from the proposed Project would depend on their locations with respect to existing and proposed recreation uses. Additional renewable energy development in the SRA has only been considered at a conceptual level; however, it is reasonably foreseeable that such development may occur during the life of the Project. Direct and cumulative recreation impacts from future projects would be subject to separate environmental review, and, if appropriate, mitigation.

3.10 Traffic and Circulation

This section describes the potential transportation and traffic impacts related to construction and operation of the proposed Project.

3.10.1 Affected Environment

3.10.1.1 Regional and Local Access Roads

Regional access to the O'Neill Forebay area, where the Project is proposed, is available from SR 33 and SR 152, which link to nearby Interstate 5 (I-5) (Figure 1). The following summarizes the primary roads that connect to the Project area.

Interstate 5 (I-5). I-5 is a major freeway serving north-south Central Valley and interstate traffic. Near the Project area, I-5 has four lanes (two in each direction), a divided median, and interchange ramp connections at SR 152 and SR 33.

State Route 152 (SR 152). SR 152 is a principal arterial, four-lane, east-west divided highway. SR 152 has two lanes in each direction, separated by a dirt/grass median. SR 152 connects to SR 33 at a "diamond" configuration interchange approximately 1 mile southwest of O'Neill Forebay.[6] Stop signs control traffic movements at the ramp intersections with SR 33. Other than at the two interchanges of SR 152 with SR 33 and I-5, access to and from SR 152 is at periodic road and driveway connections that generally consist of "T" (perpendicular) intersections.

State Route 33 (SR 33). SR 33 is a two-lane north-south undivided highway that, in the Project vicinity, extends from SR 152 north through the communities of Santa Nell and Gustine. In this area is it is also referred to as Santa Nella Boulevard. There are no left or right turn lanes at local road intersections on SR 33, except within the community of Santa Nella.

Donohugh Road West. This mostly unpaved road connects to SR 33 about 0.3 mile north of the SR 33/SR 152 interchange (Figure 8). It serves as the entrance to the Medeiros Recreation Area. The road is paved to the east of the State Parks entry gate and gravel surfaced to the west, with a posted 25 mph speed limit. It is used as a primary entrance to the recreational area along the south shoreline of the O'Neill Forebay, and would provide primary access to Site 1 for construction and operations.

McCabe Road. McCabe Road is a paved, two-lane road that connects to SR 33 at a "T" intersection north of the SR 33/I-5 interchange (Figure 1). From SR 33 it extends directly west, passing the north side of O'Neill Forebay. Traffic on McCabe Road primarily consists of agricultural vehicles associated with nearby grazing and orchard operations, visitors to the San Joaquin Valley National Cemetery and California Korean War Veterans Memorial, and workers associated with the Quinto Solar PV Project (under construction; scheduled to be completed in 2015).

3.10.1.2 Other Transportation Modes

No designated bicycle facilities exist on SR 152 or SR 33. SR 33 between SR 152 and Gustine is identified in the Merced County Regional Bicycle Transportation Plan (MCAG 2008) for future Class II bike lanes (designated bike lane adjacent to the traffic lane). Current SR 33 shoulder widths range from very narrow to several feet wide in some locations. There are no sidewalks except in the commercial and residential areas of Santa Nella, outside of the Project area. The Transit Joint Powers Authority for Merced County runs the "G – Gustine Link" bus on SR 33 between I-5 and Gustine, north of the Project area (The Bus 2015).

3.10.1.3 Primary Project Area Access

The following describes the existing intersections that serve as primary access to and from the solar PV system sites (Figures 8 and 9):

- For Site 1: SR 33/Donohugh Road West. This is a "T" intersection serving as an entrance to the east side of the Medeiros Recreation Area. A stop sign controls Donohugh Road

[6] A diamond interchange has on and off ramps that make diagonal connections to the highway (as opposed to loop ramps, for example).

West traffic entering SR 33; there are no restrictions on SR 33 traffic and no turning lanes on SR 33.

- For Sites 2 and 3: SR 33/McCabe Road. McCabe Road connects to SR 33 at a "T" intersection, with a stop sign on McCabe Road. There are no traffic controls on SR 33. Access from McCabe Road to Sites 2 and 3 would be on a gravel access route paralleling the Delta Mendota Canal on the west side.

3.10.1.4 Traffic Conditions

Caltrans reports annual vehicle and truck volumes on State highways. The most recent vehicle data shows annual average daily traffic (AADT) volumes on SR 33 of 5,200 AADT south of the SR 152 interchange, and 8,700 AADT north of SR 152[7] (Caltrans 2014). Trucks account for approximately 30 percent of these traffic volumes (Caltrans 2013a). At McCabe Road, SR 33 volumes are reported at 5,500 to 5,700 AADT. On SR 152, the volumes are 24,400 AADT to the west of the SR 33 interchange, and 25,500 AADT to the east of the interchange. The nearest truck data is at the SR 152/I-5 interchange, where trucks account for 17 percent of total traffic. Comparison of the highway traffic counts on SR 33 for 2012, 2013, and 2014 showed no change in peak period traffic volumes, no change in daily volumes between 2012 and 2013, and a 1.7 percent growth in daily volumes between 2013 and 2014.

A traffic study was performed for the Quinto Solar PV Project (Quinto Project; Merced County Planning and Community Development Department 2012). The Quinto Project consists of a 135 MW solar PV project on approximately 1,000 acres along McCabe Road, north and northwest of Sites 2 and 3. The Quinto Project relies on McCabe Road for construction and operation access. That study identified peak traffic hours as between 8:00 AM and 9:00 AM, and between 4:15 PM and 5:15 PM (based on traffic counts performed in November 2010). At the I-5 interchange ramps south of McCabe Road, trucks represented about 31 percent of the AM peak hour traffic and 24 percent of the PM peak hour traffic. The study noted that a large contribution of traffic at the I-5/SR 33 (Santa Nella/Gustine) interchange consisted of vehicles traveling between I-5 and SR 152, and regional traffic on I-5 headed toward the commercial areas of Santa Nella. Traffic on McCabe Road was reported at 36 trips during the AM peak hour and 43 trips during the PM peak hour, prior to construction activities at the Quinto Project facility (Merced County Planning and Community Development Department 2012).

3.10.2 Environmental Consequences

3.10.2.1 No Action

The No Action Alternative assumes no Project construction or operation, and therefore no additional trips would be added to or from the Project area. The No Action Alternative would not contribute cumulative effects to traffic and circulation.

3.10.2.2 Proposed Action

Project construction would take place over a 6 to 9 month period in 2016. The traffic conditions described for the affected environment could reasonably be anticipated to increase slightly in

[7] In the project vicinity, SR 33 extends south to SR 152 and then follows the east-west alignment of SR 152 as a jointly designated route (SR 33/SR 152) extending to the east. Although SR 33 east of the interchange with SR 152 is directionally in an east-west alignment, Caltrans considers SR 33 to be a north-south route.

2016 with regional growth, but recorded annual increases on SR 33 and SR 152 have been 0 percent to less than 2 percent in recent years. From 2017 (following completion of Project construction) and in all future years, local and regional traffic would be nearly the same for No Action and the proposed Project, because Project operation would have minimal contribution to local or regional traffic.

Construction

Typical construction work schedules are expected to be 7:00 AM to 5:00 PM, Monday through Friday, although some activities may occur outside these hours as needed. During construction, the on-site workforce is expected to average approximately 100 employees, with a peak on-site workforce of approximately 150 employees. The construction workforce would be recruited from within Merced County and the surrounding region (Section 2.2.2.4).

Most construction equipment and vehicles would be brought to the solar PV system sites at the beginning of the construction process, and would remain on-site throughout the duration of the construction activities for which they are needed. Potential construction staging areas for equipment and supplies have been identified at four locations on Reclamation property: south of Site 1, at Donohugh Road West/SR 33, on SR 33 at the O'Neill Forebay outlet to the California Aqueduct, and near Sites 2 and 3 (Figures 8 and 9). Project construction traffic would involve construction worker commute vehicles, plus periodic truck deliveries of materials and supplies, trash removal, other off-site truck shipments, and miscellaneous trips by Project staff. Peak traffic volumes would coincide with the peak of construction employment, which is estimated to be approximately 150 workers. At peak construction, a total of approximately 20 one-way truck trips per day may be necessary. Non-peak periods of construction would average about 5 to 8 truck trips per day (Section 2.2.2.4).

Peak-Hour Construction Trip Generation

Based on the Project information summarized above, the following estimates were used for peak construction trips.

Construction Workers

At peak construction, 150 workers would travel to the work site in the AM peak hour, and 150 would depart in the PM peak hour. For purposes of estimating a worst-case traffic impact, it was assumed that the peak hour for construction worker arrivals and departures would be the same as the AM and PM peak traffic hours identified in the Quinto Project traffic study, even though the peaks differ somewhat. (Typical work schedules are expected to be from 7:00 AM to 5:00 PM, as stated in Section 2.2.2.4; however, the Quinto study identified peak traffic hours as between 8:00 AM and 9:00 AM, and between 4:15 PM and 5:15 PM.) Other solar construction projects in the Merced area have experienced a relatively high rate of carpooling (sites are relatively rural, and as construction continues, workers find opportunities to carpool). Carpooling rates applied on the Quinto and Wright solar projects have ranged from 15 percent to 20 percent (Merced County Planning and Community Development Department 2012; Merced County Community and Economic Development Department 2014), and are assumed to increase during the construction period. If 20 percent of workers carpool, an estimated 120 construction worker vehicles would enter and leave the construction area daily.

Truck Deliveries

At peak construction, 20 truck trips may access a site per day. If 20 percent of those vehicles arrived during the AM peak hour, 4 trucks would be added to the construction commute. (As noted in Section 2.2.2.4, construction truck deliveries and shipments typically avoid the peak traffic hours in the morning and afternoon.)

Total traffic added at the peak construction period, during the peak hour, was therefore estimated at 124 vehicle trips. For assessment of impacts, it was assumed the workforce would be at its peak level at each construction location (all trips to and from Site 1, and then all trips to and from Sites 2 and 3). Assuming all trips would be at one site at a time is considered a worst-case scenario because construction activities may occur at Sites 1, 2, and 3 simultaneously (which would disperse the trips between construction sites, and reduce the concentration of traffic at each location).

Trip Origin/Destination

The Quinto Project assumed a reasonable split of origins and destinations for daily trips, grouping them into three regional directions. About 40 percent of Project traffic would go to and from the Gustine area to the north (using I-5 and/or SR 33), 40 percent would go to and from the Los Banos area to the east (using SR 152 and SR 33), and 20 percent would go to and from the Gilroy/Hollister area to the west (using SR 33 and SR 152). These communities are all close enough to the Project area to allow daily commuting, and represent the directional split for more distant commutes as well.

Peak-Hour Construction Traffic Impacts at Site 1

Traffic impacts were estimated at the intersection where the most traffic would be concentrated during construction, at the Donohugh Road West intersection with SR 33. This intersection has unrestricted traffic flow on SR 33 (no stop sign or signal) and a stop sign on Donohugh Road West. Traffic turning at this intersection, especially left turns onto SR 33, will require construction worker vehicles and trucks to wait for a clear opening in traffic to cross SR 33 and enter or exit Donohugh Road West to access Site 1. The Synchro with Sim Traffic Version 9.0 software (Trafficware 2014) was used to calculate intersection approach delays and level of service (LOS) operating conditions (rated from A to F, with A being no delays and F being considerable delays), with and without Project traffic.

At peak construction workforce conditions at Site 1, the Donohugh Road West/SR 33 intersection would operate at LOS A in the AM peak hour (with an increased delay of approximately 9 seconds) and LOS C in the PM peak hour (with 18 seconds of additional delay). The morning peak hour LOS would not change (LOS A with or without the proposed Project), and the afternoon peak hour would change from LOS A without the Project to LOS C with the Project. One measure that Merced County considers an unacceptable delay in traffic is a change in the level of service to LOS E or F as a result of a project (Merced County 2012b). Although the increased delay in the afternoon would result in a decline in level of service, it would not result in an unacceptable level of service based on the County's criteria.

The construction impact would also be temporary, limited to the period of peak construction. In 2017, following completion of construction, traffic at the Donohugh Road West/SR 33

intersection would return to the volumes and levels of service approximately equivalent to the No Action Alternative (LOS A in the AM and PM).

Peak-Hour Construction Traffic Impacts at Sites 2 and 3

Transportation access into and out of Sites 2 and 3 would use McCabe Road via I-5 and/or SR 33. From McCabe Road, Project construction traffic would use the unpaved access road on the west side of the Delta-Mendota Canal to reach Sites 2 and 3 (south of McCabe Road). The Quinto Project evaluated construction impacts for their 2013/2014 construction years on McCabe Road, SR 33, and the intersections connecting to the I-5 ramps at Santa Nella (Merced County Planning and Community Development Department 2012). The traffic study for that Project assumed an average temporary construction workforce of 300 daily workers, 20 percent carpooling, and 20 peak-hour delivery truck trips. Even with the difference in study years (2013 versus 2016), the Quinto Project traffic study represents a much higher level of traffic than the proposed San Luis Solar Project, on the same access routes. The Quinto Project will be fully constructed before the proposed Project construction period begins.

The Quinto Project traffic study identified an increase in delay at study intersections of 0.1 to 5.0 seconds per vehicle during project construction, but the delay did not result in a level of service change at any intersection. The worst-operating intersection studied was the I-5 southbound ramp/SR 33 intersection, which was projected to operate at LOS D with or without the Quinto Project. (The Quinto Project was estimated to add about 5 seconds of delay time during construction.) The delay would be eliminated at completion of construction of the Quinto Project in 2015. Delays in 2016 caused by the construction of the proposed San Luis Solar Project would be approximately half of amount estimated for the Quinto Project. Because the worst-case traffic from the construction of the proposed Project would be lower than that of a similar project determined to not cause an unacceptable change in traffic, the construction of the proposed Project would also not result in an unacceptable traffic delay associated with additional traffic accessing Sites 2 and 3.

Construction Road Closures or Detours

The proposed Project is not anticipated to require any temporary road closures. The proposed gen-tie alignment does not cross SR 33 or SR 152. In the unexpected event that temporary construction-related road closures would be needed, the events would be coordinated with transportation authorities and the necessary permits would be obtained.

McCabe Road Bridge over Delta Mendota Canal

Structural and safety impacts of additional construction traffic, including trucks, on the McCabe Road bridge over the Delta-Mendota Canal was addressed as part of the Quinto Project. The McCabe Road bridge was built in 1949 and has a legal limit of 80,000 pounds (40 tons) (Merced County Planning and Community Development Department 2012). Bridge conditions were reviewed, and truck deliveries were estimated at a probable maximum of up to four in a peak period. Adverse risks were not identified, unless two trucks were to attempt to cross the bridge at the same time. This is unlikely given that the bridge is relatively short (105 feet long) and adjacent to the access road that parallels the canal, where truck drivers have to substantially slow to make a left or right turn onto or off of McCabe Road. Measure TR-1 in Section 2.2.5 is proposed to avoid or minimize structural risks and turning conflicts.

Operation

Once constructed, the proposed Project would require about three to five part-time workers for maintenance and operations (Section 2.2.4.2). This might involve equipment maintenance and periodic replacement or repair work. Occasional cleaning of the solar equipment will involve use of a water truck (anticipated twice a year). Operations would therefore require only periodic trips, and would not measurably contribute to existing or future traffic conditions or impacts.

As noted above, Project operation would not create a substantial need for travel access to and from the sites. The Project sites are in relatively rural locations, and not readily accessible other than by car. The nearest airport to the Project is 10 miles away, and no impacts would occur to aviation or air travel.

3.10.2.3 Cumulative Impacts

The Quinto Project is anticipated to be completed in 2015, and would not have overlapping construction traffic with the proposed Project. The Wright Solar Park (located to the west of I-5, with access on SR 152) has an anticipated construction schedule of 2015 through 2016 (Merced County Community and Economic Development Department 2014), which could overlap with the proposed Project. The traffic analysis for the Wright Solar Park estimated a trip distribution of 60 percent of trips to the east on SR 152, and 40 percent to the west. The distribution of trips to the west would likely use I-5 from the SR 152 interchange to reach regional destinations, as opposed to taking SR 152 to SR 33 and traveling through Santa Nella to reach I-5. Because construction traffic from the Wright Solar Project is unlikely to pass through the SR 33/Donohugh Road West or SR 33/McCabe Road intersections, cumulatively considerable impacts are not anticipated.

3.11 Utilities and Emergency Services

This section describes potential utilities and emergency services impacts related to Project construction and operation.

3.11.1 Affected Environment

3.11.1.1 Utilities

There are no sewer or water treatment facilities in the Project area. Chemical toilets in the Medeiros Use Area, where Site 1 is located, are serviced by pump trucks. Medeiros has four water tanks—two 1,400 gallon tanks and two 1,000 gallon tanks—to provide potable water for visitors. The water tanks are replenished by water trucks (Reclamation and State Parks 2013). No water tanks or other potable water sources currently exist at Sites 2 and 3.

Several major existing power transmission corridors cross the Project area: a 500 kV corridor that borders the northern edge of Site 1, a 230 kV corridor that borders the southeastern edge of Site 1, and a 230/70 kV corridor that borders the western edge of Sites 2 and 3. Sites 2 and 3 are also crossed by a major gas pipeline, which runs parallel and just west of the northern power lines corridor.

Electricity in the Medeiros Use Area is provided by Pacific Gas & Electric via transmission lines from the San Luis Substation. No electrical service currently exists at Sites 2 and 3.

3.11.1.2 Emergency Services

Emergency fire protection in the SRA, which encompasses the Project area, is provided by Cal Fire at 31011 West Gonzaga Road in Gustine, east of the State Parks Administrative Offices. The Gustine station is part of Cal Fire's Madera-Mariposa-Merced Unit. The unit has 20 engines, three bulldozer/transport units, and five hand crews (Cal Fire 2011). Supplemental fire protection is provided by the County of Merced.

Rangers and lifeguards perform law enforcement duties in the SRA. Use areas (as defined in the RMP/GP) and camping areas are patrolled daily. Patrol shifts vary according to the season; patrols are longer, more frequent, and extend to later hours during peak use seasons (spring and summer). A patrol boat patrols the reservoirs on weekends during high use seasons as staffing is available. In addition, State Parks staff aid in SRA security by performing camp checks, collecting fees, assisting rangers, and reporting disorderly or suspicious activity to ranger staff.

All rangers and lifeguards are trained for emergency medical response. At times, advanced life support services may be delivered and rendered by Cal Fire, which is equipped to respond to all medical emergencies and holds cooperative contracts and agreements with other state and local emergency response agencies that provide supplemental resources when needed. Cal Fire's primary mission, however, is fire protection services (Reclamation and State Parks 2013).

3.11.2 Environmental Consequences

3.11.2.1 No Action

The No Action Alternative would not result in any direct effects to utilities and emergency services. There would be no increase in demand on or interruption of emergency services or utilities due to construction or operation of the solar facilities.

3.11.2.2 Proposed Action

Potential utilities and emergency services impacts from Project construction and operation are described below.

Construction

Utilities

During Project construction, construction workers would use temporary, portable restroom facilities. Waste will be regularly pumped out, hauled away, and disposed of by appropriately licensed organizations (Section 2.2.1.6). Project construction would not affect the existing chemical toilets for SRA visitors or place additional demands on sewer or water treatment facilities.

Throughout the Project construction period, water would be transported to the sites via water trucks and used for dust suppression (Section 2.2.2.7). No water would be taken from the four potable water tanks at Medeiros; therefore, the Project would not affect potable water availability

for visitors. Potable water for construction worker use would be provided by the construction contractor.

Existing electrical service would be used for construction at Site 1, if feasible. If electrical service is not available, portable generators would be used. Generators would be used to supply power to Sites 2 and 3 during construction.

During construction of the 70 kV gen-tie alignment, all required clearances from other nearby transmission lines would be maintained.

Construction wastes would include wood, concrete, and miscellaneous packaging materials. Construction wastes would be disposed of in accordance with local, State, and Federal regulations (Section 2.2.1.8).

Emergency Services

During construction, 24/7 on-site security will be in place and will include full-time security staff at all three solar PV system sites and frequent perimeter control routes, including at staging areas. The security equipment and lighting described in Section 2.2.1.10 will be installed during construction and will be fully operational at when the facility is commissioned.

During construction, the on-site workforce is expected to average approximately 100 employees, with a peak on-site workforce of approximately 150 employees. At peak construction, a total of approximately 20 one-way truck trips per day will be necessary. Truck traffic during construction is expected to average approximately 5 to 8 truck trips per day (Section 2.2.2.4). The Project will follow Reclamation Health and Safety Standards and all OSHA and California OSHA requirements in construction and operation.

The presence of construction workers and delivery trucks, especially during the peak construction period, could result in a minor increase in the need for law enforcement and medical or fire response, which would be minimized by the implementation of the Project's Emergency Action Plan (2.2.1.3), Hazardous Materials Management Plan (Section 2.2.1.8), Fire Prevention Plan (Section 2.2.1.9), and Health and Safety Plan (Section 2.2.1.14).

Emergency vehicle access to and through Project work areas would be maintained throughout construction, and emergency vehicles would be given access priority.

Operation

Utilities

During Project operations, no full-time personnel would be on-site, and as such, the Project would not include permanent, traditional restroom facilities that would connect with a municipal sewer system and subsequently require effluent treatment (Section 2.2.1.8). Therefore, the Project would not increase demand on sewage or treatment facilities.

Project operation would only require water for panel washing at each site and landscaping establishment and maintenance at Site 1, as described in Section 2.2.2.7. Water would be

supplied by contractors from an off-site location by trucks. The Project would use no water for electrical power generation.

The Project would support the Interior and Reclamation renewable energy goals described in Section 1.1 and have a long-term beneficial effect on power generation and distribution by providing a renewable energy source on Federal land.

Emergency Services

As described in Section 2.2.1.10, limiting access to the solar PV system sites will be necessary both to ensure the safety of the public and to protect the equipment from potential theft and vandalism. Sites 1, 2, and 3 would be fenced to facilitate Project and equipment security, and surveillance such as security cameras, motion detectors, or heat sensors may be installed at locations along the site boundaries. Gates would be installed at the roads entering or exiting the sites. The site perimeters will be fenced with an approximately 8-foot-tall chain-link fence. Shielded area-specific lighting for security purposes will be provided for the control buildings and Site 1 and 2 substations. Project personnel would provide 24-hour security monitoring of Sites 1, 2, and 3 remotely. The Project security measures would have beneficial effects to recreationists and State Parks staff at Site 1 and SLDMWA staff at Sites 2 and 3, where current security monitoring is sporadic.

A BESS could present fire risk associated with battery fires (Section 2.2.1.3), potentially increasing the need for emergency services. The BESS unit would have an integrated fire suppression system and secondary containment, and Measures WQ-1 and WQ-2 (Section 2.2.5) would minimize the risk of battery fires and the need for emergency fire response. Residual impacts would be minor.

As operational staff would be limited to three to five part-time workers (Section 2.2.4.2) and the Project would implement an Emergency Action Plan (2.2.1.3), Hazardous Materials Management Plan (Section 2.2.1.8), Fire Prevention Plan (Section 2.2.1.9), and Health and Safety Plan (Section 2.2.1.14), the Project is not expected to result in a long-term increase in the need for law enforcement and medical or fire response. Each solar PV system site would have internal roads and aisles that would allow for fire control and emergency vehicle access.

Summary

Project construction and operation are not expected to increase demands on utilities. A potential exists for Project construction and operation to increase demands on law enforcement and medical or fire response. As the Project includes 24-hour security and implementation of the BESS fire suppression system and the plans listed above to minimize incidents that require emergency services, adverse effects are expected to be minor.

3.11.2.3 Cumulative Impacts

The Project would not adversely affect utilities or contribute to cumulative effects on utilities. However, Project construction and operation could result in minor effects from increased demands on emergency services. Other nearby projects in the same geographical area, or that include facilities in the same geographical area, could also increase demands on the same emergency service providers.

Residential development plans and projects such as the Villages of Laguna San Luis Community Plan (Merced County Planning and Community Development Department 2008) and Santa Nella Community Specific Plan (Santa Nella 2000) are required to identify impacts to, and mitigation for, effects to utilities and emergency services. The Villages of Laguna San Luis Community Plan, for example, provides for a new public waste facility and three new fire stations.

Other energy projects in the vicinity such as the Quinto Solar PV Project (Merced County Planning and Community Development Department 2012), Wright Solar Park (Merced County Community and Economic Development Department 2014), and San Luis Transmission Project (WAPA and SLDMWA 2015) are also required to identify impacts to, and mitigation for, effects to utilities and emergency services. These projects identified no impacts to emergency services, or minor impacts for which no mitigation was necessary.

Therefore, emergency services impacts from those projects combined with the San Luis Solar Project would not be cumulatively considerable.

3.12 Hazardous Waste and Materials

3.12.1 Affected Environment

The Project is located within lands owned by Reclamation that have been primarily used for water storage and public recreation. The Project area currently contains undeveloped seasonal grasslands with dirt access roads, except for the campsites and other recreation facilities at Site 1.

San Luis Reservoir and O'Neill Forebay were completed in 1967, and a review of historical aerial photographs indicates the lands prior to that date had no obvious developed facilities at or near Sites 1, 2, and 3, other than the Delta-Mendota Canal built in 1951 (NETR 2015). Comparison of topographic maps before and after the construction of San Luis Dam show a change in topography at Site 1, indicating the area was used for a borrow area for dam construction. Review of geologic mapping for this Project's cultural resources investigation (Johnston and Brewer 2015) shows that several locations in the Project area consist of modern artificial fill or were used as quarry sites. Site 1 is within a former quarry, while Sites 2 and 3 coincide with modern fill in excavated areas (Herd 1979).

Two online record services were reviewed to identify recorded hazardous materials contamination or use in or near the Project sites: the California Department of Toxic Substances Control Envirostor database, and the SWRCB's GeoTracker database (California Department of Toxic Substances Control 2015; SWRCB 2015). The results are listed in Table 10, which covers sites within approximately 1 mile of the Project.

The databases list no recorded hazardous materials sites in the Project area and seven sites within 1 mile of the Project area. Four of the sites are listed as "case closed" or "no further action," and three are active ("open") cases where regulatory oversight has not been formally completed. The following summarizes the open sites:

- Santa Nella Parcel 41: This record was for a crude oil release from a pipeline in Santa Nella; soil sampling and testing were conducted in 2014. No further investigation or remediation action is listed.
- San Luis Reservoir SRA: One open case and one closed case were recorded at the same location, in the vicinity of the San Luis Operation and Maintenance Headquarters and consist of former leaking underground storage tanks. Two tanks have been removed, and soil and water vapor sampling and investigation are ongoing. The former tank locations are across SR 152 from the proposed Project.
- Forebay Chevron: This record is for a gas station near the SR 152/SR 33 interchange, where an underground storage tank(s) is being evaluated for integrity.

Table 10 Hazardous Materials Sites Listed Near the Project

Site Name	Address	Type	Status	Contaminant	Summary	Distance from Nearest Facility	Source
Santa Nella Parcel 41, Former Central Valley Pipelines	Santa Nella Rd. Santa Nella, CA 95322	Cleanup Program Site	Open - Site Assessment	Crude oil	Crude oil released from former pipeline discovered during Phase 1 site assessment. Assessment is continuing.	0.2 mile east of proposed gen-tie line	GeoTracker
Crude Oil Spill Near Santa Nella - Parkway Boulevard Site	Highway 33 Santa Nella, CA 95322	Cleanup Program Site	Completed - Case Closed	Crude oil, other petroleum	Hydrocarbon impacted soils encountered during sewer line trenching. Three excavations occurred in 2008-2009.	1 mile east of proposed gen-tie line	GeoTracker
Santa Nella - EPE 7 Site - Crude Oil Spill	Highway 33 Santa Nella, CA 95322	Cleanup Program Site	Completed - Case Closed	Benzene, crude oil, other petroleum	Soil and groundwater historically impacted by Valley Pipeline. Soils were excavated and removed.	1 mile east of proposed gen-tie line	GeoTracker
Forebay Chevron	29860 Gonzaga Road Santa Nella, CA 95322	Leaking Underground Storage Tank (LUST) Cleanup Site	Open - Site Assessment	None listed	Integrity of an underground storage tank is being investigated.	0.2 mile southeast of proposed gen-tie line	GeoTracker
San Luis Reservoir SRA	31426 Gonzaga Road Gustine, CA 95322	LUST Cleanup Site	Open - Remediation	Gasoline	Gasoline underground storage tank removed in 1996. Waste oil tank removed in 2003. Contaminated soil excavated. Soil vapor extraction with thermal oxidization of soil vapor implemented in 2008. Site assessment continues to determine extent of groundwater contamination.	0.1 mile southwest of Site 1	GeoTracker

Table 10 Hazardous Materials Sites Listed Near the Project

Site Name	Address	Type	Status	Contaminant	Summary	Distance from Nearest Facility	Source
San Luis Reservoir Maintenance Facility	31426 Gonzaga Road Gustine, CA 95322	Cleanup Program Site	Completed - Case Closed	Benzene, chromium, copper, diesel, gasoline, nickel, other chlorinated hydrocarbons, tetrachloroethylene (PCE), toluene, total petroleum hydrocarbons (TPH), trichloroethylene (TCE), waste oil/motor/ hydraulic/lubricating, xylene	Five exploratory test pits were excavated to a maximum depth of 15 feet to evaluate impact of vehicle wash discharges in 2012. No significant impact was identified.	0.6 mile northwest of Site 1	GeoTracker
Romero Ranch	3 Miles W of I-5 & HWY 33 Santa Nella, CA 95430	Voluntary Cleanup	No Further Action	Dichlorodiphenyl-trichloroethane (DDT), toxaphene	Concrete-lined dip tank used to treat cattle for external parasites on cattle ranch.	0.0 mile southeast of proposed gen-tie	Envirostor

Source: Department of Toxic Substances Control 2015, SWRCB 2015.

3.12.2 Environmental Consequences

3.12.2.1 No Action

The No Action alternative would involve no construction activities, and assuming the site continues to remain relatively undisturbed in the future and is used for water management and recreational purposes, there should be no adverse environmental or cumulative impacts related to hazardous materials.

3.12.2.2 Proposed Action

Overall, solar PV modules and other products used during Project construction and operation are not hazardous and are not subject to California or Federal hazardous material management regulations. Construction equipment and activities would be required to install the Project components. The following summarizes potential hazardous materials effects of the Project.

Disturbance of Contaminated Soils or Water

There are no known recorded contamination issues within the boundaries of Sites 1, 2, or 3, or along the gen-tie corridor. Because the sites do not appear to be associated with apparent agricultural use, soils are not expected to have substantial pesticide or herbicide residue. There are no existing water bodies within the construction area. Therefore, Project construction is not expected to disturb known contaminated soils or water. Construction would primarily take place on and near the ground surface, and would not involve substantial excavations that might encounter groundwater. It is also unlikely that construction will require off-site disposal of soils. In the event that off-site disposal is required, excavated soils may require testing by the contractor to determine special handling requirements, if any. No adverse impacts are anticipated from soil disturbance during construction.

Potential Release of Hazardous Materials During or After Construction

Project construction will involve transport of materials to the Project area and installation of equipment. Project operation will require the generation, transmission, and storage of electricity that involves equipment and limited materials that can be hazardous if released. These are primarily fuels and oils required for the construction equipment. Construction wastes produced or brought to the Project area are expected to include wood, concrete, and miscellaneous packaging materials. Transformers used in the transmission of electricity generated at the site will use biodegradable mineral oil. Appropriate spill containment and clean-up kits would be kept on site during construction and maintained during Project operation.

The fuels and solvents needed for the construction equipment will be stored and handled to minimize a risk of release. The construction contractor and Applicant will be responsible for meeting Merced County, state, and Federal requirements for handling these materials in excess of thresholds established for each substance or activity. For example, hazardous materials must be stored in areas that are separated and provide containment, are not subject to corrosion or decay, are secure, and are properly identified, among many other requirements. Permits may be required, depending on the quantity and amount of material stored or in use. The Applicant will be responsible for meeting all requirements applicable to these activities, and will be subject to inspection, as for any Project or site using the same materials and activities. The risk of an inadvertent spill or release cannot be fully ruled out, but would be minimized with the

construction contractor and Applicant's necessary compliance with local, state, and Federal requirements for construction activities, and this compliance is subject to inspection by regulators.

The Project's BESS would have primary and secondary containment as described in 2.2.1.3, and Measures WQ-1 and WQ-2 in Section 2.2.5 would minimize the risk of a hazardous materials release associated with the BESS. The Project's Emergency Action Plan will be implemented and updated during Project construction and operations, and personnel will be trained in response to battery storage failures.

Measures HAZ-1 through HAZ-4 in Section 2.2.5 are minimum compliance requirements, which are applicable depending on the materials used, stored, and time of storage at the Project site, to minimize the potential for a release of hazardous materials.

3.12.2.3 Cumulative Impacts

The use of hazardous materials is site specific, and not expected to contribute to any cumulative impacts associated with other projects.

3.13 Noise

This section describes the existing noise environment and evaluation of Project-related noise.

3.13.1 Affected Environment

Noise-sensitive land uses are properties where a lowered noise level is beneficial or essential to an exterior or interior activity. In the Project area, the most noise-sensitive land uses would be campsites and day use areas at the Medeiros Recreation Area, where Site 1 and part of the gen-tie alignment would be constructed. Sites 2 and 3 have no recreational uses nearby. The nearest noise-sensitive land uses are the residential area that is approximately 0.8 mile to the east of Site 2; the Forebay Golf Course, which is approximately 450 feet to the east of Site 3 and approximately 0.3 mile to the east of Site 2; and the O'Neill Forebay Wildlife Area, which is approximately 0.2 mile to the south of Site 2 and adjacent to portions of the gen-tie alignment.

Existing Noise Environment

Noise sources in the Project area include traffic on SR 152 and SR 33, boats on O'Neill Forebay, and other recreational uses.

SR 152 and SR 33 are adjacent to the Medeiros Recreation Area. Their greatest impact on ambient noise levels at Medeiros is during the day, when the highest volumes of free-flowing traffic occur, and in parts of Medeiros that are closest to those roadways. The noise level at 100 feet from SR 152 is 74 decibels (dB), day-night level (L_{dn}).[8] The noise level at 100 feet from SR 33 is 67 dB L_{dn} (Merced County 2012c).

[8] A decibel (dB) is a unit on a logarithmic scale that is used to describe the sound pressure level, or simply put, the loudness or intensity of a sound. The day-night level (L_{dn}) is the average of A-weighted sound levels over a 24-hour period, with a 10 dB penalty to sounds that occur at night (10 PM to 7 AM).

O'Neill Forebay is to the west and north of Medeiros and is used for both motorized and nonmotorized boating during daylight hours. Motorized boating could generate noise levels of up to 67 A-weighted decibels (dBA)[9] at a distance of 1,000 feet (Merced County 1990).

Other recreation uses include vehicles on Medeiros roadways and visitor conversation, music, and generator use. State Parks has rules and regulations pertaining to visitor noise (e.g., radios must not be audible beyond a visitor's immediate campsite regardless of the time of day or night, and generators or other devices are not to be operated between the hours of 8 PM and 10 AM; Reclamation and State Parks 2013). No noise measurements exist for the SRA; however, for the Quinto Project, the ambient daytime noise level at the San Luis Creek Campground was estimated at 50 to 60 dBA L_{dn} (Merced County Planning and Community Development Department 2012). The San Luis Creek Campground is approximately 3 miles north-northwest of Medeiros, and the estimated daytime noise levels are assumed to be similar to those at Medeiros. The RMP/GP does not include specific limits on noise-generating activities in the SRA (Reclamation and State Parks 2013).

The 2030 Merced County General Plan sets noise standards for residential areas at a median of 55 dBA and a maximum of 75 dBA during the day (7 AM to 10 PM), and a median of 50 dBA and a maximum of 70 dBA during the night (10 PM to 7 AM). The General Plan also sets noise standards for parks at a median of 65 dBA and a maximum of 75 dBA during the day (Merced County 2012d). However, Merced County Code Section 18.41.070 allows for temporarily elevated noise levels during construction. Merced County standards would apply to the residential area to the east of Site 2 and the Forebay Golf Course. It is assumed that existing noise levels in these areas are consistent with the General Plan.

No noise measurements exist for the O'Neill Forebay Wildlife Area. Visitor uses at the area include hunting, hiking, and nature study. For purposes of this analysis, the area is included as a noise-sensitive land use, although hunting with rifles and shotguns is permitted in accordance with CDFW regulations (CDFW 2014). Almost all firearms create noise that is over 140 dB (American Speech-Language-Hearing Association 2015).

3.13.2 Environmental Consequences

3.13.2.1 No Action

The No Action Alternative would not affect the existing noise environment or contribute cumulatively to noise impacts.

3.13.2.2 Proposed Action

Construction

During the 6 to 9 month construction period, the proposed Project would introduce noise from workers, vehicles, and construction equipment. Noise-producing construction activities would include grading, trenching, concrete work, hauling materials and equipment, and footing installation. Piles for the racks that hold the solar PV panels would be installed using tractor-mounted impact or vibratory hammers. Holes for the poles for the 70 kV gen-tie line would be

[9] "A-weighted" decibels (dBA) are decibels that have been adjusted to approximate the response of human ear.

installed using truck or tractor-mounted augers (likely 24 or 30 inch diameter). Typical noise levels from the equipment needed to perform the Project construction activities are presented in Table 11.

Table 11 Typical Construction Equipment Noise Levels

Equipment	Construction Activity	dBA			
		L_{max} 50 ft	L_{eq} 75 ft	L_{eq} 150 ft	L_{eq} 450 ft
Rubber-Tired Bulldozer	Site Preparation	82	74	68	59
Tracker/Loader/Backhoe	Site Preparation; Tracker Installation; Electrical	78	73	64	55
Dump Truck	Site Preparation	77	69	63	53
Crane	Tracker Installation; Electrical	81	69	63	54
Excavators	Site Preparation; Tracker Installation; Electrical	81	73	67	58
Graders	Site Preparation	85	78	72	62
Concrete Trucks	Tracker Installation (numerous); Electrical	79	75	65	56
Rough Terrain Forklifts	Tracker Installation	75	64	58	49
Rubber-Tired Loader	Site Preparation	79	72	66	56
Rollers	Site Preparation (2); Tracker Installation; Electrical	80	70	64	54
Water Truck	Site Preparation; Tracker Installation; Electrical	77	69	63	53
Off-Hwy Pick-up Trucks	Tracker Installation; Electrical	75	71	62	52
Generators	Tracker Installation	81	74	68	59

Notes:
L_{max} is the maximum sound level at a distance of 50 feet.
L_{eq} is equivalent sound level, represents an average of the sound level that occurs over a specified period, usually one hour.

Sources: Federal Highway Administration 2006, 2008; Merced County Planning and Community Development Department 2012

Potential Effects to SRA Visitors

Construction of Site 1 would result in temporary noise impacts to Medeiros visitors. Most construction would take place during daytime hours, Monday through Friday. During construction, noise-producing activities would occur adjacent to the designated campsites along the western shoreline of Medeiros, and noise could reach maximum sound levels of 75 to 85 dBA at 50 feet (Table 11).

During daytime hours in the 90-day construction period at Site 1, some visitors may experience a high level of disruption that could reduce the quality of their recreational experience. Visitors on the water of O'Neill Forebay could also be exposed to temporary construction noise, although noise would decrease with distance from the activity. Nighttime construction work is not planned; however, some weekend work may be necessary. Measures REC-1 and REC-2 and NOI-1 through NOI-4 in Section 2.2.5 would be implemented to minimize adverse effects from construction noise.

At the designated campsites along the northern shoreline of Medeiros, which are more than 2,500 feet from Site 1, temporary construction-related noise would be limited to trucks and worker vehicles traveling between SR 33 and Site 1 on Donohugh Road West. The maximum vehicle

noise would be less than 80 dBA at 50 feet because construction vehicle speed would be limited to 25 mph (Measure REC-1 in Section 2.2.5). Along the northern shoreline of Medeiros, other Site 1 construction noise would diminish to levels similar to ambient daytime noise levels because of the distance (2,500 feet or more compared with 450 feet shown in Table 11). In addition, Site 1 is lower in elevation than areas to the north, northwest, and west, which would provide additional acoustic shielding.

Construction at Sites 1, 2, and 3 is not expected to affect visitors in other parts of the SRA because the sites are more than 3,500 feet from the nearest designated campsites and day use areas, which are across O'Neill Forebay in the San Luis Creek Use Area. At that distance, temporary construction noise can reasonably be assumed to be lower than the 49 to 62 dBA range shown in Table 11 for activities at 450 feet. Noise levels typically decrease by approximately 6 dBA with every doubling of distance from the noise source (Caltrans 2013b). If construction noise is audible at the San Luis Creek Use Area, it is expected to be within the range of typical ambient daytime noise levels for a San Luis Creek campground (estimated at 50 to 60 dBA; Merced County Planning and Community Development Department 2012). Topography can also shield noise if it interrupts the line of sight between the noise source and the receptor (Caltrans 2013b). Therefore, berms along O'Neill Forebay would provide acoustic shielding between the Sites 2 and 3 and the San Luis Creek campsites.

Construction of the gen-tie line would involve installing poles, stringing the 70 kV line along the poles, and connecting the 70 kV line to the Site 1, Site 2, and O'Neill Forebay substations. The poles would be installed with a rubber-tired flatbed truck, and truck-mounted drills and cranes that would access each locale via existing roads or by minimally driving cross country. Similar equipment would be used for connecting the lines to the poles (Section 2.2.2.7). At a distance of 50 feet, these activities could result in maximum noise levels of 75 to 85 dBA (Table 11).

The majority of the gen-tie route would be constructed adjacent to the north side of SR 152 and the west side of SR 33 in the Medeiros Recreation Area. No recreation uses typically occur in those areas of Medeiros, which are already exposed to roadway noise from SR 152 (74 db at 100 feet) and SR 33 (67 db at 100 feet).

Potential Effects at Other Noise-Sensitive Land Uses

Construction noise at Sites 2 and 3 is not expected to affect the residential area that is approximately 0.8 mile (4,200 feet) to the east of Site 2. At that distance, temporary construction noise would not exceed the Merced County General Plan standard of 55 dBA median/75 dBA maximum for residential areas. Berms along both sides of the Delta-Mendota Canal would also provide acoustic shielding between the houses and Sites 2 and 3.

The northern half of the Forebay Golf Course is approximately 450 feet east of Site 3 and approximately 0.3 mile (1,400 feet) east of Site 2. Golf course visitors could experience construction noise levels in the 49 to 62 dBA range shown in Table 11 for activities at 450 feet. This range would be within the Merced County General Plan standard of 65 dBA median/75 dBA maximum for parks. Berms along both sides of the Delta-Mendota Canal would also provide acoustic shielding between the golf course and Sites 2 and 3.

The northern end of the O'Neill Forebay Wildlife Area is approximately 0.2 mile (1,000 feet) to the south of Site 2. Temporary noise from construction of Site 2 can reasonably be assumed to be lower than the 49 to 62 dBA range shown in Table 11 for activities at 450 feet, and within Merced County General Plan noise standards for parks.

Part of the gen-tie route follows the east and north sides of the O'Neill Forebay Wildlife Area. As noted above, gen-tie construction could result in maximum noise levels of 75 to 85 dBA at a distance of 50 feet (Table 11). Short-term construction noise could affect visitors, depending on their location in the 700-acre area. The maximum noise levels would not exceed the noise levels from visitors hunting using firearms in the area. Measure NOI-1 would minimize short-term adverse effects from construction noise.

No houses are within 450 feet of the gen-tie route.

Operation

Project operation will typically not involve equipment that generates noise. Maintenance or service vehicles driving to and from the solar PV systems and potential repairs or replacement of equipment would occasionally result in short-term noise increases, but not at a level that would affect the ambient noise environment. Maintenance activities are expected to take place during daytime hours.

3.13.2.3 Cumulative Impacts

Parts of the Quinto Project are directly adjacent to, and north of, the San Luis Creek Use Area of the SRA. The environmental document for the Quinto Project identified construction-related noise impacts to the San Luis Creek Use Area and mitigation measures to reduce impacts to visitors (Merced County Planning and Community Development Department 2012). Construction of the Quinto Project, which is anticipated to be completed in 2015, would not overlap with construction of the San Luis Solar Project. Although construction noise from the San Luis Solar Project would affect a different location of the SRA (Medeiros) at a later period of time, the overall effect of potential disturbance to SRA visitors would cumulatively add to the recent noise impacts from the Quinto Project. As both projects include measures to minimize effects to SRA visitors and the construction noise is temporary, substantial cumulative impacts are not anticipated, although minor impacts would remain.

The proposed Wright Solar Park has an anticipated construction schedule of 2015 through 2016 (Merced County Community and Economic Development Department 2014) and could overlap with construction of the San Luis Solar Project. As the Wright Solar Park would be approximately 5 miles southeast of the San Luis Solar Project, no cumulative noise effects would occur.

As stated in Section 3.9.2, the proposed San Luis Transmission Project would construct a 70 kV transmission corridor within the SRA. Two corridor alternatives have been identified. One alternative would cross through Medeiros Use Area and border the O'Neill Forebay Wildlife Area and OHV Use Area. The other alternative would cross through the San Luis Creek Use Area, on the northwest side of O'Neill Forebay. The potential for cumulative impacts would depend on the chosen alignment for the San Luis Transmission Project. As both projects include

measures to minimize effects to SRA visitors and the construction noise is temporary, substantial cumulative impacts are not anticipated, although minor impacts could remain.

3.14 Irreversible and Irretrievable Commitment of Resources

The Land Use Authorization that Reclamation proposes to issue to the Applicant for the San Luis Solar Project would result in a long-term commitment of resources, primarily at the three solar PV system sites, for approximately 30 years. However, the Land Use Authorization would not constitute an irretrievable commitment of resources because the Applicant would decommission and completely remove the solar PV systems and supporting electrical and facility systems at the end of the Project's useful life. Following facility decommissioning and removal, the area would be reclaimed according to applicable regulations at the time of decommissioning (Section 2.2.2.11).

Project construction and operation would be an irretrievable commitment of labor and capital by the Applicant and their contractors.

Section 4 Consultation and Coordination

This section summarizes Federal, State, local agency, and public coordination in support of the Proposed Action.

4.1 Public Review Period

Reclamation intends to provide the public with an opportunity to comment on the Draft Finding of No Significant Impact and Draft Environmental Assessment during a 30-day public review period.

4.2 Stakeholders

As noted in Section 1.1, the following agencies are involved in operating and managing the lands surrounding San Luis Reservoir and O'Neill Forebay, including the lands on which the Project is proposed: State Parks (recreation management), DWR (reservoir and water distribution operations), and CDFW (O'Neill Forebay Wildlife Area). In addition, SLDMWA has rights to use portions of Sites 2 and 3 for operations and maintenance.

Reclamation and the Applicant met with representatives from State Parks, DWR, and SLDMWA on December 2, 2014, and February 17, 2015, to discuss the proposed Project. In February and March 2015, Reclamation, State Parks, DWR, and SLDMWA reviewed and provided comments on the preliminary Plan of Development, which have been incorporated into this document. In August and September 2015, Reclamation, State Parks, DWR, SLDMWA, and CDFW reviewed and provided comments on the administrative draft Environmental Assessment and revised Plan of Development, which have also been incorporated into this document. Communication between the Applicant, Reclamation, and State Parks continues.

4.3 Endangered Species Act (16 U.S.C. § 1531 et seq.)

Section 7 of the Endangered Species Act requires Federal agencies, in consultation with the Secretary of the Interior and/or Commerce, to ensure that their actions do not jeopardize the continued existence of endangered or threatened species, or result in the destruction or adverse modification of the critical habitat of these species.

Reclamation has determined that the Proposed Action may affect blunt-nosed leopard lizard and San Joaquin kit fox. Reclamation initiated consultation with USFWS, under section 7(a)(2) of the Endangered Species Act, in November 2015.

4.4 National Historic Preservation Act (54 U.S.C. § 300101 et seq.)

54 U.S.C. § 306108, commonly known as Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended (54 USC § 300101 et seq.), requires Federal agencies to consider the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation an opportunity to comment on such effects. This is accomplished through compliance with the Section 106 process as outlined at 36 CFR Part 800.

Reclamation is consulting with the State Historic Preservation Officer on a Section 106 finding of No Adverse Effect, pursuant to 36 CFR 800.5(b). Upon receipt of State Historic Preservation Officer concurrence with the finding, Reclamation's responsibilities under Section 106 of the NHPA will be fulfilled. Reclamation will not issue the Land Use Authorization for the Project prior to completion of the Section 106 process.

4.5 Clean Water Act (33 U.S.C. § 1251 et seq.)

Section 401 of the Clean Water Act (33 U.S.C. § 1311) prohibits the discharge of any pollutants into navigable waters, except as allowed by permit issued under sections 402 and 404 of the Clean Water Act (33 U.S.C. § 1342 and 1344). If new structures (e.g., treatment plants) are proposed, that would discharge effluent into navigable waters, relevant permits under the Clean Water Act would be required for the Project applicant(s). Section 401 requires any applicant for an individual Corps dredge and fill discharge permit to first obtain certification from the state that the activity associated with dredging or filling will comply with applicable state effluent and water quality standards. This certification must be approved or waived prior to the issuance of a permit for dredging and filling. Section 404 of the Clean Water Act authorizes the Corps to issue permits to regulate the discharge of "dredged or fill materials into waters of the United States" (33 U.S.C. § 1344)

The Proposed Action will not require a Section 404 permit from the Corps. Prior to the initiation of construction, the Applicant will apply for coverage under the Statewide NPDES Construction General Permit Order (2009-0009-DWQ) from the California Regional Water Quality Control Board.

Section 5 Preparers and Reviewers

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Appendix A
Species List

Table A-1: Threatened, Endangered, Proposed Threatened or Proposed Species

Scientific Name	Common Name	USFWS	CDFW	CNPS	Onsite Potential. Effect of Action[1]	Comments
Agelaius tricolor	Tricolored blackbird	None. Petitioned for listing.	E[2]/SSC[3]	N/A[4]	Low	This species had a petition for listing submitted to USFWS in February 2015 and could potentially receive temporary status sometime this year. Potential offsite habitat near Site 1 but no species or previous nesting sites observed during current surveys. No nest remnants observed in any habitats assessed at or in area during current surveys. No species have been documented using the proposed sites; however, tricolored blackbirds were observed in 2002 by EDAW in close proximity to the proposed project area. Construction activities at Site 1 and along some of the transmission corridor could temporarily disturb wildlife along the shoreline of the Forebay.
Ambystoma californiense	California tiger salamander	T[5]	T	N/A	N/A	No habitat or breeding ponds on site. Numerous predatory species in all water bodies. No species documented in the reviewed database on the sites.
Ammodramus savannarum	Grasshopper sparrow	None	SSC	N/A	Low	No nesting potential on sites. Transient flyover and foraging potential on site only. No species documented in the reviewed database on the sites.

[1] Species that have no current federal status have no FESA effect determination.
[2] E = Endangered
[3] This California Species of Special Concern was emergency listed in December 2014 as Endangered for 100 days during which time the CDFW will conduct analysis to decide whether to leave as a Species of Special Concern or relist as Endangered.
[4] N/A = Not Applicable.
[5] T = Threatened

Table A-1: Threatened, Endangered, Proposed Threatened or Proposed Species

Scientific Name	Common Name	USFWS	CDFW	CNPS	Onsite Potential. Effect of Action[1]	Comments
Aquila chrysaetos	Golden eagle	BCC[6], Eagle Protection Act.	FP[7], WL[8]	N/A	Low	No nesting potential on sites. No LSN[9] within ½ mile of sites. Transient flyover and foraging potential only. No species documented in the reviewed database on the sites.
Athene cunicularia	Burrowing owl	None	SSC[10]	N/A	Low	A 2003 CNDDB record located approximately 0.6 miles from the southern edge of Site 1 indicated that the 0.1 mile non-specific polygon for the species crosses the Site 1 location by 175 feet. The CDFW evaluated the species to be presumed extant in the area. No sign[11] of the species was found during field surveys of sites or 150 foot buffer around sites. No species documented in the reviewed database on the sites.
Atriplex cordulata	Heartscale	None	None	1B.2[12]	N/A	No species were observed during field surveys or no suitable habitat is located on the sites. No species documented in the reviewed database on the sites.
Atriplex coronata var. vallicola	Lost Hills crownscale	None	None	1B.2	N/A	No species were observed during field surveys or no suitable habitat is located on the sites. No species documented in the reviewed database on the sites.

[6] BCC = "Bird of Conversation Concern". USFWS list of migratory and non-migratory bird species beyond those already designated as FT or FE and represent the USFWS conservation priorities. This list makes no finding with regard to whether they warrant consideration for ESA listing.
[7] FP = "Fully Protected". CDFW "Fully Protected" was California's initial effort in the 1960's to identify and provide additional protection to those animals that were rare or faced possible extinction.
[8] WL = Watch List. CDFW "Watch List" consists of taxa that were previously SSCs but no longer merit SSC status or which do not meet SSC criteria but for which there is concern and a need for additional information to clarify status.
[9] LSN = Large Stick Nest
[10] SSC = "Species of Special Concern". CDFW "Species of Special Concern" is an administrative designation and carries no formal legal status but within CEQA needs to be considered.
[11] "Sign" is an indicator of use of a site by selected species. Sign typically can include such items as feathers, bones, fur, prey remnants, pellets, nesting materials, scratch marks, prints, tracks, or trails, etc.
[12] 1B.* = Plants with a California Rare Plant Rank of 1B are rare throughout their range with the majority of them endemic to California.

Table A-1: Threatened, Endangered, Proposed Threatened or Proposed Species

Scientific Name	Common Name	USFWS	CDFW	CNPS	Onsite Potential. Effect of Action[1]	Comments
Branchinecta longiantenna	Longhorn fairy shrimp	E[13]	None	N/A	N/A	No species were observed during field surveys or no suitable habitat is located on the sites. No species documented in the reviewed database on the sites.
Branta hutchinsii leucopareia	Cackling (=Aleutian Canada) goose	D[14]	SSC	N/A	Low	No nesting potential on sites. Potential suitable nesting locations within ½ mile of sites. Transient flyover and foraging potential on site only. No species documented in the reviewed database on the sites.
Buteo regalis	Ferruginous hawk	BCC	WL	N/A	Low	No nesting potential on sites. No LSN within ½ mile of sites. Although no nests observed, potential nesting areas are within ½ mile radius of sites. Transient flyover and foraging potential only.
Buteo swainsoni	Swainson's hawk	None	T	N/A	Low	No nesting potential on sites. No LSN within ½ mile of sites. Although no nests observed, potential nesting areas are within ½ mile radius of sites. Transient flyover and foraging potential only.
California macrophylla	Round-leaved filaree	None	None	1B.1	N/A	No species were observed during field surveys or no suitable habitat is located on the sites. No species documented in the reviewed database on the sites.
Campanula exigua	Chaparral harebell	None	None	1B.2	N/A	No species were observed during field surveys or no suitable habitat is located on the sites. No species documented in the reviewed database on the sites.
Caulanthus lemmonii	Lemmon's jewel-flower	None	None	1B.2	N/A	No species were observed during field surveys or no suitable habitat is located on the sites. No species documented in the reviewed database on the sites.
Chloropyron molle ssp. hispidum	Hispid bird's-beak	None	None	1B.1	N/A	No species were observed during field surveys or no suitable habitat is located on the sites. No species documented in the reviewed database on the sites.

[13] E = Endangered
[14] D = Delisted

Table A-1: Threatened, Endangered, Proposed Threatened or Proposed Species

Scientific Name	Common Name	USFWS	CDFW	CNPS	Onsite Potential. Effect of Action[1]	Comments
Circus cyaneus	Northern harrier	None	SSC	N/A	Low	No LSN located within ½ mile of sites. No nests or sign observed during recent site surveys. Although no nests or sign observed, potential nesting areas are within ½ mile of the sites. Primarily transient flyover and foraging potential.
Delphinium californicum ssp. interius	Hospital Canyon larkspur	None	None	1B.2	N/A	No species were observed during field surveys or no suitable habitat is located on the sites. No species documented in the reviewed database on the sites.
Delphinium recurvatum	Recurved larkspur	None	None	1B.2	N/A	No species were observed during field surveys or no suitable habitat is located on the sites. No species documented in the reviewed database on the sites.
Desmocerus californicus dimorphus	Valley elderberry longhorn beetle	T	None	N/A	N/A	No Elderberry plants located on site or within 100 feet of site. No species documented in the reviewed database on the sites.
Actinemys marmorata	Western pond turtle	None	SSC	N/A	N/A	No species were observed during field surveys or no suitable habitat is located on the sites. Potential habitat is within ½ mile of sites. No species documented in the reviewed database on the sites.
Eremophila alpestris actia	California horned lark	None	WL	N/A	Low	Limited nesting potential on sites. Suitable nesting locations observed within ½ mile of sites. Transient flyover and foraging potential more likely than nesting. No species documented in the reviewed database on the sites. No nests or sign observed.
Eryngium spinosepalum	Spiny-sepal button-celery	None	None	1B.2	N/A	No species were observed during field surveys or no suitable habitat is located on the sites. No species documented in the reviewed database on the sites.
Eumops perotis californicus	Western mastiff bat	None	SSC	N/A	N/A	No species were observed during field surveys or no suitable habitat is located on the sites. No species documented in the reviewed database on the sites.

Table A-1: Threatened, Endangered, Proposed Threatened or Proposed Species

Scientific Name	Common Name	USFWS	CDFW	CNPS	Onsite Potential. Effect of Action[1]	Comments
Falco mexicanus	Prairie falcon	BCC	WL	N/A	Low	No nesting potential on sites. No LSN within ½ mile of sites. Although no nests observed, potential nesting areas are within ½ mile radius of sites. Transient flyover and foraging potential only.
Gambelia sila	Blunt-nosed leopard lizard	E	E	N/A	Low	A 1931 CNDDB record indicated that a non-specific polygon with a 1 mile radius for the species crosses within the Site 1 property boundary by ~88 feet in the southeastern corner of the location. The CDFW evaluated the species to be presumed extant from the area. None of the preferred habitat characteristics for the species are located at the sites. No species documented in the reviewed database on the sites.
Haliaeetus leucocephalus	Bald eagle	BCC, D	E, FP	N/A	Low	This species was not listed in the database searches for the nine quadrangles but has been observed recently in flyovers in the area. The species has been Delisted from the Federal lists. No nesting potential exists on the sites. No LSN within ½ mile of sites. Although no nests observed, potential nesting areas are within ½ mile radius of sites. Transient flyover and foraging potential only.
Hesperolinon tehamense	Tehama County western flax	None	None	1B.3	N/A	No species were observed during field surveys or no suitable habitat is located on the sites. No species documented in the reviewed database on the sites.
Lanius ludovicianus	Loggerhead shrike	None	SSC	N/A	Low	No nesting potential on sites. Transient flyover and foraging potential on site only. No species documented in the reviewed database on the sites.
Lepidurus packardi	Vernal pool tadpole shrimp	E	None	N/A	N/A	No vernal pools or wetlands located on sites. No suitable habitat located on the sites. No species documented in the reviewed database on the sites.

Table A-1: Threatened, Endangered, Proposed Threatened or Proposed Species

Scientific Name	Common Name	USFWS	CDFW	CNPS	Onsite Potential. Effect of Action[1]	Comments
Linderiella occidentalis	California linderiella	None	None	N/A	N/A.	No vernal pools or wetlands located on sites. No suitable habitat located on the sites. No species documented in the reviewed database on the sites.
Malacothamnus arcuatus	Arcuate bush-mallow	None	None	1B.2	N/A	No species were observed during field surveys or no suitable habitat is located on the sites. No species documented in the reviewed database on the sites.
Malacothamnus hallii	Hall's bush-mallow	None	None	1B.2	N/A	No species were observed during field surveys or no suitable habitat is located on the sites. No species documented in the reviewed database on the sites.
Masticophis flagellum ruddocki	San Joaquin whipsnake	None	SSC	N/A	N/A	No species were observed during field surveys of suitable habitat. Limited habitat conditions on Site 1. No species documented in the reviewed database on the sites.
Myotis yumanensis	Yuma myotis	None	None	N/A	N/A	No species were observed during field surveys or no suitable habitat is located on the sites. No species documented in the reviewed database on the sites.
Navarretia gowenii	Lime Ridge navarretia	None	None	1B.1	N/A	No species were observed during field surveys or no suitable habitat is located on the sites. No species documented in the reviewed database on the sites.
Navarretia nigelliformis ssp. radians	Shining navarretia	None	None	1B.2	N/A	No species were observed during field surveys or no suitable habitat is located on the sites. No species documented in the reviewed database on the sites.
Perognathus inornatus inornatus	San Joaquin pocket mouse	None	None	N/A	N/A	No species were observed during field surveys of suitable habitat. Limited habitat conditions on sites. No species documented in the reviewed database on the sites.
Rana boylii	Foothill yellow-legged frog	T	SSC	N/A	N/A	No vernal pools or wetlands located on sites. No suitable habitat located on the sites. No species documented in the reviewed database on the sites.

Table A-1: Threatened, Endangered, Proposed Threatened or Proposed Species

Scientific Name	Common Name	USFWS	CDFW	CNPS	Onsite Potential. Effect of Action[1]	Comments
Rana draytonii	California red-legged frog	None	SSC	N/A	N/A	No vernal pools or wetlands located on sites. No suitable habitat located on the sites. No species documented in the reviewed database on the sites.
Sagittaria sanfordii	Sanford's arrowhead	None	None	1B.2	N/A	No species were observed during field surveys or no suitable habitat is located on the sites. No species documented in the reviewed database on the sites.
Spea hammondii	Western spadefoot	None	SSC	N/A	N/A	No vernal pools or wetlands located on sites. No suitable habitat located on the sites. No species documented in the reviewed database on the sites.
Streptanthus insignis ssp. lyonii	Arburua Ranch jewel-flower	None	None	1B.2	N/A	No species were observed during field surveys or no suitable habitat is located on the sites. No species documented in the reviewed database on the sites.
Taxidea taxus	American badger	None	SSC	N/A	Low	No species were observed during field surveys or no suitable habitat is located on the sites. No species ever documented using site. Infrequent transient forays possible.
Thamnophis gigas	Giant garter snake	T	T	N/A	N/A	No species were observed during field surveys or no suitable habitat is located on the sites. No species documented in the reviewed database on the sites.

Table A-1: Threatened, Endangered, Proposed Threatened or Proposed Species

Scientific Name	Common Name	USFWS	CDFW	CNPS	Onsite Potential. Effect of Action[1]	Comments
Vulpes macrotis mutica	San Joaquin kit fox	E	T	N/A	Moderate	A 1975 CNDDB record indicated that an individual was observed at Site 1 but the element has been searched for numerous times at the site but has not been officially recorded again since the 1975 sighting. Species was likely traversing the area in 1975 and does not use site for denning purposes. No active or abandoned dens were found that would meet habitat requirements at any of the project site locations. No natural denning structures were observed or were any manmade structures available at the site that would likely be utilized by the species. Non-substantiated, anecdotal information placed a purported kit fox in the Medeiros area in 2015.
Habitat Types						
Alkali Seep	Alkali Seep	None	None	N/A	N/A	Habitat does not exist on sites.
Cismontane Alkali Marsh	Cismontane Alkali Marsh	None	None	N/A	N/A	Habitat does not exist on sites.
Great Valley Cottonwood Riparian Forest	Great Valley Cottonwood Riparian Forest	None	None	N/A	N/A	Habitat does not exist on sites.
Sycamore Alluvial Woodland	Sycamore Alluvial Woodland	None	None	N/A	N/A	Habitat does not exist on sites.
Valley Sacaton Grassland	Valley Sacaton Grassland	None	None	N/A	N/A	Habitat does not exist on sites.
Valley Sink Scrub	Valley Sink Scrub	None	None	N/A	N/A	Habitat does not exist on sites.

Appendix B

Air Quality Modeling

San Luis Solar Project Emissions

San Joaquin Valley Air Basin, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Industrial	1.00	User Defined Unit	200.00	0.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.7	**Precipitation Freq (Days)**	45
Climate Zone	3			**Operational Year**	2016
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - User defined land use type selected, project-specific equipment list and schedule used. Acreage based on approximate total site acreage.
Construction Phase - Project-specific equipment list used. Emissions based on total operating hours of equipment; all hours modeled over a single day to simplify calculation.
Off-road Equipment - Project-specific equipment list used. Emissions based on total operating hours of equipment; all hours modeled over a single day to simplify calculation.
Trips and VMT - Project-specific total vehicle trip activity used for worker and vendor trips. All material hauling is assumed to occur within site, and would not result in off-site hauling truck trips.
Grading - Cubic yards of material would be moved within site, not exported off-site. Material volume included here to estimate dust from material movement on-site.
Vehicle Trips - Project-specific operational vehicle trip activity used. All trips conservatively assumed to be commercial-work (C-W) type trips.

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	310.00	1.00

tblGrading	MaterialExported	0.00	70,000.00
tblLandUse	LotAcreage	0.00	200.00
tblOffRoadEquipment	LoadFactor	0.29	0.29
tblOffRoadEquipment	LoadFactor	0.38	0.38
tblOffRoadEquipment	LoadFactor	0.38	0.38
tblOffRoadEquipment	OffRoadEquipmentType		Cement and Mortar Mixers
tblOffRoadEquipment	OffRoadEquipmentType		Cranes
tblOffRoadEquipment	OffRoadEquipmentType		Generator Sets
tblOffRoadEquipment	OffRoadEquipmentType		Off-Highway Trucks
tblOffRoadEquipment	OffRoadEquipmentType		Plate Compactors
tblOffRoadEquipment	OffRoadEquipmentType		Rollers
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	3.00
tblOffRoadEquipment	UsageHours	8.00	264.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	264.00
tblProjectCharacteristics	OperationalYear	2014	2016
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	HaulingTripNumber	8,750.00	0.00
tblTripsAndVMT	VendorTripNumber	0.00	996.00
tblTripsAndVMT	WorkerTripNumber	100.00	9,900.00
tblVehicleTrips	CW_TTP	0.00	100.00
tblVehicleTrips	WD_TR	0.00	6.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2016	0.4360	4.6152	2.6571	6.1300e-003	0.0696	0.1902	0.2599	0.0180	0.1762	0.1941	0.0000	558.6587	558.6587	0.1467	0.0000	561.7385
Total	**0.4360**	**4.6152**	**2.6571**	**6.1300e-003**	**0.0696**	**0.1902**	**0.2599**	**0.0180**	**0.1762**	**0.1941**	**0.0000**	**558.6587**	**558.6587**	**0.1467**	**0.0000**	**561.7385**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2016	0.4360	4.6152	2.6571	6.1300e-003	0.0696	0.1902	0.2599	0.0180	0.1762	0.1941	0.0000	558.6581	558.6581	0.1467	0.0000	561.7379
Total	**0.4360**	**4.6152**	**2.6571**	**6.1300e-003**	**0.0696**	**0.1902**	**0.2599**	**0.0180**	**0.1762**	**0.1941**	**0.0000**	**558.6581**	**558.6581**	**0.1467**	**0.0000**	**561.7379**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	2.8800e-003	2.4200e-003	0.0236	0.0000	0.0000	1.0000e-005	1.0000e-005	0.0000	1.0000e-005	1.0000e-005	0.0000	0.2255	0.2255	3.0000e-005	0.0000	0.2260
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**2.8800e-003**	**2.4200e-003**	**0.0236**	**0.0000**	**0.0000**	**1.0000e-005**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**1.0000e-005**	**0.0000**	**0.2255**	**0.2255**	**3.0000e-005**	**0.0000**	**0.2261**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	2.8800e-003	2.4200e-003	0.0236	0.0000	0.0000	1.0000e-005	1.0000e-005	0.0000	1.0000e-005	1.0000e-005	0.0000	0.2255	0.2255	3.0000e-005	0.0000	0.2260
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**2.8800e-003**	**2.4200e-003**	**0.0236**	**0.0000**	**0.0000**	**1.0000e-005**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**1.0000e-005**	**0.0000**	**0.2255**	**0.2255**	**3.0000e-005**	**0.0000**	**0.2261**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Grading	Grading	1/1/2016	1/1/2016	5	1	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grading	Cement and Mortar Mixers	2	352.00	9	0.56
Grading	Cranes	2	352.00	226	0.29
Grading	Excavators	2	264.00	162	0.38
Grading	Generator Sets	3	198.00	84	0.74
Grading	Graders	0	0.00	174	0.41
Grading	Off-Highway Trucks	20	264.00	400	0.38
Grading	Plate Compactors	6	264.00	8	0.43
Grading	Rollers	2	88.00	80	0.38
Grading	Rubber Tired Dozers	0	0.00	255	0.40
Grading	Scrapers	0	0.00	361	0.48
Grading	Tractors/Loaders/Backhoes	3	264.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Grading	40	9,900.00	996.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Grading - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					5.1700e-003	0.0000	5.1700e-003	7.8000e-004	0.0000	7.8000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.4075	4.5337	2.2367	5.2900e-003		0.1890	0.1890		0.1750	0.1750	0.0000	494.2654	494.2654	0.1437	0.0000	497.2825
Total	**0.4075**	**4.5337**	**2.2367**	**5.2900e-003**	**5.1700e-003**	**0.1890**	**0.1942**	**7.8000e-004**	**0.1750**	**0.1758**	**0.0000**	**494.2654**	**494.2654**	**0.1437**	**0.0000**	**497.2825**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	6.6400e-003	0.0461	0.0786	1.1000e-004	2.9300e-003	7.9000e-004	3.7200e-003	8.4000e-004	7.3000e-004	1.5700e-003	0.0000	9.7867	9.7867	9.0000e-005	0.0000	9.7885
Worker	0.0218	0.0354	0.3419	7.3000e-004	0.0615	4.6000e-004	0.0620	0.0164	4.2000e-004	0.0168	0.0000	54.6066	54.6066	2.9000e-003	0.0000	54.6675

Total	**0.0285**	**0.0815**	**0.4204**	**8.4000e-004**	**0.0645**	**1.2500e-003**	**0.0657**	**0.0172**	**1.1500e-003**	**0.0183**	**0.0000**	**64.3933**	**64.3933**	**2.9900e-003**	**0.0000**	**64.4561**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					5.1700e-003	0.0000	5.1700e-003	7.8000e-004	0.0000	7.8000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.4075	4.5337	2.2367	5.2900e-003		0.1890	0.1890		0.1750	0.1750	0.0000	494.2649	494.2649	0.1437	0.0000	497.2819
Total	**0.4075**	**4.5337**	**2.2367**	**5.2900e-003**	**5.1700e-003**	**0.1890**	**0.1942**	**7.8000e-004**	**0.1750**	**0.1758**	**0.0000**	**494.2649**	**494.2649**	**0.1437**	**0.0000**	**497.2819**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	6.6400e-003	0.0461	0.0786	1.1000e-004	2.9300e-003	7.9000e-004	3.7200e-003	8.4000e-004	7.3000e-004	1.5700e-003	0.0000	9.7867	9.7867	9.0000e-005	0.0000	9.7885
Worker	0.0218	0.0354	0.3419	7.3000e-004	0.0615	4.6000e-004	0.0620	0.0164	4.2000e-004	0.0168	0.0000	54.6066	54.6066	2.9000e-003	0.0000	54.6675
Total	**0.0285**	**0.0815**	**0.4204**	**8.4000e-004**	**0.0645**	**1.2500e-003**	**0.0657**	**0.0172**	**1.1500e-003**	**0.0183**	**0.0000**	**64.3933**	**64.3933**	**2.9900e-003**	**0.0000**	**64.4561**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	2.8800e-003	2.4200e-003	0.0236	0.0000	0.0000	1.0000e-005	1.0000e-005	0.0000	1.0000e-005	1.0000e-005	0.0000	0.2255	0.2255	3.0000e-005	0.0000	0.2260
Unmitigated	2.8800e-003	2.4200e-003	0.0236	0.0000	0.0000	1.0000e-005	1.0000e-005	0.0000	1.0000e-005	1.0000e-005	0.0000	0.2255	0.2255	3.0000e-005	0.0000	0.2260

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Industrial	6.00	0.00	0.00		
Total	6.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
User Defined Industrial	14.70	6.60	6.60	100.00	0.00	0.00	0	0	0

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.413014	0.062673	0.156172	0.176687	0.051255	0.007895	0.018867	0.100331	0.001803	0.001598	0.006448	0.000946	0.002310

5.0 Energy Detail

4.4 Fleet Mix

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e

Land Use	kBTU/yr	tons/yr										MT/yr					
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Unmitigated	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Total	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Total	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e

Land Use	Mgal	MT/yr			
User Defined Industrial	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
User Defined Industrial	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000

Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation